



TEXTILHÖGSKOLAN
HÖGSKOLAN I BORÅS

The world's best Supply Chain

- From a sustainable point of view

Authors:

Sara Fahlén

Alicia Mason

Matilda Nyström

Linda Petersson

Iiulia Tsaupka

Abstract

This paper is devoted to creation of the world's best supply chain within the textile apparel industry from a sustainable point of view. The company "Uniforms for the dedicated" is chosen for discussion. The purpose of the paper is to develop the world's best supply chain from a circular economy perspective by taking both efficiency and sustainability in mind to align with the business strategy of UFTD and current market changes. The results of the paper is a combination of seminars and relevant literature which describe the changes that should be made in order to improve the existent supply chain to fit into the company's goal of becoming the world's most sustainable company. Improvements are suggested on each stage of the product lifecycle, starting from the design process to the end-life and disposal. In the discussion part suggested changes are talked over in three different angles: how realistic the changes are, what time frame is needed and what changes have to be done for implementation of the main aim. In conclusion, the supply chain of the company is turned into a circular one where products are designed to re-enter the circle after usage.

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1. Introduction

The introduction aims to give the reader a background for the paper and a presentation of the company studied by the authors. The definition of a supply chain and concepts applied is stated followed by the purpose of this paper.

This paper is devoted to create the world's best supply chain within the textile apparel industry from a sustainable point of view. The background for this research is the future difficulties for companies working in the textile industry to embrace sustainable practices. This derives from two fundamental ideas: The industrial system is designed on a linear model going one-way and the economic system is based on growth instead of sustainability (McDonough & Braungart 2002).

According to Larsson (2013) by the year of 2030 the need for fibers will increase two times due to the rapid growth of population, which will lead to a lack of resources. Moreover, recent studies by Claudio (2007) state that the textile industry has a negative impact on the environment due to large amounts of water- and energy usage, pollution, use of toxic chemicals and significant amounts of waste. With this problems emerging, companies in the textile industry have to adapt to the changes in the environment as well as in the market and find possible ways of handling them. This paper will focus on the principles of a circular economy, which is one approach to sustainability.

The company studied for this paper is Uniforms for the Dedicated (UFTD). UFTD was founded in 2007 by a group of people who consider the fashion industry to be unhealthy and in a need of change. UFTD believe that they are able to change the world around them by living up to the main values of the company, which are reflected in their philosophy statement. According to the founding partner Michael Lind (2013) their goal is to operate the world's best supply chain. The basis for this report is the present supply chain of UFTD, which is illustrated below:



Table 1. Present supply chain of UFTD

By the definition of supply chain the authors agree with the summary by Cooper, Ellram, Gardner and Hanks (1997): “*vision of supply chain embraces all business processes cutting across all organizations within the supply chain, from initial point of supply to the ultimate point of consumption*”. The current supply chain of UFTD is linear consisting of eight phases from design to disposal. However, when considering sustainability it is not the most optimal structure. The authors consider the following statement from World Commission on the Environment and Development when defining sustainability: “*[...] development that meets the needs of the present without compromising the ability of future generations to meet their own needs.*” This has been taking into account in the new supply chain.

The circular economy principle is defined by Ellen MacArthur Foundation (EMAF) (2013a) as follows: “*The circular economy refers to an industrial economy that is*

restorative by intention; aims to rely on renewable energy; minimizes, tracks, and hopefully eliminates the use of toxic chemicals; and eradicates waste through careful design.” This is based on the study of nonlinear living systems. The circular economy distinguishes between two nutrients: biological and technical. The biological nutrients are designed to re-enter the biosphere in contrast to the technical (See appendix 1). This paper will focus on the distinction between *consumption* and the *use* of materials. Consuming a product or service implies degradation while using a product that is later put back into the system does not imply degradation. The goal is to increase the amount of users in order for the products and services to return to the manufacturer after the consumer is done using it. When this happens, the cycle is closed. (EMAF 2013)

1.1. Purpose

The purpose of this paper is to develop the world’s best supply chain from a circular economy perspective by taking both efficiency and sustainability into mind to align with the business strategy of UFTD and current market changes.

2. Methodology

The methodology is based on two main areas composing of theoretical- and practical applications. The theoretical part of the result is based on seminars held during the course in Textile Application in Logistics and Product Development. Secondary data has been gathered in forms of literature to support the context.

The first seminars on logistics and supply chains started the 13th of November, which included a presentation about how textile and fashion companies have to adapt within the boundaries of the planet. Sustainable Apparel Coalition (SAC) was introduced followed by a workshop about the Higg Index. During the second seminar on the 14th of November, the Supply Chain Game was played and discussed in groups. Each supply chain included a customer, retailer, distributor, manufacturer and a supplier. During the first and second round, costs where accumulated in order to see if the changes resulted in lower costs and thereby a more efficient supply chain.

The seminar on the 15th of November was held by Michael Lind from UFTD who presented the company and their current supply chain. The purpose of the workshop was to identify wastes and non-value added activities and create a new supply chain with sustainability and efficiency in mind. A final presentation of the worlds best supply chain was presented on the 27th of November, which forms the basis and the outline for this paper.

The product development seminars were held between the 16th and 18th of December. The introduction for the seminars was the article *The circular model - an overview* and analyze of the Interactive System Diagram by EMAF to understand the purpose of circular economy. The first seminar was held by Åsa Strandberg from Saiboo. The instructions for the assignment were to develop new design methods and find future solutions to the endless mountains of textile waste.

The assignment for the second seminar was to examine three different garments; a blouse, a pair of trousers and a jacket to find the number of different materials in each garment. Questions about possible recycling- and disposal methods today were answered after examining the garments. This was later presented in the class followed by a discussion. On the 18th of December, presentations on new product development processes were held with reference to the two previous seminars.

The knowledge and experiences from the seminars as well as theory will be combined in this paper in order to form a cohesive structure of the supply chain. Our primary goal is to use peer reviewed research articles published in research journals related to the subject. Literature concerning supply and demand chain management that is published on trustworthy websites will be critically reviewed and discussed before used in the report.

2.1. Delimitations

This paper is focusing on creating a supply chain characterized by slow fashion concepts and adapting to the needs of environmentally concerned consumers. Theories regarding fast fashion will be excluded. Furthermore, the report will only focus on UFTD and ways to improve the present supply chain. The social aspects are not totally excluded, however they are not in focus.

3. The world's best supply chain

This chapter describes the changes in the supply chain of UFTD suggested by the authors with reference to the seminars and literature. Improvements will be made in the design process, departments, production phase, retail, webshop and user phase. Further, a disposal phase has been added. The changes resulted in the new supply chain model below, which will be explained in detail.

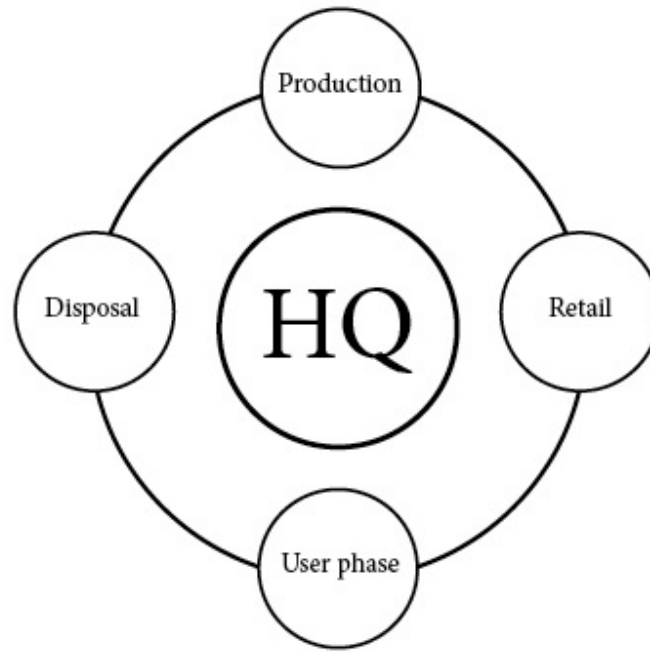


Table 2. New supply chain model

3.1. Headquarters

3.1.1. Sustainability Act – The dedicated code of conduct

In order to become a vertically integrated supply chain and control as many processes as desired (Dag 2011a), it is important that the whole company is aware of goals, values, roadmaps and strategies. Mattila (2013) stresses the importance of having a clear vision in order for the team to be aligned. The existing vision that is communicated towards the customers follows:

By creating products and projects we believe in, within the fields we enjoy, in a manner we can be proud of, we aim to inspire ourselves and others without ever compromising our core value of treating the Earth with respect. (Uniformsforthededicated.com 2013a)

A vision is created that will work as a complement to the existing vision and will be communicated internally: *The worlds best supply chain gives back what it takes from earth, without compromising any efficiency.* This will be the first statement in The Dedicated Code of Conduct, which is outlined as a frame of sustainable and social acts for all participants in the supply chain. The importance of having a code of conduct was discussed during the first seminar and outlined during the third. Gattorna

(2010) agrees with Mattila (2013) about the need of a vision, however Gattorna also stresses the need to align the vision with values within the organization.

Further more, the values will be implemented in every step including the recruitment process in order to find people that share the same values regarding sustainability as UFTD. During the third seminar Lind (2013) stressed the importance of education both externally to the customer and internally in the organization. Having on-going training sessions, workshops and development programs about sustainability will be a part of the Dedicated Code of Conduct.

3.1.2. The Higg Index

In order to become the worlds best supply chain, the Higg Index will be used as a self-assessment tool. The Higg Index is developed by the SAC and was presented during the first seminar:

A suite of assessment tools that standardizes the measurement of the environmental and social impacts of apparel and footwear products across the product life cycle and throughout the value chain. (Apparel Coalition, 2013a)

The Higg Index tool acts according to a point system, where the highest score achievable is one hundred. In order to assess the current supply chain and to set realistic goals about profitability and efficiency, this tool will be implemented (Apparel Coalition 2013b). One person at the UFTD will be in charge of the the Higg Index by educating other parts of the supply chain and working closely with the design team.

Statistics from the European Commission (2013) state that 80 % of the environmental impacts is a consequence of decisions taken in the design process. Therefore the Higg Index will work as the basis for decision-making in order to decrease that number. A feedback loop will be created from sharing information during all processes in the supply chain. Later, this information is used in the design process to make improvements early in the supply chain process. Evaluation of the supply chain will take place every quarter for further improvements and/or changes to be made.

3.1.3. Departments

In the headquarters, interaction is emphasized between the departments. According to Ericsson (2011a) an aligned supply chain is acting more efficient and at lower costs than using traditional methods. Therefore continuous evaluation and goal forming allows the departments to become cohesive. Being cohesive within the organization and working with a process approach will also add value to the products and this will hopefully result in a higher perceived customer value according to Ericsson (2011a).

Further more, Ericsson (2011a) stresses the fact that different products require different systems. Therefore, within UFTD continuous improvements of the systems will be a matter in all different departments in order to gain a holistic view of all activities needed. The basis for this view is the four interorganizational core processes described by Ericsson (2011a); Time to cash, Customer Creation and Retention, Supplier Creation and Retention and Time to Market. This approach stresses the importance of forming long lasting relationships within all functions. The need of

close relationships was stressed during the second seminar, where improvements in the supply chain were accounted for.

One vital department that will be emphasized is the Disposal function. Within the supply chain, as seen in table. 1, the disposal phase is placed after the user phase. However the disposal function is planned and structured at the headquarters, due to the need of close collaboration with the design department. The garments will be designed with disposal in mind, which will be discussed further below.

3.2. Product Development Process

In the creation of a new design process with reference to the seminars in product development, the starting point has been the main ideas of the circular economy. The first process in the supply chain is the design process. Discussions about how to structure the design processes took place during the third seminar, where a missing link in the production facilities today is design knowledge. Table. 3 illustrate a conventional and rather universal product development process.

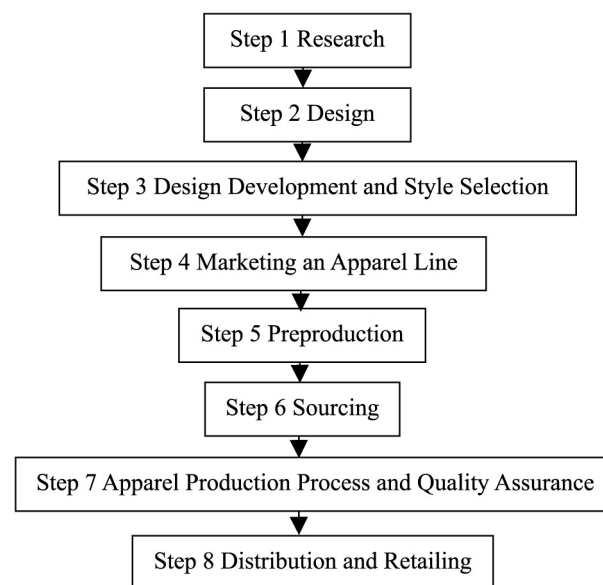


Table. 3 Product development process
(Cao et. al 2008)

At present, the design function in the headquarters conducts research, creates concepts and narrows that down to collections and specific garment. In the world's best supply chain, a part of the design function will be placed at the production facilities, employed by UFTD. The designer will participate in manufacturing and communicate fabrics the vendor has in stock in order to limit the production of new fabrics as much as possible. This will result in closer communication and interaction between UFTD and the manufacturer concerning design development and samples during production. By implementing this, decisions are based on accessible supply in combination with the vision of the company, that Lind (2013) emphasized is an essential part of the company's soul.

According to Lind (2013), knowledge is the key to sustainability. Discussion during the third seminar concerned how to educate the consumer on becoming more sustainable. This will begin in the design processes where care- and use instructions

are printed inside the garment. It will also contain the inspiration behind the garment, how it was created and the positive impact on the environment.

A modification of current design models was made to fit into the thoughts of circular economies. All processes have gained fundamental changes, although the main change is the placement of sourcing that will occur early in the process before the design development begins. According to Larsson (2011) in a general model of fashion supply business sourcing is placed relatively late in the process after design- and pre production processes.

The purpose of the new process is to design the garments based on real supply not imagination, meaning to use the fabrics and trimmings that are already produced instead of producing new. To implement these changes successfully, different professionals are needed. The design team will consist of a designer, a buyer, a sustainability engineer and a product developer, who will work as the project leader. Below picture illustrates the new product development process that is a part of the HQ. Followed by a deeper explanation of the different phases in the process.

Product Development Process 2.0

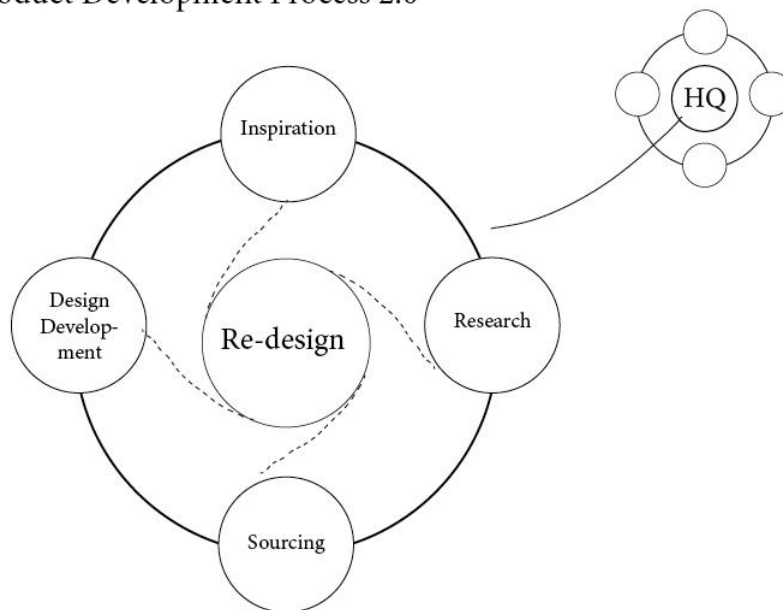


Table. 4 New product development process

3.2.1. Inspiration

The inspiration that is the first step of the design processes will not come from typical inspiration influence in the fashion industry that often come from big fashion shows in New York, Milan or Paris (Sen 2006). This inspiration gathering is not based on reality, but on imagination. To build the inspiration on reality, a possibility is to take inspiration trips to the production- and suppliers facilities instead. It gives a good picture of what is possible to produce with the resources that are already available. The companies can then take advantage of the existing material instead of producing

new ones. This contributes to both economic-, lead time- and environmental advantages.

3.2.2. Research

The research part includes several areas that need to be taken into account when designing for circular economics. The design team has to think about solving problems through design. The research part often includes trends (Sen 2006), however this is not the focus in this case. The collection mind set should be taken away. Many fashion companies have four to five collections per year (Sen 2006) and fast fashion companies can have up to twelve collections per year (Lee 2007). This results in contribution to increased consumption. The fast shifting trends have shortened the garments lifetime from months to just days (Sull & Turconi 2008). Instead of collection focus each garment should be the focus.

The garments should be clean without following rapid trends. The designs should inspire a healthier consumption behavior, meaning that the customer should not get tired of the garment due to the clean design. In order for the customer to be able to have the garment for a long time design for longevity is important, the quality must be so high that the garment has more than one life. The garment must be created in a way that makes it possible for the garment to have several buyers/users.

According to Wang (2006) the design must have the potential to be disassembled, re-used or disposed. The design must be recyclable in a way that the interactive system diagram showed resulting in all materials remaining in the circle in one way or another (see appendix 1). The garment should be easy to take apart so that the material can be used again. It should also be easy to re-design, update and modify. The last alternative is to dispose the garment, if the above alternatives are not possible. The dispose processes must also be considered. All this requires research and knowledge that must take into consideration before the design begins.

Furthermore design for ethical production is also an important aspect. The designer needs to have a holistic view of the garments lifecycle, which includes both social aspects and environmental impacts (Vuletich 2013). One approach in working with ethical production is through Lifecycle Assessments. It's a tool for evaluating the social and environmental impacts of a product within the whole production chain and it also includes the use and disposal of the product. (Baumann & Tillman 2004)

The last research area is in smart textiles, in order to see if it can be helpful when designing with sustainability in mind. This may contribute to the value of the garment and help it to have a longer life. In the area of smart textile there are many applications that can be used in commercial garments, for example thermo chromic materials that can change colors (Mattila 2006).

3.2.3. Sourcing

Sourcing of materials is one of the most important activities in the successful creation of a garment (Cadigan 2013). Sourcing is usually performed after design development as illustrated in the first seminar on product development. This implies that the products are designed before the knowledge of existing supply is gained. Hence, the requirements are mainly on the aesthetics of materials in order to fit the imaginative designs and not vice versa. This would be the case for the world's best supply chain.

Sourcing is strategically placed at an early stage in the design process to cover all requirements.

The current problem in sourcing with regards to sustainability is globalism. Braungart et al. (2007) states that companies have problems identifying the composition of materials in products due to the different origins from global sourcing. This was experienced during the last seminar in product development while identifying the materials in three garments. The conclusion was a complex and poorly thought out composition of materials consisting of both natural- and synthetic fibers, difficult to separate. Thus, sourcing will be performed locally close to the production source in Turkey together with key partners that share the values of UFTD and the dedicated code of conduct

3.2.4. Design Development

The design development process has a major influence on the final version of a product due to the fact that 80% of the product's environmental impact is an outcome of decisions taken in the design process (European Commission 2013). In order to keep up with the company's mission to create sustainable products, eight wastes described by Harrison and Hoek (2011) should be taken into consideration as the main principles used in the design process.

In order to overcome the problems with samples, which requires both non-value added time and unnecessary emissions from transporting the samples, the use of virtual draping is used and allows for high accuracy (Burns, Mullet & Bryant 2011). This would play a vital role, due to the fact that strike-offs, lab-dips and samples are not sent from production but communicated through the designer on site. Hence, it is important that the designer placed at the production facilities not only possesses knowledge about production but also has the same vision and knowledge about aesthetics as the design concept team in Stockholm.

The end life of a product cannot be neglected during design development. As it was discussed during the fifth seminar, there are ways to improve level of recyclability of existing products. (Seminar 5 2013) To ensure that garments can be easily recycled, products have to be made from one type of fiber, whether natural such as cotton or synthetic. Due to the use of different materials in one garment, recyclability has become a challenge. Development of garments in this way will set the stage for them to be easily recycled with minimum costs spent.

Another way to prolong the use of garments is the creation of functional product parts of which can be easily reassembled in order to change type of a garment. Also products can be modified with additional accessories. For example removable collars and cuffs can be developed so different colors can be used for one shirt. Moreover, cuffs and collars are the pieces that are worn off quickly. The ability to change them will also prolong the life of a garment.

3.2.5. Redesign

The re-designing step includes several different options that are individually considered for a particular item. The idea is that during this process this product would be considered and modified to make it once again desirable, new and up cycled. In order to accomplish this designers would be able to assist a client in giving new inspiration, for example deciding how to modify the product as discussed in the

fourth seminar. With the new inspiration in mind research, sourcing and further development of the product may be needed. Sourcing is considered if, for example new fabrics will be added to the existing one. In this case the designer would again take into account sustainability issues in the process of modifying the product.

3.3. Production

"We re-use what is available around us and let the process take all the time it needs. Real quality cannot be rushed." (The Turmoil Concept 2013). This quote of UFTD represents values already implemented in the production process. In order to compliment these values, reuse of materials from the disposal phase and the quality aspect will be included. However, due to the volatile demand in the fashion industry (Christopher & Holweg 2011), one goal is to achieve structural flexibility in order to adapt to changes in the environment. Sustainability programs will be implemented in various parts of the production process, which will be discussed in more detail.

During the third seminar, discussion about reducing wastes in the supply chain was made to become more sustainable. Furthermore, the seven wastes of muda described in Harrison and Hoek (2011) was discussed during the second seminar. The wastes are; overproduction, waiting, transporting, inappropriate processing, unnecessary inventory, unnecessary motions, and defect. During the second seminar Larsson (2013) presented an eight waste; the *unused employee creativity*. In order to up with improvements, the wastes were taking into consideration. The focus below is on pre-consumer waste according to Joung and Park-Poaps (2013).

One suggestion is that the place of raw material is the basis for the production facilities in order to decrease transportation. The argument for placing the production in Turkey is due to fact that they are one of the top producers of organic cotton (Burns *et al* 2011). Here, the fair-trade mark is used to inform that raw materials are grown under ethical conditions (Andréason 2012). At the raw material production facilities, reuse of rainwater will have a positive impact in terms of sustainability. Further more, solar panel energy implementations will reduce cost but still contribute to light but also a healthy working environment at the facility.

The Dedicated Code of Conduct will also include programs focusing on finding sustainable fabrics and how to improve the production in terms of decreasing chemical- and water use. In this program, the Higg Index will have a central role in order to continuously evaluate the process, as discussed in the first seminar. Due to the large amount of water use in the production of cotton, finding alternative fabrics is vital, such as Lyocell or Rayon (Burns *et al* 2011). In terms of dyeing and finishing, the goal is to use as little chemicals as needed in the production process. This could be accomplished by implementing cleaner dyeing processes or natural dyeing processes (Burns *et al* 2011).

The use of Quick Response Sewing System will (QRSS) be applied at the garment manufacturing facility in made-to-order cases. Made-to-order requires a production system that is fast and works well with small batches and individual styles (Pal n.d.). In order to avoid hiding the real demand in the supply chain, it is vital to be conscious of the role of the decoupling point, which should be as far downstream as possible (Christopher 2000). The decoupling point will be at the cutting process, before the

garments are sewed together. Excess materials will be used in production of accessories, such as socks or bow ties.

Furthermore, In order to eliminate waste in the supply chain, the distribution center (DC) in Borås will be excluded. This is one of the major changes made to the supply chain. During the third seminar, the group identified that the biggest non-value adding process being the DC, this was also brought up by Mattila (1999) stating that it usually takes five days for a garment to pass through a DC. According to Lind (2013), the garments are only stored at the center and not processed in any way. As a result, the vendor is going to manage the inventories according to the VMI approach, meaning that the vendor ship the garments directly to the retailers (Pal n.d.). Since each customer will place the orders, not the retailer, the problem of forecasting error usually associated with VMI (Pal n.d.) will be tackled. These will to lead to decreased overproduction of garments and real demand will be visible in the supply chain.

When transporting to the independent retailers, according to Köhler, Byggindustrin (2011) the use of biogas will decrease the net pollution by 70 %. Collaborations with other companies will be made in order to reduce the amount of unused space in the trucks. However, this will only be collaborations of companies using the same facilities, or if products can be picked up on the way. Hangers will be used only on suits, which will also come in a reusable storage bag that will be eventually sold with the garment at the retail store. Other garments will be sent in recyclable plastic bags.

One major change discussed during the third seminar was the need of having a designer at the production facility as mentioned before. This designer is a person in possession of great knowledge about production and the issues of production vs. design. Inputs and changes are made directly at the factory, which will increase the speed of production as well as utilize existing resources in order to save money and be sustainable.

3.4. Retail

3.4.1. Flagship store

In order to engage customers to participate in sustainable practices, education will be emphasized (Lind 2013). This was discussed during the third seminar. This can be achieved by educating personnel in the flagship store. This is of great importance due to the fact that shop assistants represent the company and therefore values can be delivered directly to the customers. At the same time the education will continue on a screen at the store which will constantly rotate videos about the company's production facilities, contribution to communities, production process et cetera.

According to Pal (2013), only 60% of the garments are sold at full price. Reducing this percentage can be achieved through installation of a virtual dressing room. A virtual dressing room can be used for trying on different styles virtually on a screen without actual fitting (Powel 2013). This will lower the SKUs in the store. A few examples of real garments will be available for customers to try on. The clothes will not be available for buying in the store, instead orders will be shipped directly to the customer's house. In this way the company can significantly reduce the amount of back-up inventory. Also the production process will be more effective since the order is placed directly from the point of sales.

UFTD currently operates a “Collection library”, which provides customers with an opportunity to rent out suits for special occasions. The approach not only creates an additional value to the customers, but also supports company’s intention about sustainability issues when it comes to overproduction and overconsumption. As it is stated on the UFTD website;

Needless to say, this kind of overproduction has a negative environmental impact. If we choose to consume in more intelligent way, we can ease this burden. Our solution is very simple and that is why we believe in it. (The collection library 2013)

In support of this point, the flagship store will include a second hand department where garments from UFTD will be sold, discussed during the third seminar. The idea is that customers will bring old clothes from UFTD in good condition that they do not wear anymore. As stated by Joung’s and Park-Poap (2013) factors motivating clothing disposal behaviors is that customers are not interested in spending time on recycling of their old garments as long as they do not get something in return. Taking this into account in the second hand division, customers who bring their old clothes in turn will get a discount on a new purchase. In case that customers want to keep their garment, the flagship store will offer a redesign option. In this section of the store, customers will be able to change a fit of a garment or to redesign it to fit new trends. A designer will be on site a couple of days a week to help with the redesigning.

One big advantage of the changes brought up (virtual dressing room, secondhand division, redesign) is the promotional effect. By differentiating themselves, interest will be sparked by outside sources such as media creating a “buzz” resulting in word of mouth marketing.

3.4.2. Independent Retailers

There are currently 150 independent retailers and concept stores of UFTD placed around the world (Lind 2013). Each independent store has its own concept and sells a variety of different brands. The aim of UFTD is to implement part of the changes suggested for the flagship store also at the independent retailers. It is important to include the education of consumers to successfully deliver the company’s mission. Here, the screen education concept from the flagship store should be used as well. Another option that has to be included is the Rental Library. Also, the company has to aim on keeping the stock small at the independent retailers back up facilities. This can be achieved through the use of POS information sharing.

To support a sustainable attitude of UFTD’s brand the final packaging of the garments will be changed. Instead of the usual plastic or paper bags presented by most retailers, UFTD will provide reusable storage bags or so-called dust bags that can be used by customers in storing garments in the wardrobe.

3.4.3. Webstore

Continuing with the ideas of sustainability, the webstore will also utilize VMI. As previously discussed UFTD’s current DC has no value adding processes other than being a storage and distribution site. In order to remove this considered waste, UFTD will now manage orders and distribution in the place of production. Opportunities for

maintaining customer satisfaction can be achieved at different levels of the supply chain and continue in UFTD's webstore. Silvio Wilde (2011) emphasizes that customer satisfaction is accomplished when the customers needs are met. In order to do so a relationship is established where the customer is able to express their expectations and desires about a certain good or product with the company.

As a result UFTD's webstore will be set up with the purpose of maintaining customer interaction, giving each customer the attention and care they need or desire. This idea was discussed by the group in the third seminar and it was decided that this will be accomplished through tools such as an interactive live chat with trained UFTD members, where customers could receive both further information about products as well as personal advice about how to wear and use products giving each customer the opportunity to have a personalized relationship with a team member.

Hudson (2012) suggests that customer reviews are considered more important than other forms of marketing. UFTD will also be given the opportunity to listen to customer feedback and have the possibility for improvement. Along with being an interactive environment for the customer to use, UFTD's webstore will also continue to educate the customer about the supply chain and sustainability efforts. This education will be accomplished through artistic and interactive videos.

3.5. User Phase

Having sustainability as the focus of the supply chain, the user phase will continue to focus on customer education in relation to sustainability. UFTD is aware of the fact that much of the environmental impact created by the products is a result of aftercare (Lind 2013). This includes washing, drying, dry-cleaning and ironing. As previously discusses a QR code will printed on each item during production to be used along with an app in order to give the end user more information regarding more environmentally friendly ways to take care of the clothing. UFTD will also create relationships with outside companies who have a focus on sustainability, such as dry-cleaners and refer customers to also work with these companies.

Along with aftercare instructions the QR code and UFTD app will also highlight sustainability efforts of the supply chain and the Higg Index score for the particular garment. It is the belief of the group that detailed information about each product can enhance the customer experience making them more aware of its value as well as give them the opportunity to make responsible choices during aftercare including proper disposal of the product (Larsson 2013). Further more, the app will work as a marketing tool where events, discounts and other sales activities will be included.

3.6. Disposal

According to Koch and Domin (1999) the interest in recycling has increased among consumers. However the knowledge about recycling still tends to be quite low and more education is needed in order to increase the recycling activities of textiles. Two reasons for disposing garments according to Joung and Park-Poaps (2013), is boredom and poor fit. Therefore, establishing the second hand shop will make it possible for the consumer to hand in used garments. UFTD purchase the garment back from the consumer and offering 10 % discount of the next purchase at UFTD. The garment's can either be handed in physically, or sent to the stores by postal service.

The garments that are not reusable are sent back to the production facilities and disposed of. UFTD will also accept garments from other brands in order to reuse them in the production. Clothes that do not fill the design requirements will be sent to organizations such as the Red Cross or Emmaus. By using these two methods as part of the sustainability act, UFTD will be able to mark the garments with “Bra miljöval re-use” and “Bra miljöval re-design” which are developed by Naturskyddsföreningen (2013) in order to make the consumer more aware of sustainable clothing.

4. Discussion

The discussion is divided into three issues concerning the purpose of this paper: How realistic the ideas for the new supply chain are, the time frame for suggested changes to be implemented and the need for the whole industry to be in the same boat.

4.1. Realistic?

When the discussion of the new ideas for the world's best supply chain started, no frames or limits were set. This led to imaginative ideas that were later modified to be more realistic, taking for example costs into consideration. This was an effective approach, instead of being given frames in the beginning that probably would have resulted in fewer ideas.

The vision of the supply chain and the new suggestions goes hand in hand with the values that UFTD already have. They possess knowledge and passion, which is required for implementing new ideas. Hence, internal resistance will not be a problem. The fact that a representative from UFTD participated during the seminars acknowledge the interest in feedback from students and an open mind for changes. Due to this, the changes in the supply chain are highly realistic compared to a company that are resistant to change. The supply chain is designed to fit the brand and the values of UFTD, meaning that it would not be realistic to implement these changes in another company, which is the foundation for the implementations to work successfully.

One of the biggest changes is the exclusion of inventory in the flagship store because of the made-to-order production. In the business strategy, UFTD emphasize that quality should not be rushed, which means that they want to put effort and time into producing something good rather than do it fast. Their customers possess values of slow fashion, meaning that they would not have a problem waiting for their garments. The customization of garments will thereby fit both in terms of body measurements and mind-set. This new approach will probably also help UFTD to find new customers who shares the same values and have trouble finding a sustainable fashion company today.

The VMI strategy is necessary to implement in order to remove the DC, which requires a lot of non-value adding time and transportation. This will take time and effort but we consider it to be realistic. New and flexible system- and information tools will be required, but will also make the process of changing to VMI easier. All the changes go hand in hand with the business strategy, sustainability versus efficiency and the target customer. Therefore, we consider this to be a realistic supply chain with the aim to become the worlds best in terms of sustainability.

4.2. Time Frame

The new supply chain for UFTD includes several new approaches that will take some time to implement. The biggest change is within the production and the excluding of the DC. It will take time in order to find the key suppliers and develop a system that works properly; therefore we have put down a time frame of five years, where changes will be made continuously. Within this frame the changes of the flagship store and the webstore will also be implemented, where made-to-order will be used. When the webstore and flagship store are up and running, the changes will continue to

the independent retailers. A realistic time frame for all parts to operate successfully and independently is approximately ten years.

In order for the whole industry to be sustainable, we believe that there is a need for a major paradigm shift in the society. Sustainability has been debated for several decades, however moving into 2014 we still do not see any major changes in the industry despite knowledge about the consequences of continue in the old patterns. There are some leading companies in the industry that work as an example, such as Patagonia and Swedish company Klättermusen. We believe that a new generation brought up under conditions of thinking sustainably need to dominate both the industry and market.

4.3. The need for change

There is a need to stress the importance of change in the whole industry and how it operates. Not only the fact that we need to change but understand *why* we need to change. To implement the changes successfully, all must gain knowledge about the underlying factors for the change. There is need for a collective mindset, to understand that everything is connected and that we all have a responsibility towards other people, communities, species and the environment. We believe that UFTD's commitment can influence other companies, but also the consumers.

Using the new strategies, the company is able to become sustainable and see the holistic picture of the supply chain, much due to the circular systems. Furthermore, the need to build brands that act as role models is important in order for the industry to keep up. Companies such as Patagonia have been industry leaders in sustainability for years and other companies have followed. UFTD wants to act as a role model and with the help of a new thinking in the supply chain they can make this a reality. Thinking in systems, as the circular economy principle suggests, in every instance of the company and not only for the supply chain is the key to make it work as a whole. The circular system was thought of before we gained the knowledge in the seminars. Although, the tools for circular economies helped us realize and be able to put into practice.

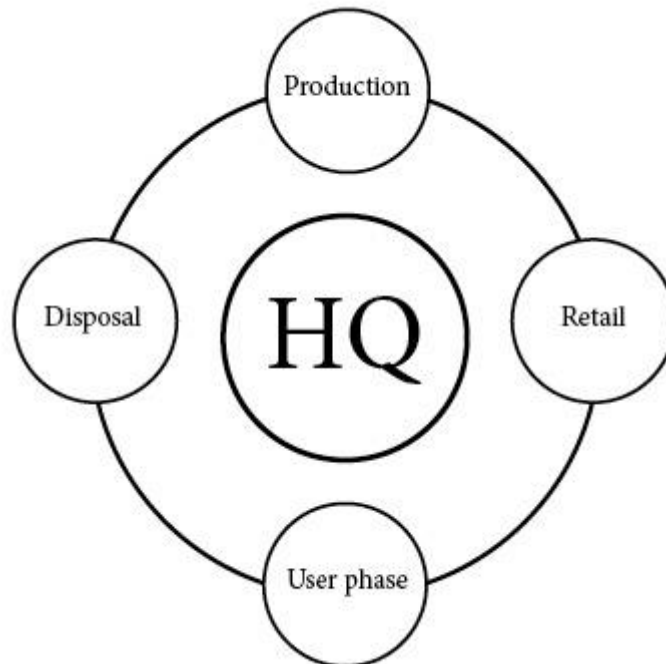
As the Interactive systems diagram suggests, the consumer and the user are distinguished separately and there is an emphasis on increasing the amount of uses rather than consumer. Within each step of the creation process, we have taken this into consideration. For example the designer is considering multiple users that will allow the product to stay in the circle. Also, the collection library is a strategy to support the closed loop circle.

Due to the fact that sustainability innovations are continuously developing, the UFTD needs to maintain and stay current with the new knowledge. The tools available today might be outdated in a few years therefore continuous education is crucial. We believe that the ideas provided for the UFTD will help them become closer to their goal of becoming the world's most sustainable company.

5. Conclusion

This paper had presented theories based on empirical studies and seminars, which produced a realistic way of operating a sustainable supply chain. The purpose of this paper was to develop the world's best supply chain from a circular economy perspective, taking both efficiency and sustainability in mind in order to align with the business strategy of the company studied and current market changes. The result is a closed, circular supply chain where products are designed to re-enter the circle after usage.

Current wastes have been identified and one of the most important changes is the exclusion of the Distribution Center, which was replaced by Vendor Managed Inventory and Made-to-order production. Furthermore, fundamental changes have been made in the product development process by changing the order of the processes to gain insight of real supply and have a possibility to make sustainable decisions. Also, the addition of a re-design process embodies the concept of a circular supply chain likewise the Disposal function that is connected to the production in order to reuse materials, to close the circle and give back what it takes from the earth.



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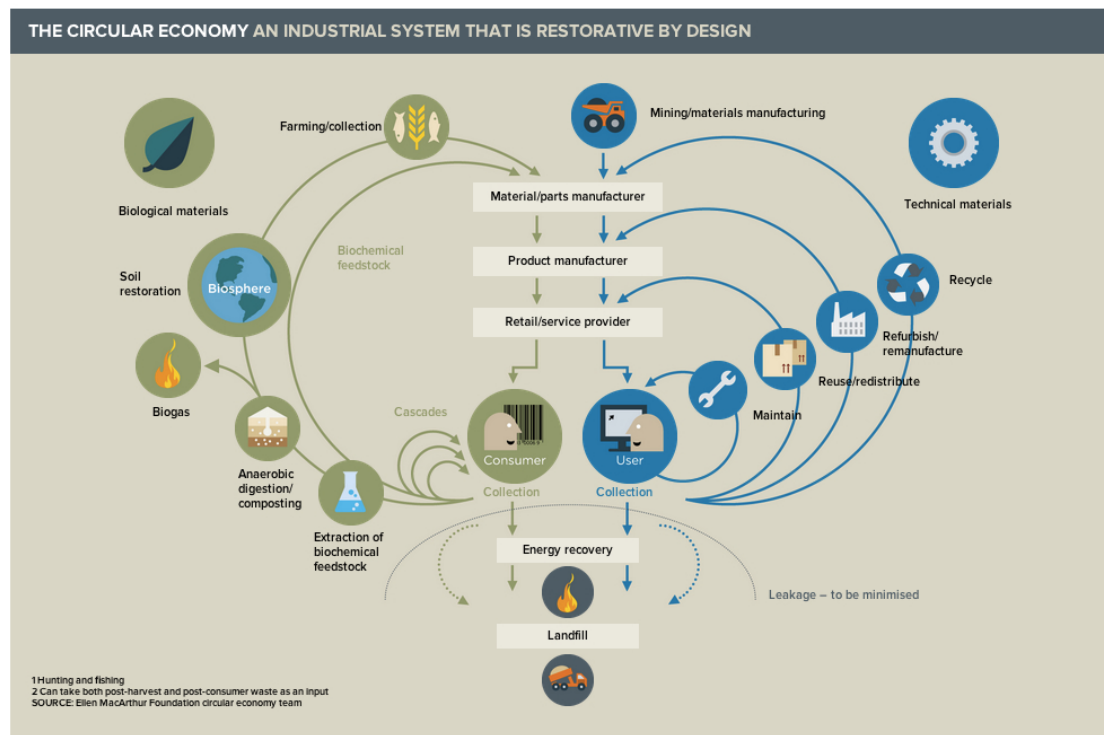
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7. Appendix

7.1. The Interactive Systems Diagram



(Ellen MacArthur Foundation 2013b)