# Master's degree thesis

**MSc in Logistics**

**Sustainability in Fashion Supply Chains**
**by Closed-loop Logistics Systems**
**Case Study: Min Boutique Group, Molde - Norway**

Melina Colic and Siu Lan Tjew

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Molde, 24th May, 2011

Molde University College

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**Master's Degree Thesis**

**LOG950 Logistics**

# Sustainability in Fashion Apparel Supply Chains by Closed-loop Logistics Systems Case Study: Min Boutique Group, Molde - Norway

**Melina Colic and Siu Lan Tjew**

**June 2011**

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Melina Colic and Siu Lan Tjew
Molde, May 24th, 2011

## ABSTRACT

**Purpose -** The purpose of this master's thesis is to design a closed-loop supply chain model for a fashion retailer as the core company. A case study at Min Boutique Group, a fashion retailer in Molde, is then performed to explore how the case company can increase sustainability by developing a closed-loop supply chain for one or more of their portfolio brands.

**Method/Approach** - The theoretical framework of Supply Chain Management and Value Chain Management were applied to design a CLSC model and to explore the important linkages between activities in the value chain. After designing a theoretical CLSC for the fashion apparel industry, action research was applied to design a particular case specific CLSC. The action implemented as a solution for this thesis is a trial on apparel products for a closed-loop supply chain and customer tracking of product identity at the case company.

**Conclusion** - The first part of the thesis shows how a closed-loop can be used in the apparel industry, and the model developed here will hopefully be helpful to retailers in implementing their own sustainability practices. The second objective was to explore how a fashion retailer can apply sustainability practices for their portfolio brands. Unfortunately, an attempt to create a closed-loop supply chain for a particular product failed, presumably because of lack of customer interest. An attempt at providing product information about sustainable items did also not generate much customer response. Finally, a survey on customer preferences showed that customers are likely to choose price over ethics. While this thesis has shown that it is possible to practice sustainability in fashion retailing, it has also shown that sustainability requires educating the customers about making the right choices. In conclusion, it is apparent that sustainability is achievable only as a long term goal through continuous effort.

**Limitation** - The case study is limited in its time frame. Since sustainability is a long term business strategy, it is not possible to determine success or failure within the limited time frame of this thesis. The case study is also limited geographically, as we have only investigated one retailer in Molde. The study focuses only on the retailer's side and only on selected efforts to increase sustainability in apparel retailing.

**Keywords** - *Closed-loop Supply Chain, Supply Chain Management, Value Chain Analysis, sustainability, slow fashion, QR-code.*

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## ABREVIATIONS

| | |
|---|---|
| WCED | World Commission on Environment and Development |
| CLSC | Closed-loop Supply Chain |
| QR-code | Quick Response-code |
| RFID | Radio Frequency Identification |
| BCI | Better Cotton Initiative |
| EOG | European Outdoor Group |
| SOS | Scandinavian Outdoor Summit |
| AR | Action Research |
| JIT | Just-in-time |

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# CHAPTER 1

# INTRODUCTION

Chapter 1 gives the objective and motivation for the thesis, followed by a brief background description, fashion apparel industry characteristics and possible ways to create sustainability. Current waste handling in the industry and theories about consumer behavior are discussed. Finally the organization of the rest of the master's thesis is given.

## 1.1 Objective and motivation

The purpose of the master's thesis work is to design a Close-loop Supply Chain model for a fashion retailer as the core company. A case study at Min Boutique Group, a fashion retailer in Molde, is then performed to explore how the case company can increase sustainability by developing a closed-loop supply chain for one or more of their portfolio brands.

Sustainability in the Brundtland Report (World Commission on Environment and Development - WCED-UN 1987) is defined as: "*Meeting the needs of the present generation without compromising the ability of future generations to meet their needs.*" Un-sustainability in fashion apparel industry is a growing concern. Fashioning Sustainability Report (2007) discusses two reasons for this:

1. **High street dynamic:** Strong competition in the market is believed to have driven down the costs and quality, and led to constantly shifting trends, and rapid emotional devaluation of the apparel products, with the unavoidable result of increased write off.
2. **Global supply chains:** The different stages required to produce the garments often take place in different parts of the world in order to achieve the lowest unit cost. Thus, retailers might not know the origin of their materials and stocks, which makes it difficult to ensure a certain standard and sustainability throughout the supply chain.

This thesis focuses on sustainability considerations from the retailer's side. Min Boutique (MB) Group, a retailer in Molde, consisting of six stores, wants to increase sustainability

in their fashion and sports apparel retailer group, by focusing on slow fashion and Closed-loop Supply Chains (CLSC). Slow fashion is characterized by quality fashion with fewer yearly collections, and designing, producing and consuming better (Fletcher, 2009). Closed-loop supply chains are supply chains where in addition to forward flow of goods, a backward flow is included (Ferguson and Souza, 2010).

## 1.2 Background

### 1.2.1 Fashion apparel industry

The fashion apparel and textiles industry is a major part of world trade. According to statistics on www.companiesandmarket.com, a website distributing industry data, the growth in global clothing retail industry was 2.1% in 2009, amounted to $ 1 078 billion, where 51% of it was women's clothing. This amount is expected to increase to a value of $ 1 223 billion in 2014, or an increase of 13.4% since 2009 despite the current economic downturn. The growing demand for clothing and textiles today is among others driven by low prices, increase in consumer welfare, and shift in consumer behavior towards emotional purchasing and over-consumption (Fletcher, 2009 and Fashioning Sustainability Report, 2007).

Despite its substantial contribution to the world's economy and trade, the clothing and textiles industry has been classified as one of the most environmentally damaging industries (Sahni, 2010 and Fashioning Sustainability Report, 2007). Starting from cotton plantation, manufacturing and distribution, the clothing industry significantly increases waste and pollution. Global sourcing to achieve lowest unit cost, leads to the establishment of manufacturing facilities in many developing countries and frequent exploitation of human rights (e.g. child labor, bad working conditions and minimal wages). At the end of its life-cycle, the discarded clothing mostly ends up in landfills, adding another critical issue to the environment (Figure 1.1). According to a report from the University Cambridge, on average every person in the UK sends 30kg of clothing and textiles to the landfill every year. The same report reveals that people purchase about one-third more clothes than they did in 2002 and that this trend is expected to continue.

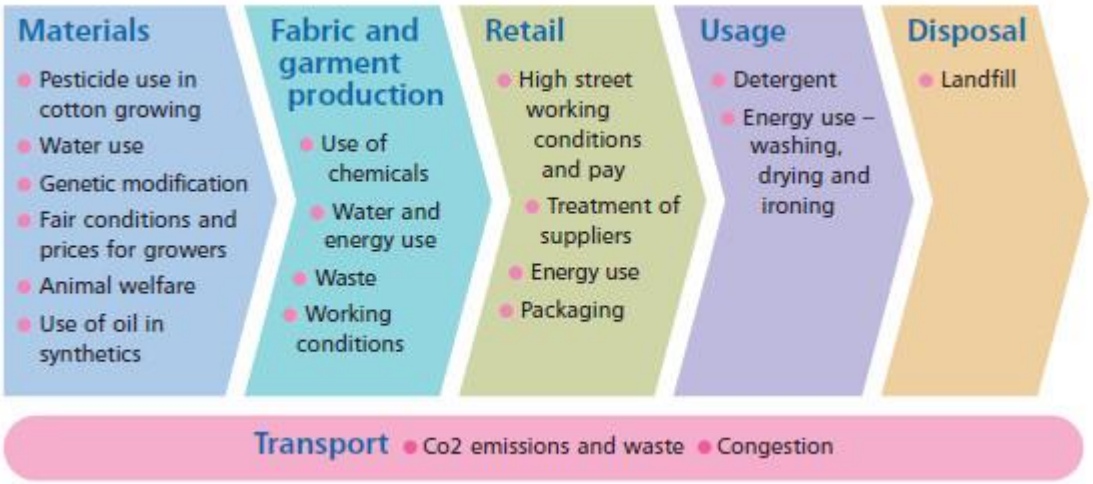



**Figure 1.1:** Stages and impacts in fashion apparel industry (Source: Fashioning Sustainability, 2007, pg. 3)

### 1.2.2 How to increase sustainability?

Actions in every stage of the chain in Figure 1.1 can be made to increase sustainability. In the materials stage, cotton can be replaced with organic cotton, bamboo, hemp, soy algae, maize, agricultural waste and nettle. At the production stage, man-made materials made by renewable fabrics can be introduced. Synthetic oil based fabrics can be recycled or recovered. Integrated labels telling garments history is also a solution in the production stage. Perhaps the largest power is at the retailer stage that can encourage social and environmental good practice through: fair pricing policies, working together with suppliers and country origin labeling. Consumers can also impact the sustainability by using environmentally-friendly detergents, low washing temperatures, by "slow fashion" behavior, and environmental "green" focus when choosing among "green" or "non green" products. Finally at the disposal stage, "producer responsibility" can be implanted through recycling awareness and possibility (Fashioning Sustainability Report, 2007). In addition, producers can increase sustainability by improving portfolio and productions/inventory planning, so to reduce product variety and over-production, without losing sight of customer preferences.

### 1.2.3 Waste handling

According to an article in the textiles magazine (Vol.1, 2009), post-consumer (Figure 1.2) of fashion apparel waste has contributed millions of tons to landfills, incineration and to "ship and dump" recycle systems. The second hand and un-sold clothing stocks ends up in

the developing countries (as waste shipping and dumping) and only small amounts are re-sold or recycled as for rags in the donating countries. This is a very far and contrast situation to sustainability. Not only from the post-consumer phase, even from the early stage of material acquirement the clothing industry starts to bring negative impacts to the social and environment.

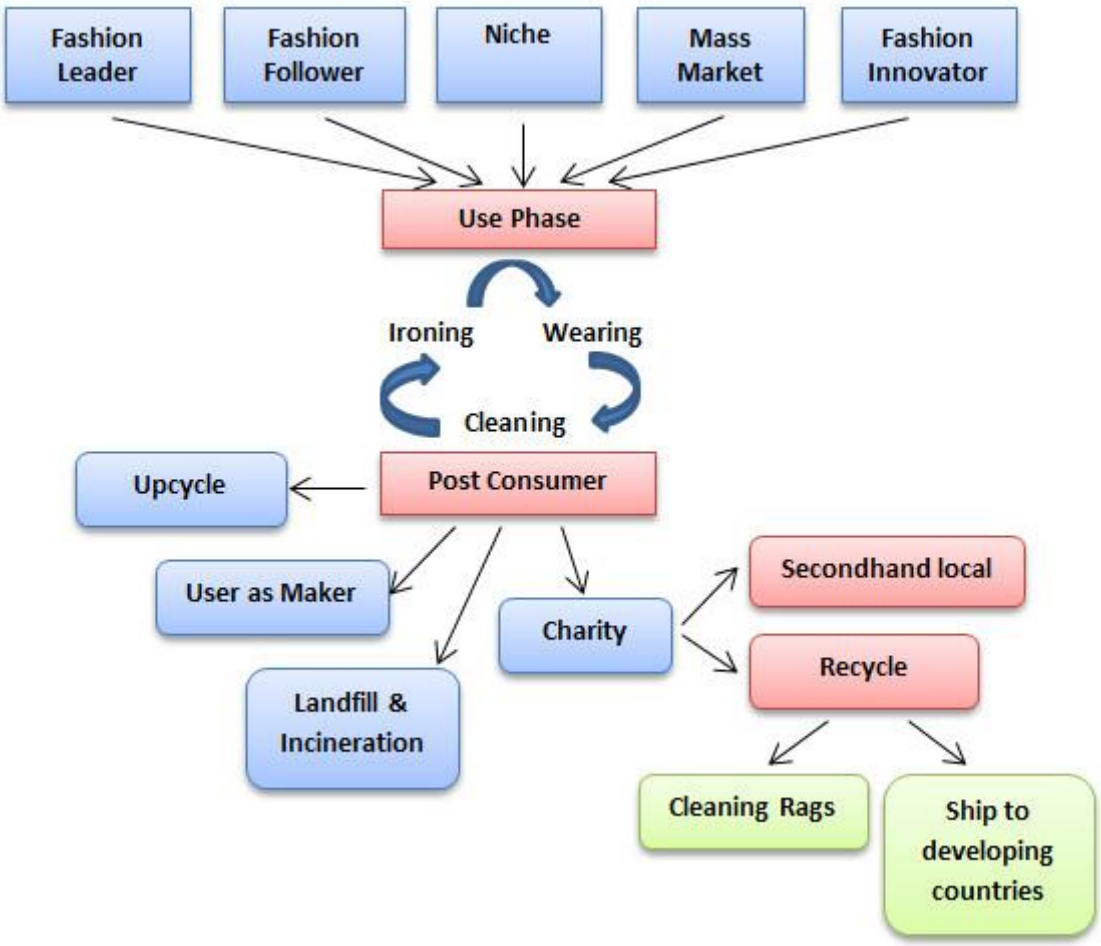



**Figure 1.2:** Fashion apparel - post consumer (Source: Textiles Magazine Vol.1, 2009, pg. 12)

### 1.2.4 Consumer behavior

Poiesz (2004) claims that suppliers offer products in particular quantity and variety that makes consumers handle these both physically and mentally. If products are equal in quality but have different prices, the consumer should be able to identify and choose the cheapest one. Conversely, if the products have equal price but differ in quality, the consumer should acquire the products with highest quality. In both cases consumers

make choice based on information handling and trade-off process that combine all personally relevant information and criteria. Several conditions must be met to become a rational consumer. A rational consumer should be able to oversee and evaluate all products and services that are offered. Moreover, the customer must truly understand quality and price differences to be able to monitor all relevant changes. A rational consumer should be able to make trade-off between buying now and buying later. Rationality also includes knowledge about costs and benefits associated with different channels and ability to absorb, comprehend all relevant product, service, and market information. The question is, does the consumer have the motivation, opportunity and capacity to act rational? In particular, how will the issue of sustainability influence consumer behavior?

## 1.3 Organization of thesis

The remainder of the thesis is organized as followed: Chapter 2 presents the literature review and industry practice. Concepts including Closed-loop Supply Chain, Quick Response (QR) code, slow fashion, and Eco index documentation are explained. Examples of industry practice in sustainability are also given in this chapter. Chapter 3 presents the theoretical and methodological approach for the thesis. In chapter 4, a theoretical model of CLSC for fashion apparel industry is designed. An analysis of important linkages in the retailer's value chain and supply chain network is performed. Chapter 5 consists of case company presentation. Chapter 6 contains the case study at Min Boutique Group, the research and action done. It also looks at retailers' motivation to apply sustainability in their business and how this can be achieved. Finally, the results and discussion is presented. Chapter 7 describes the future research and conclusions.

# CHAPTER 2

# LITERATURE REVIEW AND INDUSTRY PRACTICE

In this chapter the relevant literature on creating sustainability in dynamically changing consumer markets such as fashion apparel, music and games will be reviewed. Next, it will be presented how this issue is approached presently in the fashion industry. Initiatives to sustainability from existing literature will be described. The chapter discusses literature on Closed-loop Supply Chain (CLSC), customer take back relationships in CLSC, Quick Response (QR) code technology, slow fashion and Eco Index documentation. Finally three examples from industry practice are given.

## 2.1 Closed-loop Supply Chain

Growing concern about social and environmental issues and stricter regulation on industrial waste management has raised great interest in reverse logistics and closed-loop supply chains (CLSC) today. As a result, awareness and interest in product take-back and recovery activities has increased in both industry and academia (Seitz, 2005). Closed-loop supply chains are supply chains where in addition to forward flow of materials from suppliers to end customers, there are flows of products back to manufacturers (Guide et al., 2003). In their research paper, Guide and Van Wassenhove (2009) stated that CLSCs focus on taking back products from customers and recovering them or adding value by re-using the whole or parts of the returned products.

Ferguson and Souza (2010) discussed several treatment options for returned of used products:

1. ***Land-filling:*** waste material treated as rubbish dump. This has been the most common methods of organized waste disposal and remains so in many places around the world. This option however is considered illegal for some products (e.g. hazardous waste, electronic equipment) in some jurisdictions.
2. ***Incineration:*** this method helps to reduce the amount of wastes going into a landfill as it can reduce the volume of solid waste by as much as 95%. Emissions and pollution are the major drawbacks of this option.

3. ***Recycling:*** this option implies materials recovery and is attractive for returns with limited or no functionality remaining, such as end-of-life returns for electronic equipment.
4. ***Resale (as-is):*** this option is attractive if there is an active secondary market for the used products.
5. ***Internal re-use:*** this option implies light or no refurbishing, such as containers.
6. ***Re-manufacturing/refurbishing:*** this is a value added operation and has potential for higher profitability among the other options. Re-manufacturing is defined as a process of restoring used products to "like new" condition.

### 2.1.1 Reverse logistics activities

In recent years, closed-loop supply chains have been applied in many sectors especially automotive and electronic equipment. Apparel reverse logistics exist, but many of the networks are not closed loop because of the complex recycling process required to turn apparel to new raw materials (Joines et al., 2010).

A reverse supply chain requires careful design, planning and control. The reverse logistics network collects used products, consolidates, inspects and sorts them and then transports them for various recovery options. There are significant costs related to the establishment and operating of a closed-loop supply chain. However, the recovery operations may bring potential benefits or costs saving for the company. Some main activities along the recovery process are (Guide et al., 2003 and Ferguson & Souza, 2010):

- Used-product acquisition to obtain the products from the end users.
- Reverse logistics to move the products from the points of use to a point of disposition.
- Testing, sorting, and disposition to determine the product's condition and the most economically attractive of re-use option.
- Refurbishing to enable the most economically attractive of the options: direct reuse, repair, re-manufacture, recycle, or disposal.
- Re-marketing to create and exploit markets for refurbished goods and distribute them.

For example, to recover end-of-life returns of fashion apparel, first of all it is important to have access to adequate quantities of returned apparels. These apparels are then transported to a recovery facility to be sorted, graded and maybe washed before the best possible recovery option can be determined. By assuming that the optimal recovery option for a certain grade of returned apparel is re-manufacturing into new products (e.g. shoes or bags), a marketing strategy is then needed to sell the new items to the market.

### 2.1.2 Where to close the supply chain?

There are many phases in a product's life cycle where a "closed-loop" can be implemented/established. Flapper et al. (2005) classify the closed-loop supply chain by different phases in the life-cycle of a product: the ***production phase*** (e.g. obsolete materials, production scrap and other defect products), the ***distribution phase*** (e.g. commercial returns, wrong deliveries and recalls), the ***use phase*** (e.g. warranties, end-of-lease products), and the **e*nd-of-life phase*** when the product loses its identity but part of it may find further use. Companies have to decide whether they want to close the corresponding supply chain at each phase by creating a loop after it or not (see Figure 2.1). Depending on the type of product, type of processes necessary, and flow of materials and goods, each phase has its own specific possibility and requirement.

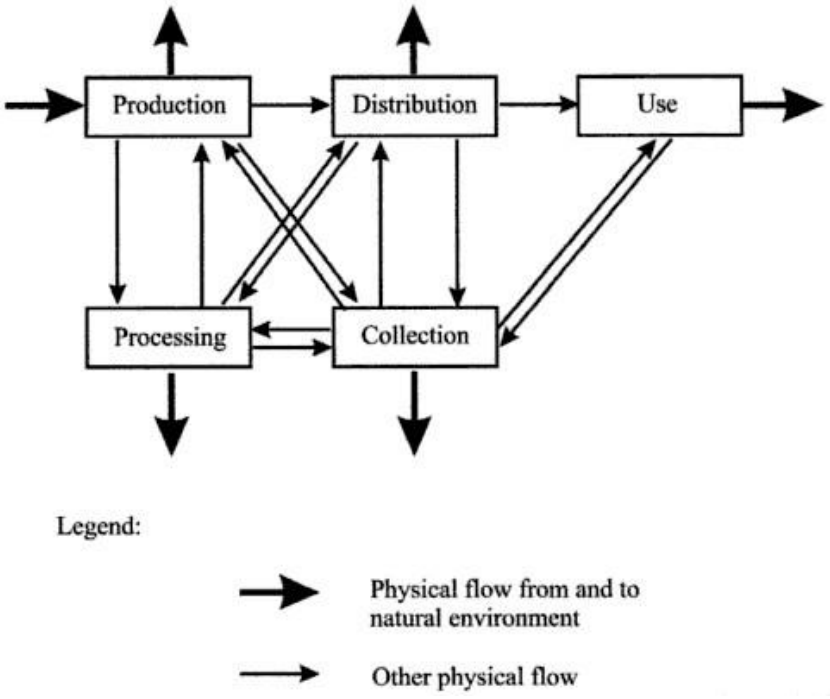



**Figure 2.1:** Closed Loops at different phases of a product's life-cycle (Flapper et al., 2005, pg. 5)

### 2.1.3 Considerations before implementing CLSC

Following the different phases where companies can apply a closed-loop, Flapper et al. (2005) also identified several managerial and technical aspects that are important for closed-loop supply chains. Table 2.1 below shows some of these aspects:

| | |
|---|---|
| ***Business driver*** | First of all, a common sense of when and why to consider a closed-loop supply chain or the reasons and drivers (e.g. regulation, value creation, image) behind the closing or not closing the loop needs to be developed. |
| ***Technical*** | Based on physical inputs and outputs of the considered closed-loop system, technical feasibility (e.g. testing, grading, sorting or re-design of products and distribution systems) and costs have to be verified. |
| ***Organisational*** | Who involve in the recovery network in closing of the chain (e.g. suppliers, competitors, recyclers) and how to measure the performance and how the incentive is structured. |
| ***Planning & control*** | Activities should be planned and controlled in order to realize the anticipated benefits and to keep costs as low as possible. |
| ***Information*** | After the above aspects have been identified, the required information system support can be defined (e.g. hardware, software and people). |
| ***Environmental*** | It is now possible to estimate the environmental aspects, this is important in the case the company intends to use the system to establish a green-image. |
| ***Business-economic*** | An economic price tag needs to be put to all the activities comprising the closing of the loop in order to establish its profitability or other benefits. |

**Table 2.1:** Managerial and technical aspects of establishing a closed-loop supply chain

### 2.1.4 Customer take-back relationship in CLSC

To make the reverse logistics possible from the retailers standing point, there must be an agreement between retailers and end customers about how the disposed products are to be returned. Östlin et al. (2008) identified seven different types of customer take-back relationships. The types mentioned below are the ones considered relevant to apparel recycling:

- ***Credit-based:*** In this case when a customer returns a used product they receive a specific number of credits for the returned product, which can later be used as a discount when buying a new product.

- ***Buy-back:*** The seller buys back the wanted used product from the end customer. An example of this is re-manufactures buying a product back from suppliers or scrap yards.
- ***Voluntary-based:*** The customer can voluntary give back the used product without being obligated to buy anything in return.

The type of incentives applied may have an effect on the rates of returned product. Customer may be more eager to return the used product if there is for example discount or point offered.

## 2.2 QR-code technology

Backward tracking of ecological and sustainable products in the textile supply chain is difficult or impossible (www.indiantextilejournal.com). The end customer is often not informed about products origin and ecological standards. A possible solution to this is track and trace technology such as RFID-tag (Radio Frequency Identification) or QR-bar-codes. QR is short for "quick response" since they can be read quickly by a scanner or reader, or by QR-enabled cell phones. QR-bar-codes are more useful than standard bar codes since they can store more data, including URL link, geographic coordinates, and text. A business retailer can use QR-codes to inform customers about product details, contact details, offer details, event details, competition details, coupons and link to any information they wish to share with customers (www.searchengineland.com).


**Figure 2.2:** Example of a QR-bar-code

Figure 2.2 illustrates an example of a QR-code. When a cell phone with reader-application scans this code, it is directly connected to the document created by the retailer about the

given product or information. Each product item must have a different QR-code but can link to the same document if the products are identical. The reason to this is to enable tracking when each single item is scanned and where the scanner is geographically located when scanning (Berland, 2011). For example, a batch of ecological T-shirts in size medium must each have different QR-code but can link to the same document since the product is identical and there is no need to change information about the T-shirts. If a retailer wants to track a T-shirt and see if it is still alive (in use) they can use a statistics application on the web to see when the product was scanned last. In this case the retailer must encourage the customers to scan the product occasionally, for example by giving an attractive offer or campaign.

## 2.3 Documents (Eco index)

The whole purpose of tracking products and informing customers about the product's origin is to increase sustainability in the long term. Eco index is a standardized qualifications required to be labeled as "green". It provides companies throughout the supply chain a way to benchmark and measure their environmental footprint, allowing them to identify areas for improvement and make informed sourcing and product life cycle decisions. Although initiated in the outdoor industry, the Eco index's output and tools have a wide range of applicability to other industries and sectors (www.ecoindexbeta.org).

The Eco Index is organized along six major stages of a product's life cycle using environmental guidelines, performance indicators and footprint metrics to assess the impacts within the six product life cycle stages. The six stages are: materials, packaging, products manufacturing and assembly, transport and distribution, use and service and end of life as shown in Figure 2.3 (www.ecoindexbeta.org).


**Figure 2.3:** Product life-cycle stages (source: www.ecoindexbeta.org)

The three types of tools in the Eco index are shortly described as followed:

- **Environmental Guidelines** - These are qualitative and general principles and practices, intended to be used as an educational tool, promoting continuous environmental improvement for companies and suppliers.
- **Environmental Indicators with Comparative Scoring System** - These are measurable attributes or parameters that demonstrate environmental impact or improvement.
- **Environmental Footprint Metrics** - These are units of measure, and include an industry wide common methodology of calculating the metric and collecting the data.

The Eco Index will provide retailers/producers with a common language and method for identifying the environmental impacts of the products and brands they carry. It is suggested that as a retailer, one can ask the brands from whom they buy the products from, whether they are aware of the index and are using the index tools, or even go further asking about their index score. However, if a brand is making environmental claims about their products, it is well within a retailer's right and responsibility to ask for evidence (www.ecoindexbeta.org).

## 2.4 Slow Fashion and Sustainability

Fletcher (2009) claims that fast fashion describes today's textile and clothing industry. The industry is characterized by high speed production and high volume consumption. A design sketch can be turned into a finished product in three weeks. Cheap clothes are made possible because much of production is outsourced to low cost countries with downward pressure on working conditions, environmental standards and quality. Price is crucial for customers, but there is also an increasing consciousness on how the clothes are made and the idea of "slow fashion". Slow fashion is about designing, producing and consuming better. It is an approach where designers, buyers, retailers and consumers are more aware of the impact of products on workers, communities and ecosystems. Slow fashion is a shift from time and quantity to a quality fashion. This approach is sustainable with choice, information, cultural diversity and identity (Fletcher, 2009).

## 2.5 Sustainability - Industry Practice Examples

To be sustainable in the future, companies have started to focus not only on the financial or profitability aspects of their business, but also on themselves as solution seekers or actors in environmental issues. In the clothing and other textiles industry for example, organizations and associations for "a greener planet" have been founded (e.g. Defra, Fairtrade-certified cotton, consumer focus). Adidas, Nike, Marks & Spencer (M&S), Hennes & Mauritz (H&M), and many other companies participate and actively engage in the sustainable clothing road-map, an industry initiative established since September 2007 (Textile Magazine, Vol. 4, 2009). The following illustrates how two famous players in the clothing and apparel industry, M&S and H&M, participate in, and support sustainability in the clothing industry. An outdoor business case in sustainability from the European Outdoor Group (EOG) is also presented.

### 2.5.1 Marks & Spencer

M&S is one of the UK's largest clothing retailers and was founded in 1884, currently employing 65 000 employees. In its contribution to the sustainability of people and planet, M&S launched the Fairtrade cotton products in March 2006, and ethical shopping campaign in August 2006. In January 2007, M&S announced a project called "Plan A", a business-wide eco-plan with the following 5 main commitments to be achieved by the year 2012 (Textiles Magazine, Vol.1, 2007):

- ***Become carbon neutral*** **-** by minimizing energy use and maximizing "green" renewable energy and also mobilizing suppliers and customers to reduce their carbon footprint. All M&S's trucks will be run on 50% bio-diesel. Based on the energy efficiency and minimization of waste, M&S will open a model "green" factory with its suppliers.
- ***Send no waste to landfill*** **-** by stopping sending waste to landfill from its stores, offices and warehouses, reducing the use of packaging and bags, and find new ways to recycle and reuse of materials.
- ***Extend sustainable sourcing*** **-** this is done by ensuring that its key raw materials come from the most sustainable sources possible (e.g. using fair traded cotton, bamboo and cornstarch fibers in clothing production).

- ***Set new standards in ethical trading*** **-** by working closely with its suppliers to ensure ethical productions, providing support to suppliers by sharing best practices and innovations or even funding investments.
- Finally, M&S also commits itself to helping customers and employees live a healthier lifestyle.

### 2.5.2 Hennes & Mauritz

H&M is a Swedish retail clothing company founded in 1947. It has approximately 2.200 stores in 38 countries and as of 2011 employed around 87,000 people (www.hm.com). In its Sustainability Report in 2009, how to make style responsible has become one of their visions in business. The company has developed a new sustainable strategy in 2008 and started launching it in early 2009.The strategy covers three areas: people, planet and profit. This means that H&M wants to run its business in an economically, socially and environmentally sustainable way. H&M aims to look at the complete cycle of its products, from how suppliers produce them, to how customers use them, by focusing on the areas they can significantly influence and make the most difference. H&M's strategies to support sustainability among others are (Sustainability Report - H&M, 2009):

- ***Raw material:*** Although H&M does not purchase the raw materials used in the productions, the company tries to limit the negative social and environment impacts by working together with organization such as Better Cotton Initiative (BCI) and Organic Exchange to help reducing the impacts. H&M also increases the use of organic cotton and other more sustainable materials e.g. organic wool and recycled cotton.
- ***Material processing:*** Despite having little direct business relationship with fabric and material manufacturers, H&M tries to encourage manufacturers to make their business more sustainable through various programs such as Cleaner Production Program and Mill Development Program.
- ***Product manufacture:*** As a large buyer, H&M is in a position to exercise a positive/significant influence over its 700 suppliers around Asia and Europe on working conditions and friendly environmental management.
- ***Transportation:*** H&M has been working actively with its transport providers and other organizations to find smart ways of transporting goods both from an environmental and from a cost perspective way.

That said, the “use once throw away” strategy of H&M is not environmentally friendly. Low quality-low price products motivate to frequent customer buys, with the inevitable result of increased environmentally damaging castaways.

### 2.5.3 European Outdoor Group (EOG)

The European Outdoor Group (EOG) was founded in 2003 by the world’s 19 largest outdoor companies as an association to represent the common interests of the European outdoor industry. One of the main objectives of EOG is to help establish platforms of best practice on issues such as the environment and sourcing transparency. (www.ecoindexbeta.org).

Suppliers and retailers are facing increasing pressure to reduce the impact of their products throughout the product life cycle. During the Eco Index pilot program in August 2010, Mark Held, secretary general of the EOG stated that “the outdoor industry’s success is inherently linked to the health of the planet, thus ensuring the continued existence of the places we hike and climb is vital. The industry has a responsibility to lead the move toward implementing more sustainable business practices that protect the livelihood of the industry and the environment”. The Eco Index is a website established to provide guidance, methodology, and tools for outdoor companies to assess their current practices and prioritize their efforts to implement more sustainable solutions (www.europeanoutdoorgroup.com).

According to Vaagen (2011), at the Scandinavian Outdoor Summit (SOS) in early 2011 in Sweden, Marc Held also discussed four main objectives of creating sustainability in the outdoor business, which are:

1. ***Cost saving and waste reduction:*** Reduction in the usage of material or reusing/reprocessing of used outdoor apparel can reduce production cost as it is cheaper, and at the same time prevent disposal of used apparel as waste to the environment.

2. ***Building trust:*** By participating in the sustainability program, companies present themselves as a social responsible company. They build trust with the customers and the public in general while generating profit.
3. ***Motivation vision:*** By engaging in sustainability business practices the company preserves the environment for outdoor activities, thus ensuring future business for the outdoor apparel companies.
4. ***Minimize and manage business risk:*** Sustainability also means less variety of products, thus allowing the manufacturers to focus on better apparel quality in their product portfolio management.

Many successful business cases in implementing sustainable practices within the outdoor industry have been proven. Some examples are (www.ecoindexbeta.org):

- Brooks Running reduced its shoe box printing costs by 8% and other material usage by removing the printing from the inside of each shoe box lid, and by creating two additional shoe box sizes that fit around several core shoe sizes.
- GoLite has re-designed its Jam Pack backpack and reduced the carbon footprint of the textile used by 30%, while maintaining the performance and durability of the products.
- Patagonia encouraged its supply chain to adopt more sustainable practices and 11 of its textile mills adopted the Bluesign standard, thus allowing Patagonia to reduce costs and time spent to monitor the vendors.

Companies participate differently in what they can do to minimize the negative impact of the industry. This depends on whether they have their own manufacturing facility, or they only act as distributors and retailers. If companies are producers, they can start from the early phase in the production by designing and producing ethical and ecological clothing, by carefully deciding their sourcing, and by working closely with their suppliers to minimize environmental issues. For those who are retailers, choosing to sell only ethical and ecological clothing may be an option. Recycling/re-manufacturing development and promotion or campaigns to increase awareness of customers in sustainability issues might be another way to go. This thesis will describe some of the feasible options for Min Boutique Group.

# CHAPTER 3

# THEORETICAL & METHODOLOGICAL APPROACH

Chapter 3 presents the theoretical approach of the master's thesis, integrating Supply Chain Management and Value Chain Analysis. The description of Action Research (AR) as the methodological approach follows, and finally the data collection method is given.

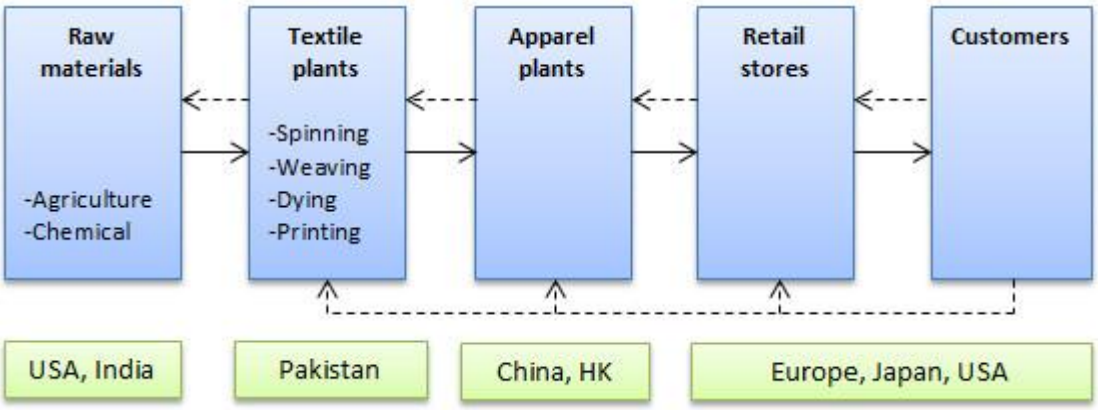
## 3.1 Theoretical Approach

In this master's thesis, the theoretical framework of Supply Chain Management and Value Chain Management will be applied. Analysis of supply chain management in the fashion industry will give an understanding about the fashion industry's network, where a closed-loop could be designed, and which partners or chain members would be involved in closing the loop. An analysis of company's value chain will provide an understanding about the organization's competitive advantages and how those advantages could be further developed to support the closed-loop activity. The two concepts are illustrated below.

### 3.1.1 Supply Chain Management

The apparel and textiles industry is a classic example of a global supply chain network. A piece of garment sold in Europe may be produced in China with fabric sourced from Pakistan and raw materials made from India or Sri Lanka. Figure 3.1 shows an example of fashion industry supply chain.

The textile and clothing industry can be seen as a supply chain consisting of several discrete activities. Cost, quality, reliability of delivery, access to quality inputs and transport and transaction costs are important aspects when location decision is made (Nordås, 2004 and Abernathy et al., 2004). The search for lower cost production has led to a relocation of production sites towards the Far East. Some firms in the EU may have maintained their domestic sourcing by focusing on technology changes such as Just-in-time (JIT) and quick response (de Brito et al., 2008).




**Solid lines: flow of goods, dotted lines: flow of information**

**Figure 3.1:** Fashion Industry Supply Chain (partially adopted from Nordås, 2004)

The figure above shows a traditional forward supply chain in the fashion industry where there is no reversed supply chain included in the process. A reversed supply chain or CLSC can be established in the different phases of a product's life-cycle, as mentioned previously.

### 3.1.2 Porter's Value Chain

Value chain analysis is a business management concept described by Michael Porter in 1985. It is a model that helps analyze which activities, and linkages between these activities, in a core company can create a competitive advantage. All companies consist of activities that link together and develop the value of the business. These activities together form the company's value chain. The value chain consists of primary and support activities. Primary activities are those involved in the physical creation of the product, its marketing, delivery to buyers and support and servicing after sale. Support activities provide the inputs and infrastructure that allow the primary activities to take place. Porter calls the "margin" or value added as the difference between the total value and the costs of performing the value activities (Porter, 1998 and www.quickMBA.com).

A company can understand which activities give competitive advantage by assessing the generic value chain to specific activities. After the activities are defined, linkages between the activities should be identified. Linkages exist when the way one activity is preformed affects the cost or effectiveness of the other activities. Value chain of a company in a particular industry links to value chains of upstream and downstream buyers. The

development of a firm's competitive advantage depends on both firm specific value chain and the value system the firm is a part of (Porter, 1998). The assessment of a company's value chain in relation to the CLSC will identify the linkage between activities and how these activities support the operation of a CLSC.

## 3.2 Methodological Approach

The master's thesis will be based on action research (AR). After designing a theoretical CLSC for the fashion apparel industry, action research will be applied to design a particular case specific CLSC. Action research is a methodological approach that includes implementation of action. This methodological approach differs from case study because of its explicit focus on research and participation. Action research bridges the gap between theory, research and practice (Sørensen and Haugbølle, 2008). Case study is a research strategy that includes in-depth study of a case. It is primarily descriptive and explanatory. The action implemented as solution for this thesis is a trial on apparel products for a closed-loop supply chain and customer tracking of product identity at Min Boutique Group (MB Group). The selected products will be tracked by QR-codes and URL link that enable customers to scan for information that the store is giving. Since this is a long term project and considering the limited time frame of the thesis, this will be a process only put in action and followed up by MB Group.

## 3.3 Data Collection

The sources of data come from interviews and secondary data. Interviews with the company will give the relevant information of the connection of the research topics in the master thesis and MB Group. Secondary data is data that is already collected and is available from other sources. The secondary data is collected from articles, research papers, electronic sources, books and textiles magazines, etc.

# CHAPTER 4

# CLSC MODEL FOR FASHION APPAREL INDUSTRY

In chapter 4, a theoretical model of CLSC for fashion apparel industry is designed, showing where a closed loop can be implemented in a supply chain. Important linkages in the value chain of a fashion retailer, and between the retailer and its suppliers/customers are also illustrated and discussed.

## CLSC for Fashion Retailer

Based on the literature review and apparel industry characteristics mentioned in section 1.2, a theoretical closed-loop supply chain model is designed for retailers in the fashion apparel industry as Figure 4.1 shows. As mentioned above, a closed-loop can be established at different phases of the product's life cycle as reflected by different phases in the value chain. In our model, the retailer is the core company with objective to design CLSC. As such, vertical (cross organizational) linkages between the retailer's activities and external suppliers/ customers, and horizontal (internal) linkages within the retailer's value chain will be studied.

The solid arrows in Figure 4.1 show a traditional forward supply chain where goods (apparels in this case) flow from manufacturer to the end customers, through the distributors and the retailers. Source of origin before the manufacturer are not given in Figure 4.1. The dotted arrows illustrate the reversed supply chain, starting from the end of traditional life-cycle. At the end of the life-cycle, the used apparels are collected, sorted, and graded (including the retailer's obsolete inventory and over-stock). According to optimal disposal decisions made during the sorting and grading stages, four paths of process cycles for the collected apparel can be identified as shown by the numbers (1, 2, 3 and 4) in the model.

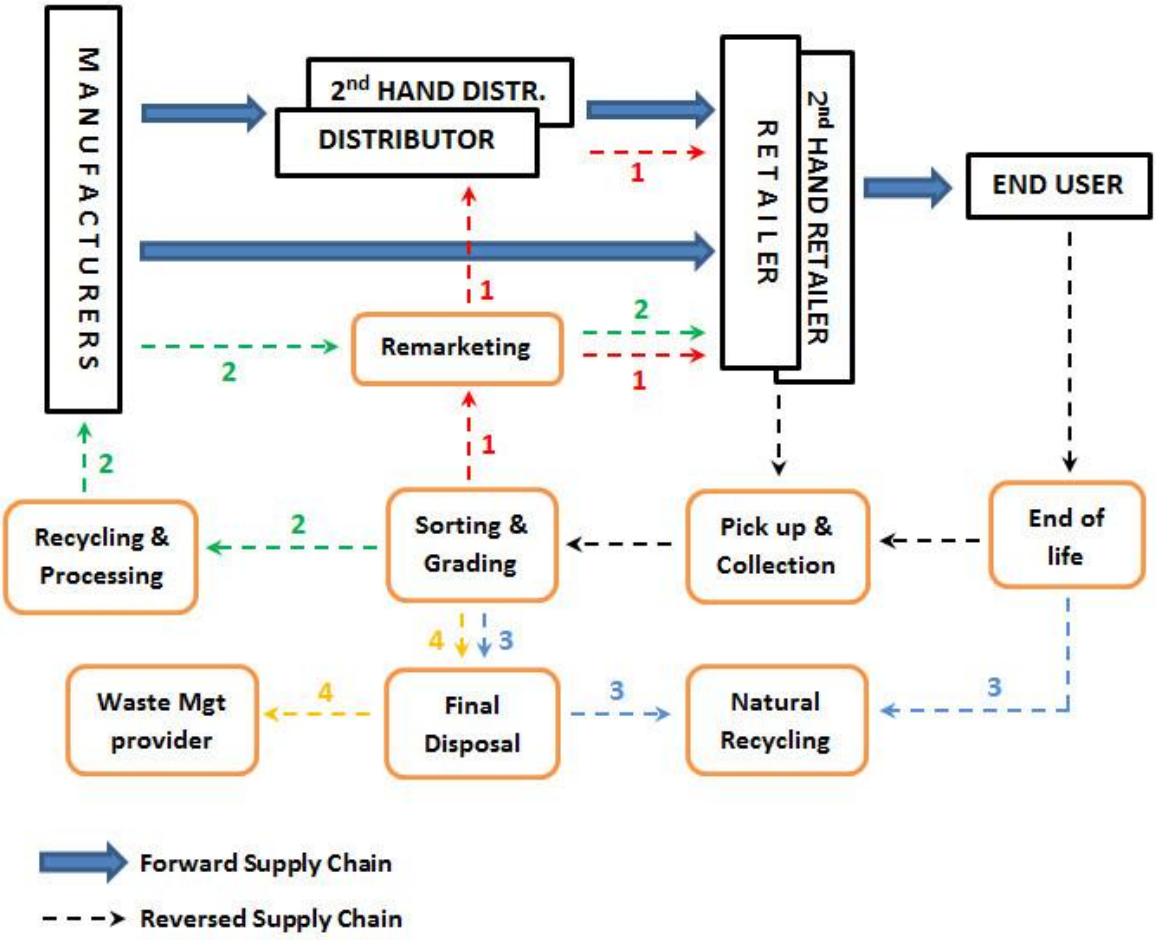



**Figure 4.1:** Closed-loop supply chain model designed for fashion retailer

***Path 1 - Reselling***

The first path, shown by arrows marked by 1, is to re-sell/re-market the collected apparel, either through local vintage stores or other second hand retailers in the third world countries (e.g. Africa). This option is carried out for high grade collected apparel. Activities like washing, repair, and chemical treatment are usually needed before the apparel is transported.

***Path 2 - Re-manufacturing***

The second path, shown by arrows marked by 2, is to re-manufacture the collected apparel into new products (e.g. to clothes, shoes, bags, rags, etc.), and then sell the new items to end customers. Re-manufacturing can be performed by the core company or sent to other manufacturers.

***Path - 3 Natural recycling***

The third path, shown by arrows marked by 3, is natural recycling. This option is for environmentally friendly or biodegradable materials, such as cotton and wool. A suitable site for this must be located.

***Path - 4 Waste treatments***

The last path, shown by arrows marked 4, is sending the environmentally damaging apparel waste (e.g. plastic, metal, non-degradable fabric) to waste treatment providers for further processing. It should be mentioned that this path is not a closed loop as the used apparel is not re-introduced into a natural cycle, but simply discarded by the waste management provider. To uphold sustainability it is important that this is done in an environmental friendly method.

The paths mentioned above can serve as a guideline for designing CLSC, but must of course be adapted to the core company and its products. Ideally, a sustainable garment of the future according to the fashioning sustainability report (2007) should be a garment that is "*carefully designed and made from renewable materials. It would be pesticide free and produced by workers in decent working conditions. It would be washed at low temperatures and have fashion upgrades to extend its fashionable life. Finally it would be recycled, reused or composted*". To make this vision a reality, it involves all the players in the industry, including the customers. This also means that it should start from the very beginning of a garment's life-cycle, namely the material acquisition and designing phases. However, as a retailer, by re-manufacturing the used products and other un-sold inventory, the life-cycle of the product is extended and is kept away from landfills. This practice should improve the environmental image of the company, besides other financial benefits by selling the re-manufactured products.

The next part will introduce Porter's Value Chain into the analysis (Figure 4.2). The vertical and horizontal linkages between activities and partners in the value chain will be explored. The value chain is also designed from retailer's standpoint, who aims to increase sustainability by introducing "recycling" activity into their business practice. This is in line with the closed-loop model designed in Figure 4.1.

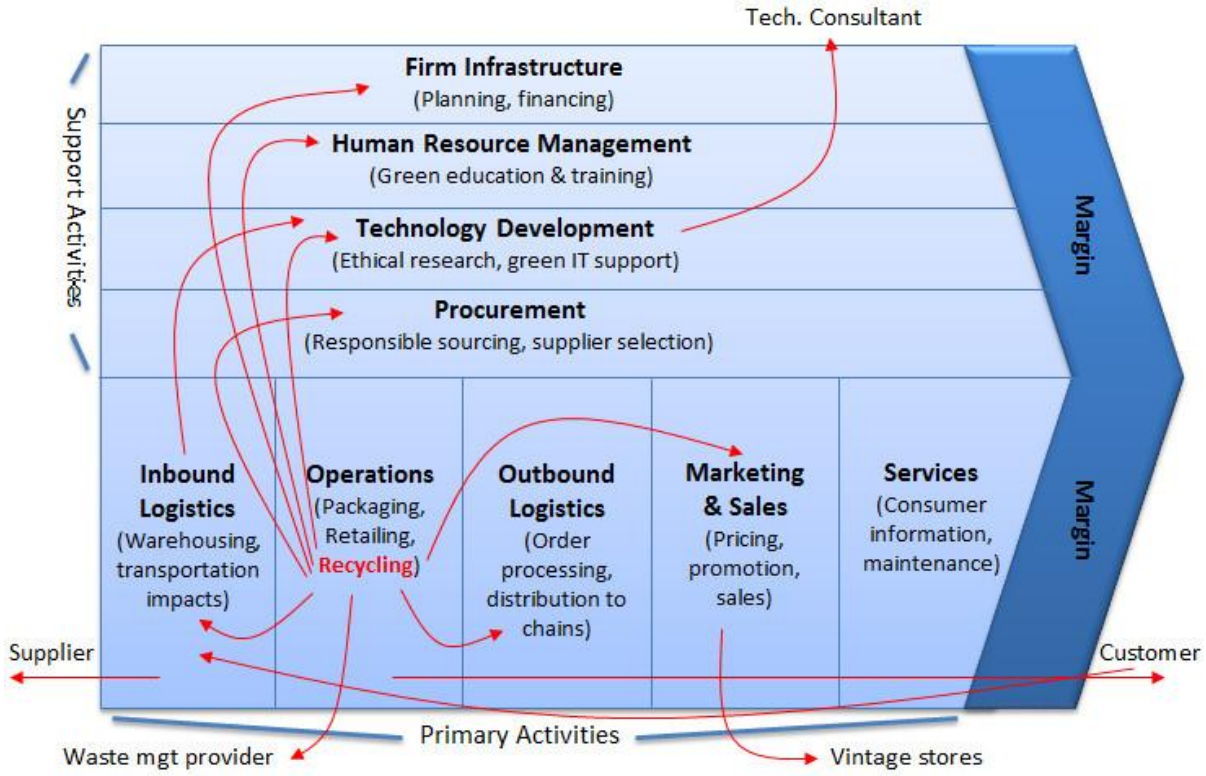



**Figure 4.2:** Porter's Value Chain adapted for Fashion Retailer

When the retailer company decides to add "recycling" activity into its operation in order to participate in sustainability effort, this recycling activity then needs to be incorporated into the retailer's main operation (as shown in Figure 4.2). Addition of a new activity will bring effects to other activities' performance in the value chain. Internal coordination (horizontal linkage) between activities and external coordination between the core company and external parties needs to be established to make the additional recycling activity run smoothly, effectively and profitably. The company must choose the form of their closed loop chain so as to earn money while also creating sustainability. The important linkages (marked by the red arrows) in the value chain that are relevant for the operation of paths/process cycles 1, 2, 3 and 4 in Figure 4.1 are discussed below.

**1. Re-selling (path 1):**

***Inbound logistics.*** The reselling path, as shown in Figure 4.1 starts with pick up and collection of used apparel from customers. This task is performed by the inbound logistics function. This creates a vertical linkage between the inbound logistics and the customers. The linkage supports the activities as the apparel and information flow between the customers and the inbound logistics. A horizontal linkage between the operation and the inbound logistics also exists as coordination of apparel and information flow between these two functions is needed.

The vertical linkage with customer can be created according to strategies or take-back relationships described in section 2.1.4. There are two collection strategies in common practice, as discussed by Ferguson and Souza (2010). One of them is the pick-up strategy, where used products are picked up from the customers. The other one is the drop-off strategy, where customers are the ones who travel to a collection point or stores to return the product. The question is, why should customers make the effort to return the used apparel/product? In this case, discounts offered by the stores or "bonus points" that can be exchanged for new clothing may be the right incentives for customers to bring used products back, along with various green awareness campaigns to increase customer consciousness.

Before the vertical linkage between inbound logistics and customers is created, an internal coordination (horizontal linkage) between technology development and the inbound logistics must exist. This linkage is important for determining and creating the technology (e.g. QR-code or RFID) to facilitate the take-back relationship with customers. The stores as the inbound logistics receiving the returned products in this case, must make sure that the customers are familiar with the technology, since this is used as a tool to bring back the used products. The technology introduction can for instance be done through posters inside the store, advertisement in newspaper or staff explaining it to customers.

***Operation.*** In the next phase, the collected apparel together with the obsolete and overstock inventory is sorted, inspected, and graded as they are usually differ in their

quality and so on. These activities are performed by the recycling section under the operation function. To assign a particular recycling process for a used garment, the grading, classification and optimal disposition methods are to be evaluated. For example, high grade used apparel may be re-sold to vintage stores where market demand is still quite high. Necessary washing and repair may need to be performed accordingly after that. Profitability is usually the main consideration when choosing which disposition options a given apparel will be further processed.

***Marketing & Sales.*** In path 1, presumably the high grade used apparel will be sent to re-sell at vintage stores or at other second hand stores in the third world countries. The role of marketing and sales will come into play here. A horizontal linkage between the operation and the marketing & sales is important for optimal coordination. So is a vertical linkage between the marketing & sales and the vintage stores and second hand distributors. At what price the apparel will be sold needs to be determined in order to maintain profitability or at least reach break-even. The apparel may also need to be re-labeled in order to maintain the image of other apparel in stores. How the apparel is going to be transported is another issue. Many options are available, such as third party transporter or by the outbound logistics function internally.

**2. Re-manufacturing (path 2)**

In this path, the initial stages will be the same as in path 1, until there is a disposition to re-manufacture the used apparel. What kind of product will be the outcome of re-manufacturing the used apparel, and quantity to be produced needs to be decided. Who will be the producer, where should the new product be sold, and is there a market for them? Questions like these need to be explored. Market surveys and product designs are needed to make this option feasible. If the new product will be produced by other partners, a vertical linkage will be created between the inbound logistics and the supplier or re-manufacturer, in addition to the horizontal linkages between internal functions mentioned previously in path 1.

**3. Natural recycling (path 3)**

The natural recycling path, in effect, has two incoming paths. The first is directly from the customer, and the second after sorting and grading re-usable. This option is feasible only for bio-degradable and environmental friendly apparel. The important linkage for this path is the horizontal linkage between the operation and the outbound logistics function. Presumably the core company has its own recycling site, the apparel will be transported by the outbound logistics to the site and then disposed into nature. Another option is to handle this over a waste management provider. In this case, a vertical linkage between the inbound logistics and the waste management company is important.

**4. Waste treatment (path 4)**

The waste management path is for used apparel that is not feasible for the other three paths and is environmentally damaging. It is usually done with working together with waste management companies, because special and complex treatment methods and equipment are needed to perform this action. As in path 3, a vertical linkage between the inbound logistics and the waste management company is needed.

Apart from the linkages discussed above, there are other horizontal linkages between the operation activity and the four supporting activities which are equally crucial to the success of the recycling activity. These linkages are important for optimizing coordination of information flow. Once the company has decided to incorporate “green” focus and sustainability (e.g. recycling), into their business practice, planning and organizing needs to be shaped properly. For example, decisions about how the recycling is financed, whether it is economically profitable, what kind of technology is needed, who should be involved, and other technical problems. The operation activity will then execute according to the decisions that have been made. Education and training of human resources is also required. The procurement function needs to select suppliers that are also practicing sustainability in the company’s sourcing strategy, especially if the company wants to add ethical and ecological brands into their product portfolio.

In term of technology, both RFID and QR coding can be used for tracking and sharing information with customers. The difference is that RFID tags costs money but can be used for several additional benefits. If an RFID tag is put on a garment, it can be used for example for inventory control, real time reporting/information and theft alarm in the store. RFID also requires an antennae and a reader (RFID system) to function that is perhaps not as easy to apply on a cell phone as a bar code reader is for QR-codes. QR-codes are fast, cheap and easy to make for a retailer. Which technology to use depends on retailer's motivation. In order to have good support for the chosen technology, the retailer may need to work together with a software & consultant company. A vertical linkage between the retailer's technology department and the software company is then established.

# CHAPTER 5

# CASE COMPANY

Chapter 5 describes the case company Min Boutique Group (MB Group), its history, strategy and market, followed by a supply chain network of the retailer.

## 5.1 Company Presentation - Min Boutique Group

MB Group is an apparel retail chain that operates in Molde and has more than 40 years of experience. MB Group consists today of multi-brand stores Min Boutique, Mia Bao, Miles Ahead, Enter Kids, Herrebørsen and Steier Sport. All stores are developed internally and are wholly owned concepts by MB Group. Main focus for further research in the thesis will be on the woman's store (Miles Ahead) and the children store (Enter Kids).

### 5.1.1 History

The first store operated by MB Group was Min Boutique, founded in 1969 in Molde. In 1988 Min Boutique was the second in Norway that opened its own Vero Moda store. In 1990 MB Group entered into cooperation with Bestseller AS in Denmark and opened three additional Vero Moda stores in Tønsberg, Kristiansund and Molde. Bestseller consists of the following brands: Jack & Jones, Mama-Licious, Name It, Object collection item, Only, Outfitters Nation, Pieces, Selected, Vila and Vero Moda (www.bestseller.com). The Vero Moda stores in the three cities operated on a high level and were several times the best selling Vero Moda stores in Noway, both in profitability and growth. The agreement with Bestseller AS ended in 2007, and Miles Ahead started operating in Vero Moda's locations (Stenseth, 2011).

During the period 1979-2002 MB-group was a member in the purchase-chain Samtex (today: Match). The 22 year membership has contributed with competence and experience to the management of MB Group. In 2002, Match was sold to Voice, and MB-group was again a standalone multi-brand store. The next expansion was made the same year in Oslo, where MB-group bought two stores in Paleet and GlasMagasinet. MB Group had also expanded in the Møre & Romsdal region, with stores in Kristiansund, Ålesund, Sunndalen, Elnesvågen and Åndalsnes (Stenseth, 2011). The progress in network and MB

Group's successful operation is shown in Figure 5.1 with constant increase in sales figures.

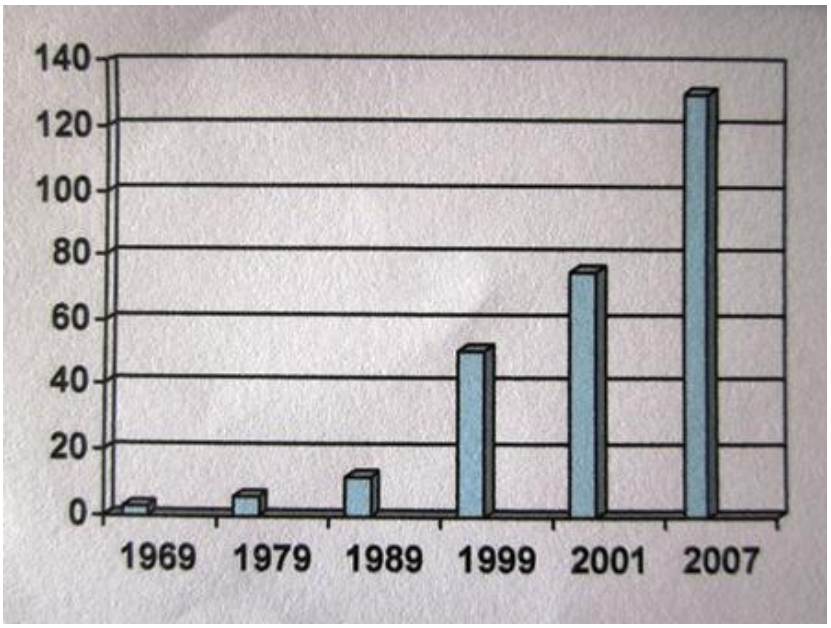



**Figure 5.1:** Sales figure - MB Group in million NOK - Sources: Stenseth, 2011, pg.3)

MB Group with its strong administration was until July 2007 the business leader for seven Bertoni stores in Norway. These have now been sold back as franchise to Bertoni-Denmark. The period 2007-2010 was a period of consolidation and change processes. MB Group terminated its cooperation with Vero Moda/Bestseller, and entered cooperation with B-young. What once was a heavy organization is now slimmed down significantly.

### 5.1.2 Strategies

MB Group is an apparel retail chain that buys finished products (brands) from all over the world through fashion events and sells them to the customers in Molde, Norway. MB Group's retail chains serve quite a variety of customers: women, men and children. The retail chains sources its products from a large number of suppliers, mainly from China, Italy and France (Stenseth, 2011) as shown in Figure 5.2.

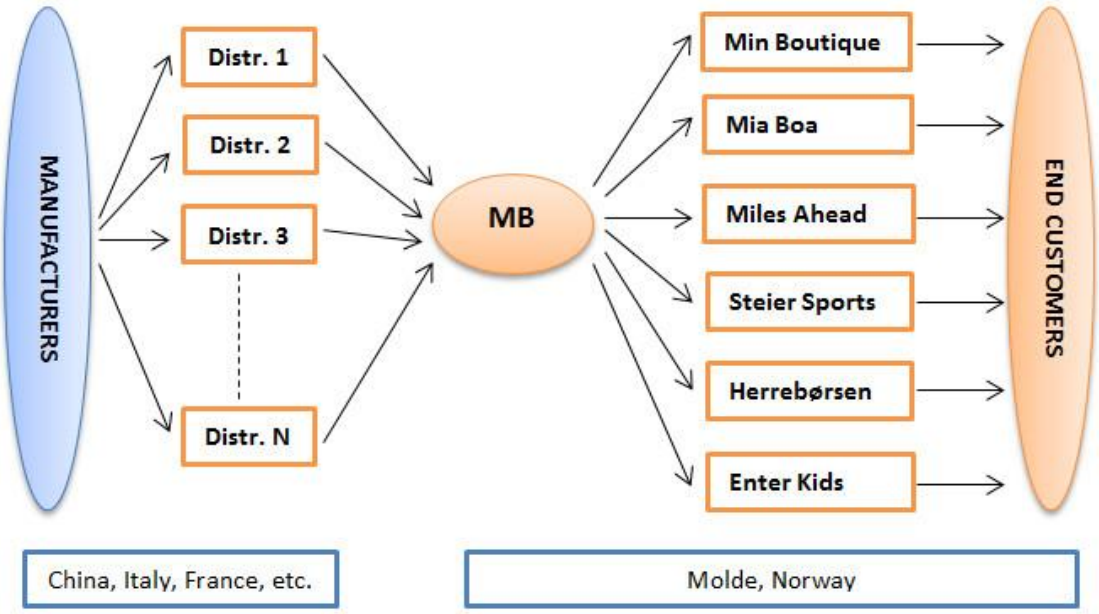



**Figure 5.2:** Supply chain network - Min Boutique Group

Inger Mette Stenseth is a local entrepreneur who believes in micro, testing small and investing big in up-work. She wishes to use the word "molding" as a future vision. To mold means to shape, but "molding" means also in Norwegian someone who is from the town Molde. Stenseth wants to participate in the shaping/molding of the local fashion industry by increasing consciousness about sustainability and slow fashion. MB-Group is working towards a sustainable future and wants to develop a platform for growth through a three-fold strategy:

1. ***Strengthen and expand multi-brand concept.*** This can be achieved by purchasing products with a "story/concept", by having own production, or establishing partnership with designers.
2. ***Invest in the human resources.*** This means giving education for the employees. This can be accomplished together with partners by facilitating to a course center for retail trade in Molde.
3. ***Establish partnership with international company in the fashion industry.*** This strategy may be implemented by signing partnership with acknowledged international companies/brands which have great market potential in Norway.

## 5.2 Market and Competition

The Norwegian apparel market is facing increased international competition. Previously, Danish and Swedish companies used to have an almost monopoly in the market. Today, Varner-Group is the biggest Norwegian player in the market. Varner-Group consists of chains Cubus, Dressmann, Bik Bok, Vivikes, Wearhouse and Poco Loco. Besides these, the market is dominated with more undefined chains like Lene V, Popin, Voice of Europe, Match, etc. as shown in Figure 5.3 (www.varner.no and Stenseth, 2011).


**Figure 5.3:** Companies in Clothing Retail Trade - 2005. Market Shares of total value 25 700 million NOK (Source: Stenseth, 2011, pg. 9)

Currently, a new trend of "vintage stores" like Urban Outfitter and Outfitters Nations (by Bestseller) is emerging. Spanish, French and German concepts see Norway as a potential market. Zara (by Inditex Group), one of the largest chain stores in Europe, has already established its stores in Oslo and Trondheim and might consider targeting more cities with several other concepts. Group Gortefiel from Spain have also showed interest in the Norwegian market as well, so have UK companies with concepts like REISS, Jane Norman

and River Island. An increase in competition with a strong pressure on price is expected, together with an increased focus on the more "adult" market. Increase in consumers awareness on quality and price makes the "fast fashion" a tough competition on prices and quantities, while at the same time giving room for the multi-brand stores to find niches in the market where they can build brand loyalty. MB Group believes that sustainable fashion is the future, and that there are great opportunities in this market (Stenseth, 2011).

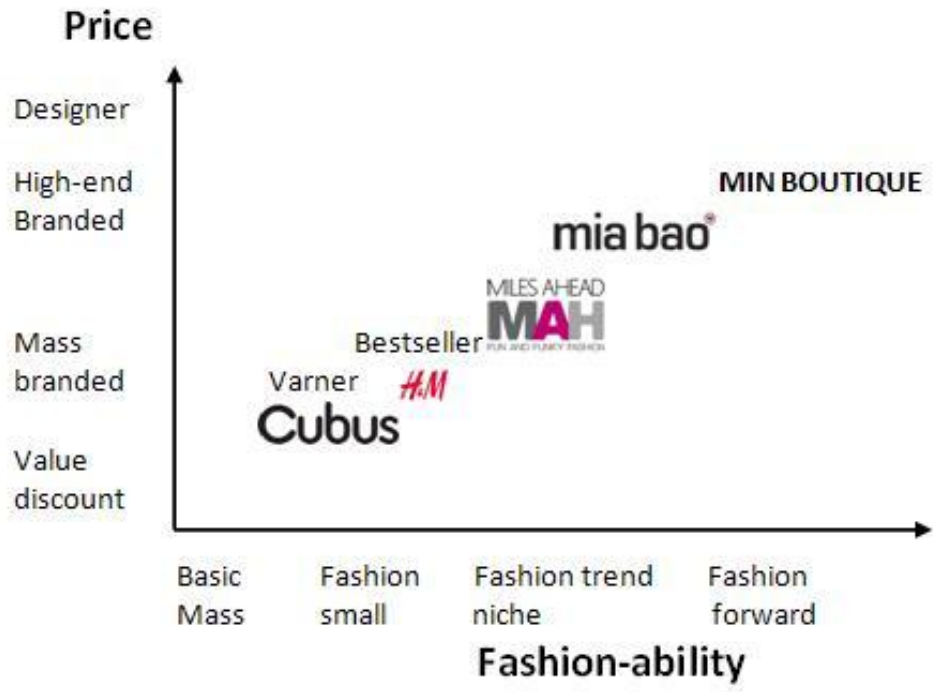



**Figure 5.4:** Min Boutique, Mia Bao and Miles Ahead - market position (Source: Stenseth, 2011)

Figure 5.4 shows Min Boutique's, Mia Bao's and Miles Ahead's position in the market based on price and fashion ability compared to other brands like H&M, Bestsellers and Cubus (from Varner). Min Boutique is the high-end fashion store with the highest quality, followed by Mia Bao and Miles Ahead which all belong to MB-Group. The vision and market segments of the three stores of MB-Group's woman's wear are presented in table 2 below.

| Store: | **Min Boutique** | **Mia Bao** | **Miles Ahead** |
|---|---|---|---|
| Slogan: | “Quality is our mission; nature is our fashion” | “Style.fashion.life” | “Fun&funky fashion” |
| Price segment: | High-end | Medium, high-end | Low-end, medium |
| Target customers: | 30- 60 years<br>Trendy women with good economy and purchasing power. | 25- 35 years<br>Women with interest in trend and function | 15- 25 years<br>Young trendy women who like to renew themselves. |

**Table 5.1:** Market segment of woman’s wear - Min Boutique, Mia Bao and Miles Ahead.

# CHAPTER 6

# CASE ANALYSIS

In this chapter we first look at the retailers' motivation to apply sustainability practices in their business, and how this could be achieved. Secondly, we look at how MB Group is practicing sustainability in their stores and how this can be increased through customer informing/educating the customers by product tracking.

## 6.1 Motivation to track products after sale

It is not yet a common practice in the apparel industry to apply a tracking system in order to have control over the used apparel either for re-manufacturing, recycling possibilities or other purposes. As shown in Figure 6.1 below, a retailer may have some control or knowledge about what happened in the "before sale" processes depending on the degree of transparency in the supply chain. On the "after sale" stages, however, the retailers usually lose control over what happens to the sold apparel on the customer's side.

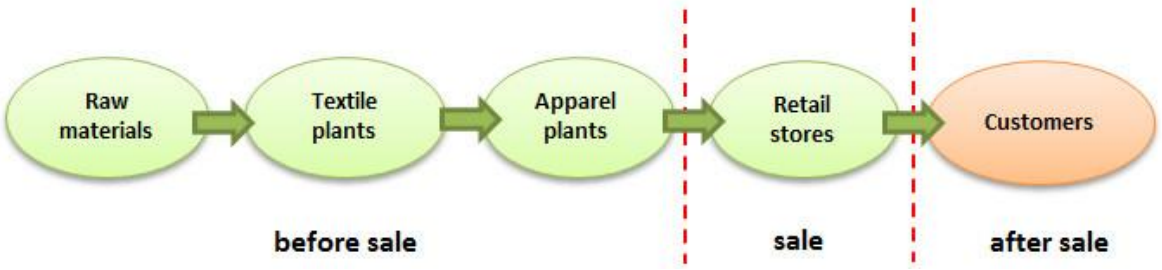



**Figure 6.1:** Supply chain for apparel in different sales stages

Just like in other industries, scarcity of raw materials in the apparel industry (like cotton) may increase, as demand for apparel keeps increasing because of the overflow of the low-price products. However, according to Vaagen (2011), sources of material are constant or maybe decreasing as some countries (e.g. India, China) may stop exporting and only produce for domestic consumption**.** In this case, getting back the used apparel at the end of its life-cycle for recycling becomes crucial since the materials can be reused. For other apparels, communication and information share with the customers is important. Retailers who sell biodegradable or other environmentally friendly materials

may want to offer the possibility for their customers to search or trace for the identity of the product they buy.

In order to achieve these motivations, technology like radio frequency identification (RFID) or QR-code can be used by retailers to keep track of the sold products. In addition to this, a document (e.g. the Eco index as discussed in section 2.3) should be created by the retailers as a reliable proof. This document can later be shared with the customers. Illustrations about the QR-codes can link to such document is presented below.

## 6.2 Technology (QR-codes)

In this case QR-code technology was chosen to inform the customers about the origin of four chosen products and in the future to track jeans after sale (Figure 6.1). QR coding was chosen instead of RFID because this was a cheaper/free solution for MB Group. For tracking of hundreds and thousands of articles, more advanced system (e.g. RFID) is needed, since making the QR-codes manually for every single item is time consuming. MB Group decided to use QR-codes as a test to see how the technology would work, and if it succeeded, it could be invested in RFID technology later. The value added to the customer according to Figure 4.2 would be the same since the consumer would receive the same information using both technologies.

The QR-coded document was distributed via Google Documents. The documents contained information about product properties and that they were produced in comply with certain international quality or ecological standards.

Since the product information was not directly visible with the product, but had to be found online, the retailer needed to create motivation for the customer to actually scan and access the QR-coded document. The incentive was a discount of 20% for the ones who answered a small survey containing QR-codes for four products at the Enter Kids store (Appendix H). It was also done for a campaign for recycling of jeans, where customers could scan the code and see that they would receive 50 NOK off every recycled jeans when buying a new one (Appendix B).

A future plan for the retailer in this case is to track jeans after sale to know when approximately they will come back to the store. To be able to track, customers must again have an incentive to scan the codes. In this case customers can be informed to scan the codes integrated in/on the apparel once every 3 months and they will receive offers on the document linked to the code. This can be a percentage off on a given product every 3months if they bring the printed document.

## 6.3 Projects at MB Group

In the discussion with the management and owner of the MB Group concerning the company's vision to increase sustainability in their business practice, it was revealed that the company has already introduced several products that are environmental friendly in their product portfolio. For example, bamboo t-shirts, G-9.8 underwear made from biodegradable material, the "think" shoes that made of organic leather and other environmental friendly products for children's clothing. Recently, the company has also started a pilot project called "jeans for life" to recycle used jeans into children's slippers. The current strategy the company applies to deal with the un-sold stocks is mark-down, and delivered to other places for sale, such as fashion events in Oslo.

Some important events of the project are described below:

- **April 7th, 2011:**

A meeting was conducted at the college to discuss the purpose of the project, which product items to include in the project, and what technology is the most suitable for the pilot project. Nils Jacob Berland, a business and software consultant from Pantarei in Bergen was invited to present the applicable technologies, namely RFID and QR-code. Finally, the management of MB Group decided to use QR-codes instead of RFID as suggested by Berland. The considerations among others are that QR-codes are much cheaper or basically free, simpler, and easier to apply. Besides, this pilot project's purpose in the short term is only to inform the customers about the identity of the product and some other promotion/campaign information, such as recycling of used jeans. For the case study of this master's thesis, two product cases from two different stores at MB Group are selected for analyzing. They are presented in section 6.3.1 (the used jeans recycling) and 6.3.2 (information sharing for the children's wear).

- **April 11-12th, 2011:**

Designing of the documents that would be linked to the QR-codes for each product took place (see Appendix D - G). The making of the QR-code for each of the documents and testing accessibility by using mobile phone or directly clicking on the links was done. A promotional campaign for advertising at the local newspaper for the recycling of used jeans was also designed (see Appendix A) together with its Google document (see Appendix B).

As mentioned Google Documents was used for the documents the QR-codes linked to. These documents was saved and set to be shared with "everyone who has the link". This means everyone who scans the code or types the associated URL can access the document. Since the QR-code was made using Google Documents, we can use Google Analytics to see when the QR-code is scanned and from where geographically the Google Document of the code is accessed. It is also useful to use a URL-shortening service to avoid long and complicated URL addresses. "Bit.ly" is a web-page where URL addresses can be shortened. The last step is to copy the shortened link from www.bit.ly and paste it into www.mobilecodes.nokia.com to create the final QR-code. The QR-code is then ready to be used for the wished purpose.

- **April 14th, 2011:**

The campaign brochures for the jeans recycling were printed and distributed on the students's information boards at Molde University College and at several student apartments (see Appendix C).

- **April 15th, 2011:**

Advertising of the jeans recycling campaign in the local newspaper, Romsdals Budstikke was published (Appendix A). For marketing and response, the owner has already made pages on facebook for each store. Facebook is a social utility that helps people communicate more efficiently with their friends, family and co-workers. Currently it has over 500 million active users. (www.facebook.com). The facebook group for Miles Ahead was used to inform the fans of the group about the jeans campaign and environmental thinking.

### 6.3.1 Jeans recycling (at Miles A Head - MAH)

The pilot project called “jeans for life” to recycle used jeans was implemented at the Miles Ahead store. To collect the used jeans a campaign was made using QR-codes (see Figure 6.2). For the first trial, the campaign lasted from 15th - 20th April 2011. The technology was first applied for this store because of its 1st. anniversary on Storgata celebration. Other considerations are that this store has the youngest target group, and generally young people are familiar with the latest technology, among those QR-codes. Appendix A-C shows how the technology was applied in the campaign. The purpose of the campaign was to present the technology for the customers, and promote the recycling of used jeans campaign. In this way, MB Group hoped to receive enough used jeans for re-manufacturing.


**Figure 6.2:** QR-code for the jeans campaign

For each used jeans returned to the store for re-manufacturing, the customers would get 50 NOK off for a new pair of jeans of brand Levis, Cheap Monday and Id Est Jeans. The recycled jeans can be of any brand and style. This is specified in the Google Document linked to the QR-code on the campaign. Together with this information the owner of MB-Group decided to use a marketing logo for every document each QR-code linked to. Figure 6.3 shows the logo. The word “I” on the dialect spoken in Molde is “i”, so the meaning of the slogan would both have an English and local character.


**Figure 6.3**: Marketing logo of MB Group

The collected jeans at Miles Ahead would create a closed loop supply chain as path 2 in Figure 4.1 shows. The jeans would first be collected, then sorted and graded and finally sent for recycling & processing. Re-manufacturing will take place in Molde by a local designer Trude Nistad who is a specialist in children's wear. The recycled jeans will be used as raw material for children's slippers. The slippers will be made in European sizes up to 38 and sold at the Enter Kids store.

### 6.3.2 Children's' products (at Enter Kids)

At the Enter Kids store the focus was set on parental care for clothing and children. The purpose of this campaign with QR-code is to introduce the technology as well as to share product information with customers. Here QR-codes will be used to inform the customers about the ecological aspect of the products the store carries. The documents these QR-codes link to (Appendix D - G) contain information about the product, ecological certificates and the marketing logo (Figure 6.3). The four children products chosen were Hufa caps, tops from Claire, Lilleba nightwear, and Bobux shoes. Information about the four products that is provided in the document is shortly described as followed:

**Hufa cap (Appendix D):**

Hufa caps, produced in Ålesund, give maximum protection against wind while keeping water vapor resistance from inside to outside. This cap has the Woolmark certification; this indicates that the product contains 100% pure new wool. Merino wool gives quality, comfort and softness while wearing it (Appendix D). The cap has also the Confidence in Textiles Certification. This means that it is tested for harmful substances according to Oeko-Tex® Standard 100 for textile products of all types which pose no risk whatsoever to health.

**Top from Claire (Appendix E):**

Nordic winters are best qualified for wool, but children prefer cotton. This is a top made of wool outside and cotton inside. It carries the Confidence in Textiles- and the Global Compact Certification. "The United Nations Global Compact is a strategic policy initiative for businesses that are committed to aligning their operations and strategies with ten universally accepted principles in the areas of human rights, labor, environment and anti-corruption" (www.unglobalcompact.org).

**Lilleba Nightwear (Appendix F):**

This product is designed by Norwegian designers and made of Bamboo. Bamboo is said to be the world's best sustainable resources, with a grow-rate up to a meter or more per day. It holds the world record as fastest growing plant. It is actually a grass not a wood that sends new shoots after harvesting without need for replanting. Bamboo in clothing is organic since it does not require chemical pesticides or fertilizers. It is an alternative to cotton, wool, hemp and synthetic fibers like polyester and nylon (www. bambooclothes.com). Nightwear from Lilleba keeps the skin dry and is a good choice for those with atopic eczema. The products are PH-neutral and do not contain formaldehyde.

**Bobux "i-walk" shoes (Appendix G):**

Bobux "i-walk" is a soft, flexible rubber sole shoe, with extra grip to support natural development and avoid malformation and spinal issues later in life. They are made from breathable Eco leather, ensuring feet breath and staying cool (www.bobux.com).

### 6.3.3 Customer survey on green thinking

In addition to the two projects illustrated above, a small survey was also carried out on May 6th, 2011 by MB Group concerning green thinking. Focus was set on the Enter Kids Store. The purpose of this survey was to have a picture about parents' opinion and awareness concerning "green products". The question of the survey was "How important is it for you that the clothes and apparels that you shop for your children are ethical and environmentally friendly?" The answer sheet was design in the time frame of "today" and in the "coming 4 years". The alternatives to answer were: price, ethics & environment, and brand (see Appendix H).

The survey sheet contained the QR-codes that were made on April 11th, 2011 for the products at Enter Kids. A discount of 20% was given to people who response to the survey. A number of copies of the survey was printed and given to the store and another one to a cafe “Fole godt” in Molde. This cafe has number of mothers coming in with their babies every day. A third pile was shared to people passing through Moldetorget, the shopping mall in center of Molde.

## 6.4 Results

This section gives the results of the two projects (jeans recycling and sharing information on children’s products) and the result of the green thinking survey. Some possible causes of the projects’ success and failure are also pointed out.

### 6.4.1 Jeans recycling

Three weeks after the jeans recycling campaign was announced, it was revealed that the result was not satisfying. Unfortunately, no jeans were returned for recycling. Perhaps it was because people do not care about recycling at all? Or was the campaign of five days before Easter Holiday too short, so that people did not have time to check on their wardrobe? Was the technology too advanced for people in Molde? Or was the offer of 50 NOK not considered attractive enough for customers? The reasons may be many.

As a response to the bad result, MB Group has decided to continue to use QR-codes, Facebook and a blog site to increase consciousness about sustainability and slow fashion behavior among customers. Tracking of jeans with QR-codes to follow the products life cycle is a strategy for the future, depending how QR-codes at the current early stage will be received among customers. The recycling of jeans campaign was first planned to be from 15-20th April, 2011 but was extended for unknown period of time, since the campaign was giving slow results.

It was also agreed that the local newspaper should be contacted once again. This time, an article describing this thesis and the cooperation between Molde College University and Min Boutique Group would be published. This will be done to create awareness among people about sustainability and the dark sides of fashion industry. In the article the

campaign about recycling of jeans will be mentioned in hope to increase number of recycled jeans.

### 6.4.2 Children's products

It was initially suggested to have a separate QR-code for each individual product on the shelf to be able to track number of scans, but this was not fully followed through by the store. MB Group decided instead to use one QR-code for each brand. This was done because of assumptions that customers needed first an introduction to the technology. It also saved time and effort in case the codes would not create interest. Making one code for each brand made it unfortunately impossible to track how many customers actually accessed the information behind the codes. The action research was therefore not carried out as planned. However, to have an indicator on green interest and consideration among customers when purchasing, MB Group decided to conduct a survey as explained in section 6.3.3 and the results is presented in section 6.4.3 below.

### 6.4.3 Survey on green thinking

The responses for the survey on green thinking focus on children's products that was conducted by MB Group are presented in table 6.1 below. A total number of 24 parents responded to the survey.

| Criteria | Response | Total |
|---|---|---|
| **Today:** | | |
| - Price | IIIII IIIII IIIII IIIII I | 21 |
| - Ethic & Environment | IIII | 4 |
| - Brand | III | 3 |
| **In 4 years:** | | |
| - Price | IIIII IIIII IIIII IIIII I | 21 |
| - Ethic & Environment | IIIII I | 6 |
| - Brand | IIIII | 5 |

**Table 6.1:** Responses of green thinking survey

The table shows that price by far out-wins the other two criteria. Some responders may answer more than one criterion, but when asked, price is still their first priority.

## 6.5 Discussion

The two pilot projects presented above are meant to increase the sustainability in the business. Information sharing with customers will hopefully affect the "green focus" and contribute to "slow fashion" behavior among the consumers. As illustrated in Figure 4.1, a supply chain can be closed by re-manufacturing. This is exactly what the recycling of jeans does. Strong chemicals are used when making jeans, and often under bad working conditions. The chemical use might be difficult to reduce and make the product more sustainable, however re-manufacturing increases sustainability and lifetime of a product.

By informing about product's history, both the negative story about the jeans and the more sustainable one, such as on products at Enter Kids, consumers can become more rational. Knowing the origin, the environmental benefits and personal benefits of these products makes consumers better able to evaluate products that are offered. When becoming more rational it is easier to understand quality and price better. The question is as Poiesz (2004) asked; do customers have the motivation, opportunity and capacity to act sustainable even if this kind of information sharing is given? It might be difficult to motivate them to pay a higher price for a sustainable children's product when there are many low price chain competitors. Perhaps anti-allergy products should also be set in focus at the children's store, to combine sustainability and personal health.

As mentioned briefly, MB Group also sells biodegradable products such as G=9.8 underwear made of white pine trees. This is another way the business closes the loop as illustrated in Figure 4.1 (natural recycling). The third way according to the same figure is their second hand and vintage sale (re-selling).

The technology used is a cheap and easy way to track products. The limitation in this project is that one QR-code was made for every batch of the same product. To be able to track and see when and from where the codes are scanned, a different QR-code should

be used for every single item. Because of time limitation of this master thesis it was decided to make the process easier by making one code for every batch. To begin with, it was decided just to introduce the technology to the public through the recycling campaign and informing about products background at Enter Kids. For these purposes it was no need to use time to create different codes. As the methodology in this master thesis is action research, the foundation for using QR-codes to track jeans will be set, but continued and followed up by MB Group.

The results of the survey MB Group conducted shows that parents do not think much about ethical and environmental friendliness when purchasing for their children. The survey was taken just to give a small indication whether parents consider this issue at all. The limitation of the survey was that mostly parents of babies were asked. A couple of people commented that price is determining when the kids are still babies, but as kids grow, brand is more important, especially for teenagers. A father also commented that parents consider quality on outdoor clothing for children because of Nordic weather conditions, so here slow fashion behavior is important. Otherwise people claimed that price is essential most times since children grow fast and need many shifts.

As the survey focused on young parents who might not be economically established yet, it is natural to assume that price is their main consideration. Had a different customer group or product group been chosen for similar survey, the results might have turned out differently. An older customer group for example, might be more environmentally conscious and concerned about what garment they wear and what kind of food they consume. If the survey had been about outdoor clothing instead of fashion, people might have chosen environmentally friendly products, or slow fashion with high quality, because willingness to pay is higher since it is about publicly displaying hobbies and lifestyle. Moreover, Molde is just a small town, perhaps people are not that aware of or influenced by environmental fashion and “green” focus compared to bigger cities. Bigger cities have a wider range of people and may have a larger group of people interested in these issues. To be able to buy environmentally friendly wardrobe, one must be financially strong. Slow fashion costs, not only for parents but for everyone.

# CHAPTER 7

# FUTURE RESEARCH & CONCLUSIONS

## 7.1 Future research

In this thesis, a theoretical closed loop supply chain model was proposed, a case analysis on sustainability and educating customers by QR-coding was performed for the Molde based MB Group. This QR technology requires knowledge and effort made by the customers to download an informative application on the product's origin. Therefore, it might be reasonable to analyze customers' motivation and incentives to actually do that. Further research opens the opportunity to perform an in depth study on how much people know about sustainability in fashion apparel. Are people aware of the ethics behind a garment: water, pesticide and energy use in growing, chemical use and working conditions in production, retailer's role, and consequences of their own usage of apparel and disposal damages on environment?

It might be also worth researching if QR-codes are the right technology to track a pair of jeans after sale in order to receive it back in the future, since this requires time and following up. For the recycling of jeans activity, a study can be done to find out if 50 NOK per jeans is enough motivation to make the effort to recycle.

## 7.2 Conclusions

Sustainability in fashion is a multi-faceted issue. Often the focus is on the manufacturer, asking for apparel to be produced in an environment-friendly manner, or on the consumer, suggesting each of us to buy less and recycle more or to buy environment-friendly items. However, as this thesis has shown, the retailer too can play a major role in promoting sustainable practices. The retailer can work in two directions, towards the supplier and towards the customer.

It is possible to change customers' buying behavior, but it requires time, effort and money as most customers nowadays are still price focused. People with "slow fashion" behavior will perhaps continue to act this way as they already know the benefits of

buying quality versus quantity. People acting according to fast fashion might be more difficult to influence, especially young people because of the strong price competition. For parents with young children price is important, and competitors (e.g. H&M) with ecological standards on children's clothing can be quite as good at some products as Enter Kids.

According to Stenseth, strong pictures of dark sides of the fashion industry are needed to be able to influence customers' buying behavior in a more sustainable direction. If people are exposed to pictures like child labor, bad working conditions and effect on animals of environmentally damaging products, they will hopefully start to think about ethics.

*"I assume that parents are conscious consumers when comes to apparel purchasing. I believe that the moment they see ethic in the value chain, and the consequences of cheap products, their production processes and use of chemicals, they will see that cheap products are not for the future. I take ethics and ecology seriously especially at Enter Kids"* Stenseth (2011).

The first objective of this thesis was to design a closed-loop Supply Chain model for a fashion retailer as the core company based on literature and theory reviews. The first part of the thesis shows how a closed-loop can be used in the apparel industry, and the model developed here will hopefully be helpful to retailers in implementing their own sustainability practices.

The second objective was to explore how a fashion retailer could apply sustainability practices for their portfolio brands. Unfortunately, an attempt at creating a closed-loop supply chain for a particular product failed, presumably because of lack of customer interest. An attempt at providing product information about sustainable items did also not generate much customer response. Finally, a survey on customer preferences showed that customers are likely to choose price over ethics.

While this thesis has shown that it is possible to practice sustainability in fashion retailing, it has also shown that sustainability requires educating the customers to make the right

choices in order to be successful. In conclusion, it is apparent that sustainability is achievable only as a long term goal through continuous effort. For Min Boutique Group the closed loop model created (Figure 4.1) can serve as a tool for “molding” the fashion industry in Molde.

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**APPENDIX A**

**JEANS RECYCLING CAMPAIGN (ADVERTISEMENT)**

**APPENDIX B**

## JEANS RECYCLING CAMPAIGN (GOOGLE DOCUMENT)

***Vi gir deg 50 kroner for din gamle jeans!***

*Spør i butikken for mer informasjon*

# *JEANS for Life!*

Love me
Wear me
Pass me on




**Resirkulering av jeans!**

Å være "miles ahead" kan man være på mange måter. Vi har valgt å markere 1 år i Storgata ved å lansere en kampanje med mange elementer. Vår lille miljøkampanje er et stor skritt for oss på mange vis. Vi viser at vi er en butikk som bryr oss om det nære og fjærne. Hjerte er et symbol for at vi bryr oss om byen vår like mye som vi bryr oss om menneskene, som har vært med å produsere våre jeans. Vi ønsker at du skal være glad i dine jeans, at du skal bruke de med glede og at du kan få sjansen til å gi de videre.

I samarbeid med studenter ved Høgskolen i Molde undersøker vi forbrukeres interesse og nysgjerrighet til å bruke sine forbrukermakt til å til å tenke miljø gjennom produkters hele livssyklus.

Takk for at du er interessert!
Takk for din jeans!

MILES AHEAD
MAH
FUN AND FUNKY FASHION

Daaehjørnet, 6413 Molde, tlf: 71200763

**APPENDIX C**

## JEANS RECYCLING CAMPAIGN (BROCHURE)

**HUFA CAP**

**ENTER KIDS**
**Molde* Norway**
**i ♥ MOLDE**
**Takk for at du er bevisst miljøet og en bærekraftig fremtid**

# HUFA LUER

Maksimal beskyttelse mot vind (kulde faktor reduksjon) men samtidig beholde vanndampmotstand fra innsiden til utsiden (svette kontroll).
http://www.hufa-luefabrikk.no

Spesielt utvalgt Merino ull gir deg overlegen kvalitet, komfort og mykhet når du bruker det. Dette plagget bærer Wollmark-symbolet på kvalitet for ren ny ull. Bare lisensierte produsenter som oppfyller Woolmarks sine strenge ytelsesstandarder har lov til å bruke det. Ta vare på det og det vil belønne deg med varig utseende.
www.woolmark.com

CERTIFICATION TRADE MARK
WOOLMARK
All our tartans are made from 100% pure new wool

TEXTILES VERTRAUEN
Schadstoffgeprüfte Textilien
nach Öko-Tex Standard 100

Testet for skadelige stoffer i henhold til Øko-Tex Standard 100. Øko Tex Standard 100 er en global enhetlig testing og sertifiseringssystem for tekstilråvarer, mellomprodukter og sluttprodukter i alle ledd av produksjonen.
http://www.oeko-tex.com

http://bit.ly/gpkiMt

This project is part of the master's thesis for Msc in Logistics titled "Sustainability in Fashion Apparel Supply Chains by Closed-loop Logistics Systems". This thesis project is a case study at Min Boutique Group by students from Molde University College.

**APPENDIX E**

**TOP FROM CLAIRE**

# ENTER KIDS
# Molde* Norway

**Takk for at du er bevisst miljøet og en bærekraftig fremtid**

## WOOL/COTTON - CLAIRE KIDS

Ull ytterst – Bomull innerst Nordiske vintrer egner seg mest til ull, men barn trives best med bomull direkte mot huden. Akkurat denne sammensetningen holder du nå i hånden, i ett og samme plagg. www.clairekids.dk


Testet for skadelige stoffer i henhold til Øko-Tex Standard 100. Øko Tex Standard 100 er en global enhetlig testing og sertifiseringssystem for tekstilråvarer, mellomprodukter og sluttprodukter i alle ledd av produksjonen. http://www.oeko-tex.com


Menneskerettigheter og grunnleggende arbeidskrav skal være overholdt, der våre plagg produseres. Claire Group støtter FN's Global Compact initiativ, og vi er medlem av Business Social Compliance Initiative, som hjelper oss med å kontrollere at det hele ikke er bare tomsnakk.
http://www.unglobalcompact.org/

This project is part of the master's thesis for Msc in Logistics titled "Sustainability in Fashion Apparel Supply Chains by Closed-loop Logistics Systems". This thesis project is a case study at Min Boutique Group by students from Molde University College.

http://bit.ly/hG2gib

**LILLEBA NIGHTWEAR**

# ENTER KIDS
# *Molde*Norway
# Takk for din interesse!

## LILLEBA NATTØY

Nattøy og undertøy i eventyrlige fibre av bambus.

*Unike egenskaper:*
Bambus suger fukt fire ganger bedre enn bomull og holder huden tørr og god, noe som blant annet er bra for barn med atopisk eksem. Produkter fra Lilleba er PH-nøytrale og inneholder ikke formaldehyd som kan være både allergi og kreftfremkallende.

*Norsk design*
Designerne Silje Sivertsen og Nina Eikerol holder til i en gammel spikerfabrikk i sentrum av Stavanger. I utformingen av produktene flettes nordisk tradinsjon og et rent, grafisk utrykk sammen med fremtidsrettende kvaliteter.

http://www.lilleba.no

This project is part of the master's thesis for Msc in Logistics titled "Sustainability in Fashion Apparel Supply Chains by Closed-loop Logistics Systems". This thesis project is a case study at Min Boutique Group by students from Molde University College.

http://bit.ly/g4xx4P

**BOBUX SHOE**

**ENTER KIDS**
**Molde*Norway**

i ♥ MOLDE

## BOBUX i WALK SKO

Love your kids, love Bobux.

Bobux i-walk støtter naturlig
utvikling og unngå misdannelser og ryggmargsproblemer
senere i livet. Utvalget av joggesko, tøfler og sandaler ser flott
ut og støtte små føttene til enhver anledning.

I-walk er enkle i form og har fullt fleksibel anti-skli såle, noe som gjør det enkelt for småbarn å leke ute. De er laget av pustende Eco lær som lar føttene puste og dessuten ser kule ut.

http://www.bobux.com

http://bit.ly/guC2dy

This project is part of the master's thesis for Msc in Logistics titled "Sustainability in Fashion Apparel Supply Chains by Closed-loop Logistics Systems". This thesis project is a case study at Min Boutique Group by students from Molde University College.

**APPENDIX H**

## GREEN THINKING SURVEY FORM

i ♥ MOLDE®

EN LITEN MARKEDSUNDERSØKELSE

**HVOR VIKTIG ER DET FOR DEG AT KLÆR OG TING DU HANDLER TIL DINE BARN ER PRODUSERT UNDER ETISKE OG ØKOLOGISKE FORHOLD?**

I samarbeid med masterstudenter på Høgskolen i Molde (logistikk) så har ENTER Kids inngått et samarbeid om å undersøke forbrukeres bevisste valg når det gjelder kjøp av klær og ting til barn. Ved bruk av QR koder er det mulig for kundene å undersøke mer om opprinnelsen til produktene. Slik er det både artig å bruke mobiltelefonen til å scanne et databilde får så å få opp nyttig informasjon om hvor og hvordan produktet er produsert. Her er kodene – lykke til med å teste ut.

CLAIR / FACTS : http://bit.ly/hG2glb

LILLEBA NATTØY: http://bit.ly/g4xx4P

BOBUX i WALK: http://bit.ly/guC2oy

HUFA LUER: http://bit.ly/gpkMI

Hva er viktigst for deg i dag: ☐ pris ☐ etikk og miljø ☐ merkevare

Hva er viktigst for deg om 4 år: ☐ pris ☐ etikk og miljø ☐ merkevare

**ENTER KIDS**
- barn i sentrum -

Takk for at du tar deg tid!

Du får **20%** på alle varer når du tar deg tid til å svare på denne undersøkelsen. ( Gjelder for perioden 5.mai – 20.mai 2011)

Din mening er viktig. Bruk din kjøpekraft. Velg kvalitet.
Vis at du bryr deg om fremtiden..
Etikk og miljø er viktig for en bærekraftig fremtid.