Changing the Paradigm of Fashion Design: Sustainable Design Strategies

By Loes Poot
Amsterdam Fashion Institute
2012 - 2013
“You cannot solve a problem with the same thinking that created it.”

- Einstein, A.
This research report was written according to the current developments of sustainability across several (global) sectors. One of these sectors is the fashion industry. Twenty years ago no one in this industry had heard about the term sustainability but in today’s world it has become one of the top list priorities for fashion businesses. Unsurprisingly, since the fashion industry has a very heavy impact on the environment due to the use of high amounts of (natural) resources and the discharge of waste(water). The raise of awareness on the impact of the fashion industry was supported by media attention since the 1990’s, in which the environmental footprints of fashion companies were criticized. One of these examples is the lately published report by Greenpeace named “Toxic threads” reporting on pollution by the fashion industry in the countries where the production takes place. In the extreme competitive environment of the fashion industry businesses have to keep up with the latest developments and therefore many fashion companies have established sustainable strategies and commitments by now. Nevertheless, some aspects are still being overlooked concerning these initiatives and therefore this research is focussed on the very beginning of the fashion value chain, the design process.

In today’s fashion industry, which addresses a mass market, products are often designed based on planned obsolescence. For these reason many cheap and low quality garments are produced and garments are disposed quickly. In this research four sustainable design strategies were analyzed with a common objective; the (re-)use of a minimum of resources like water, energy and fibres, reduction of waste material and the extension of a garment lifecycle. First, the sustainable design strategies were described and analyzed by performing secondary research existing of literature and journals. Secondly, primary research was conducted by means of interviews with professionals from the fashion industry in order to assess whether the strategies are suitable for actual implementation in a fashion company.
The four strategies which were analyzed and reviewed in this research are briefly presented in the table below.

<table>
<thead>
<tr>
<th>1. Sustainable textiles</th>
<th>The use of sustainable textiles or, at least, the use of a larger variety of different (sustainable) fabrics instead of being 100% reliable on 1 or 2 kinds of conventional fabrics (e.g. cotton or polyester).</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Co-creation</td>
<td>The consumer is involved in the design process, or a(n) (online) platform is provided to increasingly engage the consumer with the products and brand (e.g. social media), resulting in information for the design process which enables the designers to create products that progressively meet the demands from the consumer.</td>
</tr>
</tbody>
</table>
| 3. Design for longevity | This strategy exists from several practical methods which can extend the consumption process of a garment :  
  * Wear-resistant design  
  * To make repair and maintenance of clothing easy and available  
  * Design of which parts can be easily removed and replaced  
  * To enable the consumer to customize their clothing or to inspire ‘ageing with dignity’ (for jeans)  
  * Design which can be easily varied by the consumer, for example reversible clothing. |
| 4. Design for disassembly | During the design process the post consumption process is already taken into account by less mixing of different fibers (natural and synthetic) and sewing them together as less as possible. This makes the recycle process faster and easier and therefore cheaper. |

During the interviews it appeared that there are two problems which are counteracting the progression of sustainability. First of all, it turned out that many fashion companies still have little transparency on their supply chain, especially the transparency down to farmer level is lacking. Without transparency it is very difficult to source materials in a responsible way. Furthermore the speed of the fashion seasons is already causing high pressure for designers working in fashion companies as some companies produce up to 12 collection drops a year. People in the industry do not expect this to change because it responds to the demands of the consumer.
For three strategies (Sustainable textiles, Design for longevity and Design for disassembly) implementation is relatively uncomplicated. In the case of co-creation a different business model is essential and therefore this strategy requires more money and time to be implemented. Next to this, the co-creation strategy should be targeted at exactly the right target group. If not, the co-creation strategy will fail as not every target group is interested, let alone able to co-create.

Of the three remaining strategies, sustainable textiles is the most widely implemented strategy among fashion companies yet. It is introduced in small amounts as it is still slightly more expensive than conventional fabrics and available in small amounts although this is expected to change in the future. The professionals foresee a bright future for more sustainable textiles. Organizations like the Better Cotton Initiative can be very helpful for fashion companies that want to source more sustainable fabrics. With the support of several fashion companies this organization is able to ‘chase’ the supply chain in order to improve transparency.

Design for longevity almost sounds paradoxical in a fashion industry that produces for a mass market on a high speed, and where products are designed for planned obsolescence. Nevertheless, a higher quality product will provide a longer-lasting utilization and therefore will get more sentimental value and emotional product attachment by the consumer and perhaps even reutilization. A product which is useful and meaningful to a consumer on the long term, will not be easily replaced. Eventually less but higher quality products could be produced resulting in less use of energy, water and fibres and a longer lifecycle of products.

The last strategy, Design for disassembly, is focused on the possibilities of recycling products. This strategy is mainly seen as an opportunity for the future as this strategy requires the company to use less blended fabrics and these fabrics are often used because of their benefits. Nevertheless this strategy provides an opportunity for a closed loop chain by recycling fabrics, and this could result in a decrease of waste and disposal of clothing.

Sustainable design strategies are of most value when a fashion company is planning to engage sustainability in its policies on the long term. In this case the company will support its designers to choose for a sustainable design strategy, providing them with time, education and perhaps extra budget. If the sustainable design strategies are actively supported by fashion companies they could result in a more sustainable fashion industry in the future.

As a result of the research recommendations on sustainable design strategies are put together in a final product, targeted at fashion designers and fashion companies. The final product exists from a handbook for sustainable fashion design, and this handbook could serve as a helpful tool for the implementation of (one of the) strategies.
The choice for the subject of my thesis lies in the field of Corporate Social Responsibility (CSR), with a focus on the design process. In the last half year of 2011, I was an intern at a large apparel company in Amsterdam at the production and buying department. While working there, I learned about the development and production process on a professional level. However, during my internship I started to mention that this company was trying to become more sustainable in their daily practices, for example by giving workshops to their employees, and separating the trash at the head office. However, after a while I started to realize that there were many aspects within that company which could improve their overall sustainability level. For example, most of the products this company is producing are made from cotton, a material that has a very heavy impact on the environment during growth and production. That is how I got interested in this subject and started looking into alternative ways of designing garments that have less impact on the environment.

I hope this report will be an addition to the raise of awareness and efficiency in the fashion industry. It aims at designers and fashion companies and its goal is to make them realize what impact the fashion industry has on the environment, not only when the garments are being produced but also what impact the consumption of these products generates. It would make a significant difference for the future if designers would create products which can be produced and consumed in a more efficient and environmental friendly way.
Acknowledgements

First of all I would like to thank my coaches Jacqueline Ritchie, Joop Smit, and Marco Mossinkoff for their helpful advice during my research process. Next to this I would like to express my very great appreciation to the interviewees for their enthusiasm to participate in the interviews which have been of great value for my research. Besides, I would like to thank them for their honesty and sincerity during these interviews.

Furthermore I would like thank to my family and friends who have always been a great support, also during this research process. A special thanks goes out to my parents, who have always supported and encouraged me throughout my studies and thanks to them I have been able to get where I am today.

I hereby declare that the text presented in this Bachelor thesis is original and that no other sources have been used than the ones mentioned.
# Table of Contents

Executive Summary ..................................................................................................................3
Preface.....................................................................................................................................7
Acknowledgements ..................................................................................................................8

1 Introduction ............................................................................................................................12
   1.1 Problem Definition ........................................................................................................13
   1.2 Research question and subsidiary questions ...............................................................14
   1.3 Methodology ................................................................................................................15
   1.4 Relevance for industry .................................................................................................16
   1.5 Research structure ......................................................................................................17

2 Sustainability ..........................................................................................................................20
   2.1 What is Sustainability? .................................................................................................21
   2.2 Sustainability in today’s fashion industry .................................................................24
   2.3 Green washing ...........................................................................................................25
   2.4 Why should fashion companies engage CSR in their company? .............................27

3 From Fibre to Consumption ..................................................................................................30
   3.1 The design process .....................................................................................................31
   3.2 The production process .............................................................................................33
   3.3 Consumption .............................................................................................................36
4 Sustainable Design Strategies ..................................................................................................................38

4.1 Sustainable fibres and textiles ..................................................................................................................43

4.1.1 Improving conventional fibres ...........................................................................................................46

4.1.2 New alternatives ....................................................................................................................................47

4.2 Co-creation ................................................................................................................................................50

4.3 Design for longevity ...................................................................................................................................54

4.4 Design for disassembly ...............................................................................................................................58

5 Perspectives from the professional field .......................................................................................................60

6 Conclusion ....................................................................................................................................................66

6.1 Are design strategies the solution to a more sustainable way of producing and consuming garments? ........................................................................................................67

6.2 Limitations and future work .......................................................................................................................68

7 Recommendations .........................................................................................................................................70

8 Bibliography ....................................................................................................................................................72
“Design is directed toward human beings. To design is to solve human problems by identifying them and executing the best solution.”

- Ivan Chermayeff
1 Introduction
1.1 Problem Definition

The textile and garment manufacturing industry is one of the most high-impact sectors on the environment in the world.\(^1\) This sector is known for having a large impact on the environment, because it is a major user of water and energy. Over the past years, fashion retailers have increasingly become aware of sustainability and even applied new sustainable approaches within their businesses, partly due to the pressure of consumers and legislations. A major opportunity for increasing sustainability, which has been unnoticed for years, is the design process.\(^2\) As the Design process is at the very beginning of a product lifecycle this is a crucial stage. As Line H. Nielsen stated: “The designer creates products and thereby consumption. This is why the role of the designer in relation to sustainable design is so important to investigate.”\(^3\) However, the question is what possible sustainable design strategies have been developed, and how to implement them in the design and production process. Next to this, a change in these processes will affect the impact of the consumption process of apparel products in a positive way. In this thesis new opportunities and implementations will be researched, in order to increase the sustainability of the production and consumption process of garments.

---

\(^1\) Rossum, 2012.
\(^2\) Kotler and Rath, 2011.
\(^3\) Nielsen, 2010.
1.2 Research question and subsidiary questions

As stated in the problem definition, this research will be focussed on the opportunities of new design strategies in order to increase the sustainability of the production and consumption process. In order to carry out the research in a structured and organized way, a main research question and subsidiary questions were formulated. The main research question is as follows:

Which sustainable design strategies can be implemented by fashion companies in order to reduce the water, energy and material use of the production and consumption of garments?

During this research, sustainable design strategies will be analyzed and reviewed by conducting interviews with professionals who are working in the fashion industry. Finally, the sustainable design strategies will be translated into a practical recommendation report for designers and fashion companies, so that it will be easy to adopt in their daily procedures and decision making. According to these recommendations, designers will be able to change their design strategies and to add to a more environmental friendly fashion product with a longer life-cycle. When applied on a large scale the fashion industry has the potential to become a more environmental friendly industry. According to the research question the research objective can be formulated as follows:

To examine sustainable design strategies for the fashion industry which can reduce the impact of garment production and consumption.

The sustainable design strategies can provide a solution for the problem of the high impact of the production and consumption of clothing on the environment, and the quick disposal of garments by consumers. The objective of this research is to provide a solution that could change this process and that will reduce the level of this impact.

In order to answer the main question, several subsidiary questions are formulated for the structure of the research:

1. What is sustainability and how is this reflected on in the fashion industry today?
2. How does the lifecycle of a garment look like?
3. What does the term sustainable design strategies imply?
4. Which sustainable design strategies can be applied in fashion design?
5. How do professionals in the fashion industry reflect on these strategies?

When conducting research for these sub questions first, a solid research framework is provided to eventually formulate an answer to the main research question. At the same time, the sub questions provide a structure for the research which will be explained in chapter 1.5.

1.3 Methodology

In order to meet the research objectives and to answer the research questions, a research framework needs to be constructed. To start with the research philosophy, this research can be classified as an interpretive study. The interpretive philosophy is providing the framework for the methodology used in this study. This philosophy is most appropriate for this study because the strategies analyzed by secondary data will be reviewed by conducting interviews with persons who are ‘social actors’. These interviews will provide a rich insight into the complex world of the fashion industry, and could possibly give an insight in aspects which might be overlooked in the research. Besides, during the research it will be taken into account that every company is unique.

Furthermore, this study will be inductive as this research will not be based upon a hypothesis, but a theory will be created from the collection of data and not the other way around. Easterby-smith et al. advocates that ‘researchers in this tradition are more likely to work with qualitative data[..]’. An important aspect of this research will be de semi-structured interview which are going to be carried out, which will provide the qualitative data for this study.

In order to successfully gather information for my research I will use a broad variety of research methods. I will make use of both primary and secondary research, because I will conduct desk research (secondary data) and semi-structured interviews (primary data). The desk research will mainly exist from research by (online) literature, journals and articles. In order to gather primary data, semi-structured interviews with professionals from the fashion industry

---

4 Cooper and Schindler, 2008.
5 Saunders et al. 2007.
6 Saunders et al. 2007.
7 Easterby-Smith et al. 2002, as cited in Saunders et al. 2007, p. 119.
will be conducted to gather their opinions on my research findings. Semi-structured interviews are non-standardized interviews in which the list of themes and questions to be covered may vary from interview to interview, the order of questions may also be varied depending on the flow of the conversation.\(^8\)

Altogether this research design provides a good framework to perform my research and to eventually draw my conclusions from, and to formulate my recommendations for fashion designers and fashion companies.

### 1.4 Relevance for industry

The main subjects of this research are sustainability and design strategies. Sustainability is a very contemporary topic within the fashion industry, so this research could be relevant to anyone working in the fashion industry at the moment or in the future. Many companies are showing more engagement with sustainability and are therefore creating Corporate Social Responsibility departments. A wider interest for sustainability is emerging and this study responds to this interest by examining sustainable design strategies.

This research will look into new sustainable approaches on design, thus it will be most relevant to designers in the fashion industry. At the moment many companies are busy creating a Corporate Social Responsibility department, so this research could be interesting and useful for fashion companies and their CSR departments as well.

This research will be most relevant for designers who are working in fashion companies. Nevertheless, it could of interest for anyone working in the fashion business. Furthermore it could be helpful to students who aspire to become a designer in the fashion industry in the future.

\(^8\) Saunders et al. 2007.
1.5 Research structure

The research structure is mainly based upon the subsidiary questions which were defined in chapter 1.2, and will be explained in depth below.

To start with, the term *sustainability* will be analyzed and its increasing importance in the fashion industry will be clarified. In this chapter more critical views on sustainability will also be presented in order to give the reader a realistic view on sustainability, and not to give them only a positive viewpoint. Additionally, arguments will be given to underline the benefits of sustainability for (fashion) companies.

In the next chapter an overview of the *lifecycle* of a garment in the fashion industry will be provided. In order to make the reader understand the impact a sustainable design strategy can have on the complete lifecycle of a garment and eventually the impact on the environment, an overview of this process is necessary. The lifecycle process exists from garment design, production and consumption, and these aspects will be analyzed in chapter 3.

Following, the *sustainable design strategies* will be introduced by an explanation on this definition. After this general introduction the four sustainable design strategies will be presented and analyzed. The strategies will be explained in a comprehensible way and the potential benefits and limitations will be included as well. To critically review the strategies and to decide which are the most realistic and beneficial to implement in a fashion company, interviews will be conducted with professionals from the fashion industry. The results will be presented in chapter 5.

Finally, in chapter 6 a conclusion will be drawn from the primary and secondary research. The main research question will be answered and the most realistic and beneficial strategies will be chosen. These strategies will be converted into recommendations for fashion designers and this will result in an end product. The end product will be a recommendation report addressed to fashion designers to inspire and inform them on how to change their decision making in order to contribute to more environmental friendly products.
“... more than ever we need to address the problems of how to create a more sustainable future. Design is key to this process, because its inherent nature is to create visions for the future.”

- Vibeke Riisberg (Teaching sustainable design to textile and fashion students at Kolding School of Design)
2 Sustainability
2.1 What is Sustainability?

During the past years ‘sustainability’ has almost become an overused term in the fashion industry as well as in other sectors. There are many books, articles and conferences continuing the discussion on the meaning of this term. In fact this term is covering many aspects and understandings, often relying on its context. To most people the key principle of sustainability is to preserve the earth and its resources for the next generations, but for every business or organization sustainability requires a different approach. The term ‘sustainability’ was described by Fronteer Strategy as ‘a moving target, determined by an organization and its ambition, market, environment and its stakeholders.’

Nevertheless, the question is where this sudden interest and engagement of sustainability comes from. It has been suggested by critics that sustainability is today’s new ideology. The need for an ideology is inherited in the human nature, humans need an ideal to live for. As suggested by Balakrishnan et al. 

sustainability is ‘merely a function of market forces, which will generate the solutions for all problems including the environmental dilemmas that loom over the globe today.’ This suggests we want to believe that sustainability will solve all our problems arising (ecological crisis) from our consumption. This suggestion is being supported by the philosopher Zizek who claims that ‘sustainability is the new ideology for addressing a problem’. This could be a logical approach to the sudden popularity of this term, according to the everlasting need for ideologies by humans what is also called ‘Ideology mechanism’, caused by the temptation of meaning.

One could argue that sustainability is a new ideology, however, by others it is referred to as a very serious subject saying “Few conversations hold greater portent for the future.” Ehrenfeld cites the following definition of sustainability: “the possibility that human and other life will flourish on the planet forever”, suggesting that sustainability is as old as the emergence of human cultures and that it provided a cultural basis for the emergence of magic and

---

10 Balakrishnan et al. 2003, p. 300.
11 Zizek 2010.
religion which serve “to illuminate sustainability and to seek it as part of one’s living experience.”\textsuperscript{13} With his book ‘Sustainability by Design’ he wants to point a way to a sustainable future by providing new strategies on design in different sectors.

Even in the conducted interviews philosophical thoughts on sustainability were shared. One of the interviewees sees sustainability “something we look for since our quality of life is already very good.”\textsuperscript{14} Hereby referring to sustainability as a new kind of ideology, just like another interviewee who suggested that probably the most sustainable humans are the poor because they do not consume what they do not really need. Overconsumption is the cause of the exploitation of resources and a one hundred percent sustainable products do not exist because this means there would be no product at all.\textsuperscript{15}

This research aims at a more sustainable future by design in the fashion industry. However, only several aspects can be addressed in this research since sustainability is a very broad definition. The sustainable design strategies analysed in this research were selected on influencing the following elements:

- Waste minimization;
- Cleaner manufacturing;
- Cleaner materials;
- Less materials;
- Less energy;
- Renewable resources;

\textsuperscript{13} Ehrenfeld, J., 2008.
\textsuperscript{14} Appendix D
\textsuperscript{15} Appendix H
With these aspects in mind a definition was created for the term sustainability. When regarding to sustainability in this research it is defined as:

The (re-)use of a minimum of resources like water, energy and fibres, the reduction of waste material and the extension of a garment lifecycle.

---

2.2 Sustainability in today’s fashion industry

The term sustainability has raised many questions over the past decades, and it still does. Especially in the fashion industry it is a very broad-used term and therefore a complex subject. The cause of this term being so complex is that ‘producing fashion clothes, and the textiles they are made from, is one of the longest and most complicated industrial chains in the manufacturing industry’. Throughout this supply chain an incredible amount of resources are being used, such as water, fibres, energy and manpower. So in fact one could say that ‘sustainable fashion’ is an oxymoron, the one term contradicting the other. Black described this problem earlier as “fashion’s inbuilt obsolescence is intrinsically unsustainable, but the desire for fashionable renewal is an inherent cultural construct; fashion is also a powerful economic driver, sustaining global industry and employment.” Nevertheless, the subject ‘sustainability’ has become more mainstream within the fashion industry. Slowly the impacts of this chain are being recognized by fashion companies and their consumers. One of the reasons for the increasing awareness of sustainability among consumers, is that ‘this subject has been progressively incorporated in governmental policy and corporate strategies.’ However, when doing research on a definition of the term sustainability in the fashion industry, it turns out to be an undefined expression. According to the interviews Friedman carried out in the end of 2009 at the sustainable fashion conference, also the fashion professionals do not really know how to define sustainable fashion. Nevertheless, there is a widespread interest in what is called ‘sustainable fashion’ as it has increasingly become an important subject within the industry. Even the international market research company Mintel predicts that “As consumers demand more from the companies they do business with, they will want [...] more scrutiny on ethical claims than ever before”. In order to meet these consumers demands in the future, fashion companies will need to invent new and, above all, creative ways to fulfil these needs. As interviewee A suggested “If companies do not change then the future of the company is in jeopardy.” The question has shifted from why we need sustainable fashion towards how can we create sustainable fashion. Accordingly, this research focusses at new ways of implementing sustainability at the start of the lifecycle of a garment, the design phase.

---

17 Fletcher, 2010.
18 Black, 2008.
19 De Brito [et al.], 2008, p. 534
20 Friedman, 2010.
21 Friedman, 2010.
22 Appendix H
2.3 Green washing

Along with the increasing interest for sustainability and the rising amount of companies implementing this in their policies, the phenomenon of ‘green washing’ arose. Because of the competitive advantage that comes along with a successfully implemented sustainable strategy, many companies try to get their share in the rapidly expanding success of sustainability. Today’s total green market is estimated to be worth around $230 billion and is expected to grow to $845 billion by 2015. In addition, green advertising has increased almost tenfold in the past 20 years.

Green washing is the practice of ‘misleading consumers about their environmental performance or the environmental benefits of a product or service.’ Green washing is committed by companies on a large scale, including fashion companies. Two factors are involved in green washing; environmental performance and communication about this aspect. The balance between these two aspects is present is shown in figure 1. The so-called ‘green washing’ firms are communicating positively about their environmental performance while they are not performing well in reality. The silent brown firms rather stay silent on their environmental behaviour as they are conscious of the fact that their performance is poor. On the other hand there are the Vocal Green Firms and the Silent Green Firms which are performing well environmentally and of which some choose to communicate is externally while others choose to stay silent.

Due to this problem of poor transparency of the fashion industry, consumers have become sceptic about CSR in the fashion industry. Consumer research showed that ‘52% of Canadian, US and UK consumers

---

23 Tolliver-Nigro 2009, as cited in Delmas et al. 2011, p. 64-87.
24 Delmas et al. 2011, p. 64-87.
25 Delmas et al. 2011, p. 64-87.

Figure 1, Delmas et al., ‘A Typology of Firms based on Environmental Performance and Communication’.
believe that businesses’ alignments with social or charitable causes is half hearted.’”

Ravasio suggests that this problem is not only to be solved by legal compliance as this is very complex due to the globalized supply chain. However, the call for more transparency in the fashion industry is substantiated by the fact that consumers are willing to support apparel companies that offer sustainable and ethical products when more transparency makes the companies prove that they are acting as sustainable and ethical as they say they are.

In relation to design, greenwashing is keeping designers from having an influence on sustainability. “Design has slowly developed some methodologies and tools for designing products and services with less impact on the environment […]. But the influence of design is still limited here as long as many companies still do ‘greenwashing’ instead of developing clear visions and design strategies to have less impact on the environment.”

In this research a critical viewpoint towards greenwashing by fashion company will be kept in mind, although sometimes this is extremely hard to prove due to poor transparency. This research provides fashion companies with practical solutions to actually make a difference by designing sustainable products instead of spending the budget on ‘green’ marketing.

---

26 Ravasio 2012.  
27 Ravasio 2012.  
29 Joziasse, 2011.
2.4 Why should fashion companies engage CSR in their company?

The objective of sustainability is a ‘cleaner’ environment, and it makes people more conscious about how they are harming the environment. Companies are now getting more familiar with Corporate Sustainable Responsibility as well, sometimes already implementing this in their strategies. However, the question is why a company would want to engage CSR in their strategy. As Keinert stated, there are several benefits (non wishful-thinking but empirically analyzed) when CSR gets implemented in a company’s policies 30:

1. Competitive Advantage;
   Positive influence on stakeholders attitudes and public opinion on the company.

2. Added value to products and services;
   CSR has the potential to add value to products and services, despite critical opinions, it has been proved that consumers are willing to buy more from a environmentally responsible company.31 This makes it likely that a phenomenon like ‘ethical consumerism’ has emerged. Besides, research has proved that consumers are willing to pay a higher price for environmentally responsible fabricated products (depending on price class): for $10 items consumers are willing to pay 28% extra and for $100 items this percentage is 15%.32

3. Organisational commitment;
   CSR has the potential to increase the attractiveness for employees, resulting in the choice of the most motivated an highly skilled employees which is a key resource for advancing an organization.33 Besides, CSR increases the loyalty amongst consumers due to increasing identification with the company.34

---

4. Financial benefits;
   Although investing in CSR is investing in an intangible asset, it has been proved that there is a significant positive relationship between CSR and Financial Performance. CSR is said to have positive impact on a company’s return on sales, return on assets and return on equity, relative to the industry averages.\textsuperscript{35}

5. Equal opportunity compliance and diversity;
   CSR policies can be used to offer career opportunities to high potentials coming from disadvantaged social groups. While at the same time companies could benefit their talents, unique background and experience.

6. Opportunities for partnerships and alliances.
   CSR engagement builds trust and confidence in a company, by the values and principles that come along with CSR. Values like honesty and fairness play a crucial role in this potential benefit.

In order to get more companies to engage sustainability in their strategies, these reasons provide benefits on the long term. As an increasing amount of companies are engaging CSR, other companies will feel the necessity to do this as well in order to keep up with competition. As shown above, CSR can be significantly beneficial for a company internally as well as externally.

\textsuperscript{35} Seifert et al. (2003), p 199 ff, as cited in Keinert, C. 2008, p. 100.
3 From Fibre to Consumption
To gain a better understanding of all the processes within a fashion company, an overview will be given in this chapter. Since design, production and consumption are all part of the lifecycle of a garment, this chapter will cover all three processes. After this part of the research and overview it will be less complicated to define the processes and to find aspects which could be improved on efficiency and therefore become more sustainable. Moreover, by getting a deeper understanding of this lifecycle it becomes more clear how a change in the designers decision-making could affect the rest of the cycle.

3.1 The design process
The design process within fashion company can also be understood as ‘Collection Development’. Designers working for a fashion company are not always completely free to design anything they want, they are bound to many rules and regulations and often working under high (commercial) pressure. These restraints are for example a certain amount of product groups and styles, trends in fabrics or styles and of course there are financial boundaries as well, all set by the planning department. Next to this, ‘the designers’ ability to check up on their suppliers is limited by the very tight time schedules of seasonal fashion production, which are pivotal for commercial success.’

These factors are restraining the possibilities for designers to create more sustainable products. The influence of the designer on this process is also determined by the certain role the designer has in a fashion company, as this differs per company. These roles have been described in a theory by Bakker. He suggested that there are two roles a designer can have in a fashion company: an operational role or a strategic role. In the operational role the designer works with an idea that he or she translates in an

---


Figure 2, Eberle et al., Stages in the Development of a Collection.
product, taking in account the constraints of the ‘company rules’. A designer in an operational role has little influence on the environmental influence as the designer has modest control over the fundamental product idea. The second role is the strategic role. In this role the designer is involved in the product planning stage, having a say in strategic decisions on the product like: function, physical properties and environmental profile. The processes before the actual design stage are visible in figure 2: many researches and analysis are conducted after which a product planning will be made. According to these plans a designer starts the design process. Bakker added that most designers’ roles in fashion companies are more likely to be operational. From this viewpoint we can already conclude that designers often do not have the ultimate position to be able to influence the environmental profile of a product. Moreover, the willingness to create more sustainable products is also highly dependent on the interests of the designer. After product planning, sketches are made by the designers and together with fabric samples they are discussed. After the first approval the samples are ready to be made, either at the company itself but often by outsourced production. When the company receives the sample (a sample will be received for almost every style of the new season, except for styles which are repeated), these samples are fitted and judged on quality. Based on these fitting and quality check sessions, samples are approved on and bulk production can be started. The ones which have not been approved, will be changed before going into production or will be cancelled. After the bulk has been produced it will be shipped to the stores.

According to the conducted interviews with professionals who are working in the fashion industry, it appeared that for many designers and other professionals in the fashion industry transparency is lacking. As the production is often being outsourced it is hard to control or to influence what is happening at the place of production unless one is travelling there. Furthermore all the interviewees agree that the speed of the collections in fashion is very high, often bringing up the example of Zara a fashion company designs and produces styles within 6-8 weeks. It is predominantly the demand of the consumer that makes a fashion company increase the amount of the collections a year and makes the fashion company deliver new styles to the store all year round.

3.2 The production process

The history of clothing mass production
The introduction of the sewing machine in 1829 was the beginning of mass production of clothing. But in fact, only in 1859 mass-production started to become a serious part of clothing production when the foot-treadle machine was invented by Isaac Singer. It was in the industrial revolution in Europe when it was discovered that it was very time-efficient to have workers only sewing just one or two parts of a garment; this still is the main way of production in today’s mass market production. During World War II, the largest factories in Europe were mainly producing products to be used in the war. After the war, most of these factories had gained a strong competitive position, being able to mass produce clothing.  

Current mass production
A huge change took place when comparing the start of mass production (above) to today’s mass production. A large part of the processes is automated such as pattern-making, pattern-cutting, grading and tracking. The use of computer programmes make all of these processes a lot faster, see figure 3 for an overview of these programmes in all facets of a fashion company. As a result, the fashion retailers became increasingly able to quickly respond to the market’s demands, and simultaneously JIT (Just In Time) manufacturing was introduced. In addition, EPOS (Electronic Points Of Sale) were initiated. This technology uses the universal product code (UPC) in order to indentify the style, size and colour of a product and this enables the company to track sales and move goods around quickly and efficient. Most of the production by mass market production companies is being outsourced to Asian countries because of the low wages, as the production of clothing is a labour

---

39 Jones 2005, p.56.
40 Jones 2005, p.56.
intensive industry. Most of the production takes place in China but recent wage increases of around 20% a year is causing fashion companies to move their production elsewhere. They are starting move production to Asian countries where the wages are still extremely low such as: Cambodia, Indonesia, Bangladesh and Vietnam. It was predicted that the production of clothing will move again in the future for these reasons.

Most of the large fashion companies are ‘Wholesalers’, as they create the designs, buy the materials and plan all operations themselves, but they do not produce the actual clothing. On the other hand there are ‘vertical’ fashion companies (like American Apparel) that have control over all processes, from design to production and advertising, as everything is arranged by the headquarters. In case of fashion wholesalers, the production is operated by CMT (cut make trim) subcontractors, which provide flexibility but less transparency on quality and prices. The dominant criteria to select these subcontractors are price, quality, supplier capacity and reliability. Recently, an increasing amount of wholesalers is taking an additional few factors into mind concerning their CSR programmes, in order to establish more collaborative relationships with their suppliers. Moreover, Styles stated

---

41 Jones 2005, p.56.
42 Whadcock, 2012.
43 Jones 2005, p. 60.
that “There is huge potential for retailers to use their market position and influence over suppliers and consumers to drive environmental improvement [...] (nevertheless) the complexity of some product supply chains can limit retailers’ direct influence over key processes determining environmental performance.” Figure 4 shows the complexity involved in the value chain of cotton textile and garments and clarifies the challenge for retailers to effectively increase the sustainability of all these different layers of suppliers and subcontractors. Furthermore the figure shows how the different stages within this value chain harm the environment (see index below the figure).

The production of textiles and garments is very dependent on water and it impacts the global water profile by discharging waste water containing pesticides and dyes. Ravasio states that about 14.4% of an apparel retailer’s total water footprint is related to manufacturing. In the future water resources will be under increasing pressure due to the growth of the population and more extreme climate conditions will occur. The sustainable design strategies (chapter 4) could provide solutions for lowering the water use during garment manufacturing.

46 Ravasio, 2012.
47 Ravasio, 2012.
3.3 Consumption

In order to get the fashion industry to create more sustainable designs a better understanding of consumption of garments is necessary. Consumption is inevitably connected to the behaviour of human beings. As Chapman once stated sarcastically: ‘Ask a developed world human to stop consuming and you might as well ask a vampire not to suck blood’. Due to the demand for garments the production is still increasing: in the UK the purchase of clothes per capita increased with 37% between 2001 and 2005. At the same time the environmental impact of fashion has increased, and the price of garments has been driven down by globalization and cheap labour. As a result consumerism has turned today’s world into a throw-away society, and lack of quality of products is taken for granted. The lifespan of the products of mass market fashion chains is mostly short, however a large part of consumers clothing budget is being spent on cheap and low quality clothing. Moreover, research even shows that ‘consumers are liable to replace functional products in response to fashion and new technology, are price sensitive (even at the expense of quality) and have lowered their expectations of product life-spans’.

---

49 Allwood et al. 2006, p. 12.
51 Evans and Cooper, 2010.
52 Evans and Cooper, 2010.
On the other hand, the longevity of clothing products is highly influenced by the way consumers treat and use these products.\textsuperscript{53} The influences of the consumer on the life-span of clothing is a critical factor for exploring sustainable design strategies. Evans and Cooper created an overview of consumers influences on their product life-spans (see fig. 5). As clearly presented, they divided the consumption process into three phases: the acquisition phase, the user phase and the disposal phase. Each phase has its own factors in which the consumer can influence the consumption process. Two factors within the user phase which are of critical influence when it comes to garment consumption are usage, maintenance, product evaluation and product obsolescence. It has been proved that laundering has the most impact on the environment instead of production of the fibres and textiles. Lifecycle assessments by Franklin Associates have shown that the consumption process of garments requires much more water and energy than the production process.\textsuperscript{54} Furthermore another lifecycle assessment report ‘Well dressed?’ showed that washing and tumble drying a t-shirt 25 times takes 65\% of the total energy consumption compared to 7\% of the total energy use for transport.\textsuperscript{55} The fact that the consumer phase of a garment has the most impact on the environment is highly interesting for our research in design strategies.

\textsuperscript{53} Van Nes, 2010.
\textsuperscript{54} Fletcher, 2010, p. 77-79
\textsuperscript{55} Black and Eckert 2005, p. 57.
4 Sustainable Design Strategies
'In many ways, the environmental crisis is a design crisis. It is a consequence of how things are made (Van der Ryn and Cowan, 1996, p.9). The direct link between products, production (their implied consumption) and ecological damage emphasizes the role played by design activities in determining the environmental profile of goods and services.'\textsuperscript{56} This was cited by Fletcher, and expresses the need for more sustainable design strategies. In this chapter several sustainable design strategies will be analyzed by giving possible implementations of sustainable design strategies for fashion companies and their designers. As described in chapter 3, the designer has a crucial role in decision making on the environmental impact of a product, as this will highly influence the processes of production and consumption. By analyzing the design strategies a suggestion is given for the problem that ‘Designers are finally becoming recognized as important catalysts for economic growth [...] but not enough are able to think deeply about ethics or know much about eco-design methods.’\textsuperscript{57}

Separately, the words Design and Strategies have many meanings and definitions. Defining the term ‘Design strategies’ for this research, we will look at the meaning of the words and their function within (fashion) companies. Oslon et al. stated the following definition in their article on design strategies: “The effective allocation and coordination of design resources and activities to accomplish a firm’s objectives of creating it’s appropriate public and internal identities, its product offerings, and its environment.”\textsuperscript{58} As this research will focus on ‘sustainable’ design strategies, the main objective in this case is the environment.

This research is conducted to analyze sustainable design strategies in the clothing industry that eventually will provide a more sustainable production and consumption of garments. To eventually achieve this goal, the design process of garments needs to be reviewed. Designers are keen on their traditional ways of designing and decision making. To be able to create more sustainable designs, they will need to move away from this traditional paradigm by being creative and innovative. Designers will only be capable of doing this by using new tools, skills and understanding of consumer behaviour.\textsuperscript{59} Besides, this willingness to work with sustainable design strategies is restricted by practical issues like costs and availability under the time constraints designers are

\textsuperscript{56} Fletcher, K. 1998, p.72.
\textsuperscript{57} Wood, J. 2005 Goldsmiths College, as cited by Black, S. 2008, p. 53.
\textsuperscript{58} Olson, E. et al., 1998.
\textsuperscript{59} Nielsen 2010, p. 69.
In the past the design aesthetics rarely have been based on sustainability, but times are changing and the demand for higher sustainable standards in fashion is growing. In this way designers can become ‘key in influencing the agenda for greater sustainability and creating consumer demand.’

In the following chapters several implementations of sustainable design strategies will be discussed. To create a clear distinction between these different design strategies, Marchand fused two theories of Fletcher and Cooper and as a result she classified the design strategies into three categories:

1. Product focus: making existing products more resource efficient;
2. Result focus: producing the same outcome in different (and more sustainable) ways;
3. Needs focus: questioning the need fulfilled by the object, service and system, and how it is achieved.

This research will be primarily product and result focused. The strategies can be implemented to make products more resource efficient (sustainable textiles) or produce the same outcome in more sustainable ways. Need focussed strategies can also influence the environmental impact of products but these are less relevant to this research.

The sustainable design strategies analyzed in this chapter are concerned with the following environmental issues:

- Waste minimization;
- Cleaner manufacturing;
- Cleaner materials;
- Less materials;
- Less energy;
- Renewable resources;
- Renewable energy;

---

61 Marchand et al., 2008.
According to these environmental issues the sustainable design strategies were selected and analyzed from a garment designing and producing perspective. An overview of costs for every strategy is difficult to estimate as implementing one of these strategies cannot be executed overnight and no trials have been conducted yet. Therefore it is impossible to translate the design strategies into numbers and the output and possible profits have not been verified yet.

---

“Design is a potent strategic tool that companies can use to gain a sustainable competitive advantage. Yet most companies neglect design as a strategy tool. What they don’t realize is that good design can enhance products, environment, communications, and corporate identity.”

- Kotler and Rath
4.1 Sustainable fibres and textiles

According to a widely known product design theory, the material choice is responsible for 80% of a product's environmental impact. This theory underlines how important the choice of textiles can be and what a major change more environmentally friendly textiles could make. Today, fashion companies are highly dependent on a few conventional fibres for instance cotton or polyester; these fibres together account for over 80 per cent of the global market in textiles. The production chains of these textiles are long, complicated and have a high impact on the environment, because converting fibres into textiles and garments uses a lot of energy, water, labour and other resources. There is an increasing interest in sustainable fibres and fabric, as Fletcher advocated: ‘There are statistics that indicate consumer willingness to choose more responsibly [produced] fibres, and growth in the ethical clothing market is increasing very rapidly.’ However, there is also confusion on what textiles are sustainable or not. The distinction between natural and synthetic fibres raises questions on what sort of textiles actually are sustainable. In this chapter a distinction will be made and the best alternatives for environmental friendly choices of textiles will be provided.

The distinction between natural and chemical textiles starts at the fibres: natural fibres are made from plant or animal sources, chemical fibres (including cellulosic and synthetic fibres) are (man)made from different sources like plants, animal or synthetic polymers. Chemical fibres are divided into two categories: cellulosic fibres are natural fibres which are chemically treated (e.g. viscose, acetate and cupro) and synthetic fibres are made from synthetic polymers. As visible in figure 7 the demand for natural fibres stayed the same from 1990 until 2004. In

---

63 Black and Eckert 2012, p. 57.
64 Simpson, 2006.
65 Fletcher 2008 as Cited in Burke, 2008.
the same period, the demand for man-made fibres nearly doubled. This increase was mainly driven by the demand for polyester. The production processes of these fibres are very different, that is why they will be shortly explained below.

Synthetic fabrics are not environmental friendly because the production of these fibres, is heavily relying on non-renewable sources like oil and gas. For the future different alternatives will need to be sourced because sources like oil and gas are not endless, and as scarcity of these sources will increase and demand will stay the same or will increase as well, the price of these sources will raise significantly. Furthermore, the production of synthetic fibres is energy intensive, synthetic fibres are not biodegradable, and they are not easy to recycle. A positive aspect of the production of synthetic fibres is that it is using little amounts of water (compared to natural fibres).

Natural fibres, on the other hand, need large amounts of water when getting produced. Besides, the waste water (containing chemicals from fertilizers and pesticides) is often discharged in rivers and canals and this advantageous for the growth of algae, and an excess of algae will eventually kill off fish because of a shortage of oxygen. Cotton is the highest demanded natural fibre. It is alarming to know that the land dedicated to the growth of cotton has not changed significantly over the past 80 years but the output has tripled. This shows the extreme use of fertilizers and pesticides used to grow cotton crops. The use of these chemicals is causing problems like reduced soil fertility; loss of biodiversity; water pollution;

---

66 Allwood et al. 2006.
67 Burke, 2008.
69 Myers, D. 1999, as cited in Fletcher 2008.
pesticide problems (resistance) and health problems. Interestingly, these pesticides and fertilizers account for 50% of the total price of the cotton production.\footnote{Fletcher, K. 2008, p. 9.}

The question on what kind of material is most environmental friendly remains. In fact, it is really hard to compare since all these fibres go through different processes during production which are harming to the environment in different ways. Usually synthetic fibres are seen as ‘bad’ for the environment whereas natural fibres are suggested to be ‘good’ based on aspects like raw material renewability, biodegradability, chemicals and pollution.\footnote{Fletcher, K. 2008, p. 9.} In fact the production of natural fibres uses a lot of water and the crop growth is chemically intensive as explained above. In fact, the production of both kinds of fibres is harming to the environment, ‘the relative importance relies on the constantly evolving scientific research and social and ethical concerns.’\footnote{Fletcher, K. 2008, p. 7.} In figure 8 a clear overview is given of how natural and chemical fibres are harming the environment. The table is categorized in different aspects of the production of textiles; growing / fibre manufacturing, production of fabrics and after treatment /finish. It is obvious that both kind of fibres are harming to the environment on different aspects. One major distinction between the two kind of fibres is that natural fibres need a lot of water and

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{chart.png}
\caption{Figure 8, Breds et al., ‘Environmental impact of fibres’.
\footnote{The category of bast fibres includes ramie, jute and hemp, for example.} \footnote{Including amongst others acetate, triacetate, cupro, lyocell and modal.}}
\end{figure}
pesticides when grown, whereas chemical fibres do not need this at all. Furthermore natural fibres need a lot of bleaching and dyes during production which are harming to the environment whereas polyester does not need this as much.

The reduction of the impact of textile production can be achieved in two ways. One way is to reduce the impact of the production process of conventional fibres, the other way is to source alternative, low impact textiles. The first method can be accomplished by changing agriculture systems, the second method is slightly more difficult to achieve as this requires technological inventions.\textsuperscript{73} Below several opportunities will be described.

\subsection*{4.1.1 Improving conventional fibres}

\textbf{Organic cotton}

Choosing organic cotton over conventional brings several benefits covering different aspects including: the use of less chemicals, reduced water usage, no use of genetically modified cotton crops and the use of low-impact dyes. Although one might expect organic cotton to be cheaper than conventional cotton as pesticides and fertilizers account for 50\% of the cost price, unfortunately this is not the case. When growing organic cotton the problem of weeds and insects is something what needs to be dealt with, and doing this in an organic way costs even more than the use of fertilizers and pesticides; this is why conventional production methods use these chemicals. The harvesting of organic cotton is more labour intensive than conventional cotton. At the moment the cost price of organic cotton is still 10-45\% higher than conventional cotton.\textsuperscript{74} However, according to chapter two, consumer are willing to pay up to 28\% more for sustainable products. In fact this price difference could partly be covered by this alacrity of the consumer, in case the sustainability aspect is communicated well and transparency increases. According to a report by the organic trade association it shows that the production of organic cotton grew by 20\% over 2007-2008, this is showing a bright perspective for the future.\textsuperscript{75} Nevertheless organic cotton needs more land to be grown and for farmers who want to switch to organic cotton production it takes up to three years to become officially recognized for organic production.\textsuperscript{76}

\textsuperscript{73} Fletcher, K. 2008, p. 18.
\textsuperscript{74} Everman, V. 2009.
\textsuperscript{75} Organic Trade Association, 2009.
\textsuperscript{76} Fletcher 2008, p. 21.
Recycled textiles

The recycling industry has not innovated for a long period, the same technology for recycling is still being used; machines are tearing apart the yarns while it breaks the fibres and due to the shortened length the yarn is of lower quality at the end of the process.\(^77\) Besides, the recycling process is often a slow and costly process. Despite the fact that few innovations took place, recycling offers a low-impact alternative to other fibres. The most common available recycled fabric is polyester, made from plastic bottles by chemical recycling. Although chemical recycling requires more energy than the extraction of fibres, it does provide a more predictable quality.\(^78\)

4.1.2 New alternatives

Bamboo

Bamboo fabric is made of cellulosic fibres and is hypoallergenic, fast-drying and absorbent which makes it a comfortable fabric to wear. Another positive factor is that the bamboo plant grows very quickly, and it can help to improve soil quality. In spite of this, to be certified as an organic textile bamboo should be harvested without the use of pesticides or fertilizers. The production process of the most commonly produced sort of bamboo textile is very similar to that of viscose / rayon, in which a chemical solution is used during this process in order to spin the fibre. Recently several clothing companies claimed they were selling ‘eco-friendly’ bamboo while actually this was Rayon made from Bamboo, this is an example of greenwashing.\(^79\) A more sustainable way of processing bamboo is the mechanical way (not chemical) which makes the fibre look and feel more like linen so this is a natural way without using chemicals.\(^80\) However, this process is labour intensive and therefore costly. When it comes to the growth of Bamboo, only China is growing bamboo on a commercial scale and due to the difficulties with transparency on production in China there is often little evidence that the fabric has been produced in a sustainable way. Besides, there is not an official certification yet for bamboo fabric.\(^81\) A new certification would definitely make a difference, as the companies then have more clarity on what kind of bamboo they are buying.

\(^{77}\) Fletcher 2008.
\(^{78}\) Fletcher 2008, p. 35.
\(^{79}\) Nordic Initiative Clean and Ethical 2009.
\(^{80}\) Fletcher 2008. P. 32.
\(^{81}\) Carter, 2008.
Hemp

Hemp is one of mankind’s earliest fibres and it was one of the most important fibres in the EU, until it was replaced by cotton.\textsuperscript{82} Just like the bamboo plant the Hemp plant is a fast growing plant, it grows in almost all conditions and it needs little or no fertilizers and pesticides. Besides, it requires little pesticides to grow it and unlike many crops, it enriches the soil it grows in rather than depleting it.\textsuperscript{83} In line with Bamboo, Hemp can only be certified organic when processed as a bast fibre, this means it has processed in the natural way not with chemicals. Today most of the hemp available is grown in China, Romania, Russia and Poland subsidized by the EU.\textsuperscript{84}

Lyocell / Tencel

This fibre is associated with two names because Tencel is the branded name of the lyocell fibre. It is made from the pulp of eucalyptus trees (grown at FSC farms), which makes it biodegradable and renewable material.\textsuperscript{85} During the processing a non-toxic solvent is used which can be recycled and this makes the processing already a lot more sustainable then other fibers.\textsuperscript{86} Another benefit of Lyocell is that it does not need to be bleached as it is already very ‘clean’, and it can be laundered at low temperatures. However, the production of Lyocell is energy intensive an aspect which is one of the challenges for Lenzing, the producer of Lyocell.

\textsuperscript{82} Black 2008, p. 126. 
\textsuperscript{83} Black 2008, p. 128. 
\textsuperscript{84} Black 2008, p. 128. 
\textsuperscript{85} Fletcher 2008, p. 32. 
\textsuperscript{86} Organic exchange.
**Nike design tool**

A design tool was developed by Nike to help increase the sustainability of their products. The tool evaluates waste, energy, toxics and water required for textile and garment manufacturing and therefore it can provide insight on the impact of a garment. For designers this can be extremely helpful to create more sustainable garments as they do not always have an overview of how a garment or textile can impact the environment, or there is a lack of transparency throughout the supply chain.

By entering the fabric choices in the online tool (see figure 9) the environmental impact of the garment can be calculated on beforehand. As a result the tool will show a garment treatment score, a waste score and materials score. The tool is easy-to-use and therefore it is targeted at designers who are often already have to deal with a high workload.

**Figure 9, Nike, ’Nike Environmental Design Tool’.**
4.2 Co-creation

The past decade was the decade of the internet revolution, which introduced a new world of possibilities. As a result fashion companies managed to reach their customers in different ways; web shops, mobile applications, social media, emails etc. In order to create more sustainable products, fashion companies should strive to gain a better understanding of their customers’ needs and with the help of these tools it has become easier to get an insight in these needs. Understanding the consumers should become a critical tool within the design process. Through the development internet the costly and time consuming process of getting to know the customers and its needs (research & development) has now turned into quick and inexpensive process. Some companies even made their customers a part of their design process, allowing them to involve in design choices. This new phenomenon has been cited by as ‘The consumer-as-creator revolution’ , or ‘the new era of collaborative design’. Co-creation in relation to sustainability, tough, is not an entirely new phenomenon. In 1972, Cross made a statement in Design Participation:

“Professional designers in every field have failed in their assumed responsibility to predict and to design-out the adverse effects of their projects. These harmful side effects can no longer be tolerated and regarded as inevitable if we are to survive the future . . . There is certainly a need for new approaches to design if we are to arrest the escalating problems of the man-made world and citizen participation in decision making could possibly provide a necessary reorientation. Hence this conference theme of ‘user participation in design.’

---

It seems that co-creation was then already associated with creating more sustainable designs. The involvement of consumers was from then on seen as an opportunity to benefit their creativity and therefore create sustainable solutions and products which should increasingly meet the needs and wants of the consumer. Today co-creation is still seen as an opportunity for sustainable design, according to Parker (CEO of Nike): “Open innovation is the best way to stimulate sustainable innovation”.  

Co-creation enables the consumer to co-create unique experiences with a company. Whereas in the traditional model a company used to create value for the consumer (the consumer used to have a passive role), with co-creation the consumer is joint creating the value together with the company.  

Companies do not just listen to what their consumers want, they are now able provide an (online) design tool in which the consumer can adjust its design preferences. For an overview of this new process see figure 9. To get the consumer to engage in the design process, it is extremely important that this online ‘toolkit’ is easy to use. Co-creation in the fashion industry is often associated with involvement of the consumer in the designer of a garment. However the co-creation can also be applied in companies providing services. For example, KLM started to provide a service called ‘social seating’ that enables their customers to check into a seat next to other customers with the same interests, based on Linkedin or facebook. This shows that social media provides unlimited opportunities in relation to co-creation.  

Among fashion companies, Nike is in the forefront of co-creation. The Nike+ experience kit (created together with apple) has enabled consumers to transmit distance and speed information from their Nike running shoe to their Ipod or Iphone. Through the Nike+ website consumers can track their progress, challenge their friends and set personal goals. Through this interaction with their consumers, Nike is able to use all this knowledge to engage better with their running community, providing their consumers more valuable experiences. In this way Nike’s value system is now open and co-creative, taking advantage of the talents and skills of millions of people willing to contribute their knowledge. This example shows that co-creation is not only a matter of involving consumers in design, but it is also about ‘using engagement platforms to systematically involve customers, employees and stakeholders […].’

---

91 Fronteer strategy 2012.  
92 Thomke and von Hippel, 2002.  
94 Tsukayama, 2012.  
95 Ramaswamy 2009, pp. 11-17.  
96 Ramaswamy 2009, pp. 11-17.
innovative implementation of co-creation by Nike has paid off in an increased marketshare; Nike+ was launched in 2006, a year later their market share had grown from 47% to 57% and over 600,000 users started to use the website in more than 170 countries.\footnote{Leavy 2012, pp. 25-35.}

Another concrete example of consumers involving in designs is the popular webshop Threadless. This is an example of increasing interest in co-creation through an online platform. Designers can submit their t-shirt designs after which these can be voted for, and the winning design gets produced and the designer wins a $2000 prize. In return, consumers can get rewarded for sharing links and photos of Threadless (tees) and earn credit. The benefits of this co-creation system turned out to be:

- An actively participating community that designs, critiques and perfects the product;
- Social media and link sharing instead of costly marketing;
- Good inventory management: community forecasts demand before the Tees are produced;
- Low overheads; no professional models, designers or photographers;
- Always offering trendy products.\footnote{Schuurman, 2009.}

To summarize, the overall benefits of co-creation for a more environmental friendly fashion industry are:

1. As manufacturing is mainly based on a build-to-order process, inventory management becomes more efficient. Considering that the textile industry, along with many other industries, is overproducing and 40% of the finished products are eventually destroyed, the co-creation model could provide a waste reducing potential. Besides, less inventory and less production and transport of garments which are not being sold could offer great economic benefits for fashion companies.

2. Customized products increase the fulfilment of the needs and wants of the consumer. ‘Research has shown that customers perceive higher value in items that have been customized to fit their specific demands than in standardized products.’\footnote{Leavy 2012, pp. 25-35.} Consumers will take greater care of their customized products and consumers will potentially create a stronger emotional attachment to the product, resulting in extended lifecycles of the products.
3. A fashion company can get more insights in the behaviour of the consumer when the consumer gets more involved in the design process. ‘A stronger relationship between this two can advance the recycling and reuse of resources.’

Although co-creation could provide great opportunities for a more efficient supply chain, there are also some barriers in changes that need to be made in a company to make co-creation a success. For example:

- Designers have to adapt a new way of thinking;
- The factories and transport need to be organized differently;
- Consumers need to change their purchasing habits.

Although these barriers need structural changes by fashion companies, co-creation is a good sustainable alternative for the increasing interest of consumers in ‘personalized fashion products, countering the tendency for fast and throwaway fashion through increased satisfaction, meeting consumer needs more accurately and perhaps disrupting established wasteful systems.’

---

102 Black and Eckert 2010, pp. 52-65.
4.3 Design for longevity

The market strategies of fashion companies are often developed by the marketing department. This department creates value by presenting the brand as selling quality products and therefore making profits. Through this marketing tool the fashion company reaches its customers and provides them with a brand experience.\(^{103}\) At the same time, this focus on marketing and market strategies could abstract from the focus on product design, development and manufacturing and therefore the quality of a product. The product price and quality of the products of these fashion companies are often calculated beforehand in order to meet with the target group and market strategy. In order to become a more sustainable company, the design process should become more involved with this strategy planning. When designers are able to expand the potential quality of products, the product will get more sentimental value and therefore provide a longer-lasting utilization and emotional product attachment by the consumer and even reutilization.\(^{104}\) A product which is useful and meaningful to a consumer on the long term, will not be easily replaced. A fashion chain striving for more sustainable products should allow more time and budget for research, discussion and debate, and this will enhance the possibilities for designers to make a difference in creating more sustainable products.

In this chapter some practical opportunities for sustainable fashion design will be discussed, according to a theory from van Nes. She worked from the viewpoint of understanding replacement behaviour. The replacement behaviour of consumers depends on several product characteristics. According to this research she developed a model ‘Design strategies for longevity’.\(^{105}\) This research was based on several types of products not only clothing, however, the model can be applied to garments as well. The details of this design strategy below are slightly adjusted according to similar models of Van Hemel and Charter and Tischner to make it more comprehensible from a fashion industry perspective. The model exists of five categories and sub-categories, of which each could be explained in view of fashion design:

---

103 Nielsen 2010, p. 69.
104 Nielsen 2010, p. 69.
1. Design for wear-resistant design

Reliable and wear-resistant design stands for a level of quality the consumer should be able to rely on, this involves preventing wear and tear. Sustainable garments should have an increased ‘Long life guarantee’ instead of the low quality garments which are disposed of quickly. Consumers can use their products for a longer period instead of discarding them too soon and buying new (low quality) garments. This will save fibres, energy and water used during production.

2. Design for (easy) repair and maintenance

According to an old saying: ‘A stitch in a time saves nine’. This relates to the fact that repair prolongs the life of a garment and this saves nine times the energy what is needed for the replacement of new materials. Due to the fact that clothing has become cheaper consumers are discarding their garments easier as repair costs are relatively high. Besides, consumers rather buy a new item which is ‘on trend’ and satisfying their regular shopping habits.\footnote{Allwood et al. 2006, p. 43.} However repair and maintenance could expand the lifecycle of a garment, as many garments are disposed of even before repair. Often, garments are sold provided with a spare button, but to increase the repair of clothing, more inventions are necessary. For example garments could be designed to facilitate repair with easy-to-remove parts (e.g. collars and cuffs on men’s shirts) which makes it easy to replace these parts.\footnote{Allwood et al. 2006, p. 41.} In order to facilitate this repair spare parts should be offered by fashion companies through, for example, their website. These parts could be buttons, zippers, other haberdasheries, spare parts of garments etc. This also gives an opportunity for consumers to customize their clothing (Design for upgradeability).

3. Design for upgradability

Design for upgradability are products designed with the consumption of a product in mind. It ‘enables the opportunity to add new functionality (and fashion appeal) during the life of a product by replacing parts or modules[...]’\footnote{Van Nes 2010, pp. 107-131.} Therefore parts should be easily replaceable, so that the consumer can decide to give the garment a new look and/or functionality and therefore expand its lifecycle. This design strategy is slightly different than the second strategy because its more focused on the need for change of the consumer rather than necessarily replacing parts due to wear and tear.
4. Design for product attachment

This design strategy can be related to that of co-creation, as it is related to personification of a product at the acquisition process. Besides, Design for product attachment enables the consumer to ‘customise’ during the consumption process, for example, adding personal elements to the product, or ageing with dignity. The last method has a large potential in the fashion industry, especially concerning the consumption of jeans. The production of jeans with a worn look requires treatment which are non-environmental friendly (e.g. bleaching, stone wash, sandblasting, scraping etc.) and already decreases the quality of the fabric. Unwashed jeans are stronger and has a longer durability, but requires a much longer period for the wearer to create this worn look. However when wearing unwashed jeans, the jeans will get authentic and personal characteristics and therefore more emotional value for the consumer and a longer lifecycle.

5. Design for variability

A design for variability can be easily changed by the consumer, f.e. a jacket or pants which can be worn inside out. The consumer can convert the look of garment into a different one without having to do a lot of effort. According to a research by Koo ‘transformable garments have the potential to lead consumers’ natural engagement with sustainable acts by satisfying their various needs and wants [...] even though consumers may lack knowledge or indicate little concern about sustainability’. Transformable garments are being worn for a longer period of time and more frequently due to serving multiple needs of the consumer. Koo’s research gives an insight in designing transferable garments.

Design for longevity is a strategy that requires dynamic, flexible products. Therefore the designer will need to think ahead of what is going to happen with the product during its lifespan. As a result variability, product attachment and future repair or upgrading can be implied.\textsuperscript{111}

\textsuperscript{109} LG, 2012.
\textsuperscript{110} Koo 2012, p. 6.
\textsuperscript{111} Van Nes 2010, pp. 107-131.
“If you succeed in creating great, sentimental value in a product, you will automatically get the consumer to keep the product for a longer time. Therefore, when working with sustainable design, you have to investigate and focus on the emotional bond that the consumer develops with the product.”

- Line Hangaard Nielsen
4.4 Design for disassembly

A large part of garments exist from blended textiles, for example a blend of natural and synthetic fibres. This method was named ‘monstrous hybrid’ by McDonough and Braungart since it is almost impossible to use either one of the fibres for re-use or recycling. To improve this system they suggested the concept of ‘design for disassembly, a strategy for aiding material recovery, reuse, recycling of composting’. 112 When designing for disassembly, the designer should ensure that at the end of a product’s life the used materials can be reclaimed for reuse. Therefore products should be designed with the simplest forms possible. 113 This is the crucial element of this strategy, as product materials only have a significant recycled value only when it is divided into clean, separate elements. Mixed materials are impossible to separate in an ecological as well as an economical way. 114

Over the years, interest for design for disassembly has been growing, however most research and implementation yet took place in the automotive industry. 115 During the research of Gam et al. it was found that garments (in this research mainly men’s jackets) which are conventionally produced were difficult to disassemble due to the use of several types of textile. For successful design for disassembly three critical factors should be taken in consideration; selection and use of materials, product architecture and the selection and use of joints, fasteners and connectors. 116

---

112 McDonough and Braungart, 2002.
115 Gam et al. 2010, p. 84.
116 Gam et al. 2010, p. 84.
Gam et al. developed different suggestions to minimize the time and effort required for disassembling garments and maximizes the material recovery:

1. Aim to minimize material diversity, and aim to sew similar materials together during the production of a garment, this will decrease the disassembly steps and time.
2. When sewing different types of textile together (natural and synthetic), a larger stitch type should be used, for example a normal straight stitch with six stitches per inch.
3. In case of the use of fusible interlining (e.g. production of jackets), blind hemming stitches under the collar and on the backside of the lapel.\textsuperscript{117}

These measures applied during production of a casual men’s jacket, eventually made the disassembly of the men’s jacket 1,5 minute faster. This could have the same effect when applied in the production of different kinds of garments. When the disassembly process becomes faster, and at the same time less costly, it will be more appealing for fashion companies to recycle textiles in the future.

A brand that already involved Design for Disassembly in its business model is Timberland, they applied it on one of their footwear lines. This footwear line is the so called Earthkeepers line, and the styles are created from recycled material. Next to this, the shoes have a greater potential to be recycled after the consumption process. Because of the design for disassembly, Timberland states that 50% of the shoe can be recycled compared to other styles.\textsuperscript{118}

\textsuperscript{117} Gam et al. 2010, p. 86.
\textsuperscript{118} Timberland, 2012.
5 Perspectives from the professional field
To start with, all interviewees working in the fashion industry agree on the fact that a change is taking place in the fashion industry, “the days of usual production and sales of clothing are over.” When companies will not respond to this change, “the future of a fashion company is in jeopardy.” Sustainability is increasingly becoming important in the policies of fashion companies. When asking the interviewees on the transparency in the supply chain of the fashion industry, a problem which is inevitably connected to sustainability, they agree that it is very difficult (especially for the large companies) to get full transparency of their supply chain all the way to the ‘farmer level’.

Another issue in the design and production of clothing is that the speed of seasons and collection drops increased tremendously. The demand of consumers for new styles and trends is forcing fashion companies to produce many collections a year, and sometimes this results in cheap and therefore low-quality garments. Almost all of the interviewees directly refer to the example of Zara, a (vertically integrated) fashion company that is able to design and produce clothing and 6-8 weeks. The pressure of producing many and cheap collections involves all kinds of fashion companies from small to large sized companies. The interviewees do not expect this demand to change very soon as the “consumer is impatient” and the consumers need to change their buying and consumption behaviour into a more holistic approach.

Sustainability could provide a solution to overconsumption, and some interviewees were referring to the idea that sustainability is ‘the new ideology’. “Now that people have a very good quality of life, and therefore they start looking around at what their consumption is actually doing to the earth, for example how are clothes are actually being produced.” Another interviewee says that “A hundred percent sustainable company cannot be achieved as this means that there should be no products at all”. To not produce any products at all is not an option as this would mean the end of many fashion companies. Nevertheless, designing garments that have less impact on the environment is a possibility and it could offer many benefits for a company as well. Therefore design strategies were analyzed in this research and through conducting interviews these were critically reviewed.

119 Appendix G
120 Appendix H
121 Appendix G
122 Appendix D
According to the interviews the first strategy, the use of a wider variety of textiles or new and more sustainable textiles, is already being implemented in small amounts within many fashion companies. Some companies started to work with organic cotton or recycled polyester already. However, it has not been applied yet on a large scale yet as the availability is still little and therefore it is expensive as well. Still almost all the interviewees foresee a positive future for this strategy as they expect that the prices of sustainable textiles will decrease in the future, and it is a strategy that can be implemented on the short term. Currently “the look and feel of the fabric is more important than if it is organic or not” to many fashion companies, but when the offer of organic and sustainable textiles increases a wider variety and larger amounts of fabrics will be available as well. Very helpful for companies which want to source more sustainable fabrics are organizations like the Better Cotton Initiative in which many brands are engaging. With the support of brands, this organization has the possibility of ‘chasing’ the supply chain and to improve the current operations.\(^{123}\)

The opinions of the interviewees on the second strategy, co-creation, differ. Co-creation has “the great potential to increase the emotional bond of the consumers with the product and brand.”\(^{124}\) Next to this is expected that “it could boost sales and it is a great marketing tool.” On the other hand, co-creation requires a good online platform which could be expensive and most of all, to make it successful it has to be targeted at the right group of consumers. The target group that could be interested in co-creation is a younger group of people, the

\(^{123}\) Appendix H
\(^{124}\) Appendix G
Sustainable Design Strategies

interviewees agree. This target group is interested in design in comparison to the 30+ target group which is less interested in this aspect. Some interviewees refer to the successes of Nike by implementing co-creation, saying that they target the exact right group of consumers for co-creation.

Design for longevity relates to a more holistic view on the use of clothing. It has the potential of extending the life of clothing to make it more durable and compared to the current speed of the fashion industry it almost makes it a paradox. Two of the interviewees relate to the electronic industry, which marks the change into a consumerist and throwaway society. Years ago people bought televisions or other electronics and they would have them repaired when broken. Instead, today consumers directly buy a new television because it is relatively ‘cheaper’ than to have it repaired. It is now actually the same with clothing and no repair service is offered anymore in any store. One of the interviewees suggests that the key to this strategy is to provide designers with information on the consumption of garments. If designers have more knowledge on the consumption of garments, they will be able to anticipate on this in their designs. What was also suggested is the use of fabrics that get a different look and feel during the consumption of the garments for example by wearing or washing it. Therefore a garment only becomes nice to longer a consumer uses it and therefore it has the potential to extend the lifecycle.

The implementation of the last strategy, design for disassembly, depends on the kind of fashion company. It might work for more basic styles or basic fashion companies, but most fashion companies use blended fabrics for the benefits of these fabrics. The strategy might be implemented in the future but at the moment companies are more focussed on the use of for example organic cotton as recycled fabrics are expensive and only available in small amounts.

These strategies have are predominantly applicable on large companies as they provide garments on a large scale of which the production has a big impact on the environment. From the interviews it appeared that small companies often have different values than large companies and therefore the strategies are less suitable for small fashion companies.
What all interviewees agree on is that the education of fashion designers is essential in order to produce more sustainable products. Whether the designers are being educated on sustainability depends on the values of the kind of company. “Some companies which are highly involving sustainability in their business are really pushing their designers to be innovative.”129
Understanding nature,
How we relate to it,
And understanding our bodies better
is key in making progress in terms of sustainability.
- Hussein Chalayan
6 Conclusion
6.1 Are design strategies the solution to a more sustainable way of producing and consuming garments?

After conducting extended research on sustainable design strategies, it can be concluded that the fashion industry involves many constraints for designers. The fashion industry is a very time-constraint industry that has to deal with several seasons and collections per year, and this often results in a high pressure for people working in this industry, including designers. However, the everlasting competition in the fashion industry is crucial in times of economic downturn and this is forcing companies to distinct itself. Due to this fact, companies are starting to recognize the potential of sustainability as a competitive advantage and therefore implement it in their policies. Yet unfortunately some companies ‘greenwash’ their identity by positive communication on their poor environmental behaviour. Nevertheless, there are many reasons why companies should engage sustainability in their policies and many professionals in the industry believe, according to the conducted interviews, that a change is taking place in the fashion industry and that companies cannot ignore this.

Recently fashion companies are trying to become more sustainable by organizing sustainable initiatives, but often these are focussed on the production (e.g. Levi’s water less) or on the consumption of garments (Marks & Spencer) and are not yet initiated at the start of a product lifecycle. The design process is often overlooked when creating sustainable initiatives and that is why this research was focussed on this aspect. During this research four sustainable design strategies were analyzed and reviewed and as a result a handbook for sustainable design was created. When these strategies are implemented by designers it could result in more sustainable products, requiring less water, energy and material use during production and which have a longer lasting lifecycle. The question is in how far designers are willing and are able to implement these strategies. Designers are often working under high pressure and it would be a major challenge to implement sustainable strategies unless they are being supported by the company they work for, as it will require extra time and money. Besides, it depends on the interest of every individual designer whether they are willing to add to a more sustainable fashion industry or not. Nevertheless, still a lot can be improved in

An efficient implementation of sustainable design strategies requires a fashion company that has a positive attitude towards sustainability and that is wanting to engage sustainability into their daily procedures. Designers cannot implement sustainable design strategies without the support of the company they are working for. The fashion company will need to assist by educating their staff (including designers) and perhaps provide extra money and time for implementation. When these requirements are met, sustainable design strategies could be serving as helpful guidelines for achieving the goal of becoming a more sustainable fashion company.
6.2 Limitations and future work

During this research there were several aspects which limited the research on sustainable design strategies. First, the interviews with professionals in the fashion industry were very valuable for my research, however, the input of designers would have been a great addition to the completeness of the research. Interviews with designers were very difficult to arrange as they have very little time available and sometimes it can be difficult to get in touch with them. Nevertheless, from the interviews that were conducted I was able to draw more information than I expected on beforehand so this was not a major problem for the outcome of my research.

Another limitation for this research was that the strategies could not be properly examined within a fashion company. The outcome of the implementation of these strategies can therefore only be estimated. The reason for this limitation is that the research was time bound, and that fashion companies might want to implement these strategies on the long term as it is not possible to implement overnight. Despite these limitations the research that was completed could be an inspiration and guideline for designers and fashion companies to increase their awareness of the environment in the future.

During this research many other potential subjects for future research were discovered. A major point of improvement in the lifecycle of a garment is the consumption process of a garment. During the research on sustainable design strategies in fashion, it became evident that the consumption of garments requires most energy and water of all processes in this lifecycle. During the research I came across several interesting opportunities and strategies which could possibly change this process into a more efficient way of consuming garments.
One of these examples is the washing machine manufacturer Electrolux. This company did a trial by introducing a pay-per-wash system. They charged consumers for individual washes by using 'smart meters' by supplying them with washing machines at no costs. This system makes the washing machine manufacturer develop machines of high quality to extend the durability, and it makes them use recyclable materials and components to control costs. Besides, the system has potential to change consumer behaviour, as consumers will first think about the necessity of washing their clothes and they will be encouraged to do a ‘full wash’ instead of always washing a half empty washing machine.\footnote{Black 2012, p. 61}

Next to this, providing consumers with more and clear information on garment care could help to have them wash more efficient and therefore lower the use of water and energy. Nevertheless, these examples require separate research as they are a different stage of the lifecycle than design but they do provide grounds for future research.
7 Recommendations
In line with this report and the conclusions of the research, a final product was created. The product finalizing this report is a recommendation report for fashion designers and fashion companies. The extended research where this product is based upon, consisted of literature research on sustainable design strategies (in fashion) and these strategies where critically reviewed by conducting interviews with professionals working in the fashion industry. The outcome of this research resulted in recommendations, and these will be comprehensively described in the recommendation report. To complete this research report a short overview will be given below. In this research a total of four strategies were analyzed and reviewed:

1. The use of sustainable textiles or the use of a larger variety of different (sustainable) fabrics;
2. Co-creation;
3. Design for longevity;
4. Design for disassembly;

The strategies were critically reviewed with the help of professionals and finally three of these strategies will be converted to recommendations for fashion designers:

1. The use of sustainable textiles or the use of a larger variety of different (sustainable) fabrics;
2. Design for longevity;
3. Design for disassembly;

The choice for these three strategies is based on the fact that these aspects can be highly influenced by designers. The second strategy will not be included in the recommendations because this strategy requires a complete different business model and can not only achieved by the influence of designers. Nevertheless, co-creation is seen as a great potential, unless targeted at the right group of consumers. To be implemented it requires a good and easy-to-use online platform and therefore an investment will be necessary.

Recommendations on the remaining three strategies can be found in the recommendation report.
8 Bibliography


Black and Eckert, ‘Considerate Design: Empowering fashion designers to think about sustainability’ *Sustainable Fashion – Issues to be addressed*, Kolding (Laboratory for Design, Innovation and Sustainability at Kolding School of Design) 2010, pp. 52-65.


Blackburn, Sustainable textiles: Lifecycle and environmental impact, New Delhi (Woodhead Publishing Limited).


Easterby-Smith et al., Management research, Los Angeles (SAGE) 2008.


Ehrenfeld, Sustainability by design: a subversive strategy for transforming our consumer culture, New Haven (Yale University Press) 2008.


Fletcher, K., ‘Fashion and Sustainability’, Sustainable Fashion – Issues to be addressed, Kolding (Laboratory for Design, Innovation and Sustainability at Kolding School of Design) 2010, pp. 34-41.

Fletcher, Sustainable fashion and textiles: design journeys, London (Earthscan) 2008.


Joziasse, F., ‘Design leadership: Current Limits and Future Opportunities’ (2011), in Cooper et al. (eds.)


Leavy, B. ‘Collaborative innovation as the new imperative – design thinking, value co-creation and the power of “pull”’, Strategy and leadership 40 (2012) 2, pp. 25-35.


Ravasio, ‘Made to measure: ethical fashion’ *Guardian*, 16 April 2012.

Ravasio, ‘How can we stop water from becoming a fashion victim?’ *Guardian*, 7 March 2012.


