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## SCHOOL OF BUSINESS, ECONOMICS AND LAW

### **Hangers - The plastic straws of the Fashion Industry?**

*A case study of single-used plastic hangers*

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Hangers - The plastic straws of the Fashion Industry? A case study of single-used plastic hangers.

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*Gothenburg, May 2022*

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## **Abstract**

In line with globalization, increased customer awareness, and increasingly stringent regulations regarding sustainability, the fashion industry faces huge challenges in line with several dimensions of sustainability. Until today, the biggest focus has been on environmental improvements linked to transportations and environmentally sustainable textiles. Thereby, another sustainability aspect that has not received as much attention, is the plastic hangers. Generally, the hangers are a vital part of the exposure of the clothes in physical retail stores. Hence, the purpose of this study is to map out the value chain of single-used plastic hangers and also investigate whether the use of these hangers could become more sustainable, regarding environmental and economic aspects. The relevance of focusing on the role of the hangers further increases in line with the growth of e-commerce, which is a distribution channel where the hanger does not bring any value, either for the case company or the end customers. The empirical findings of the case study are also substantiated by theoretical findings from a literature review of the field.

The empirical findings and analysis are divided into three main parts, where the current situation is mapped out which then, through substantiation of theories, leads to a proposal for a future scenario where environmental and economic sustainability are in focus. This is followed by a final discussion where the findings are generally discussed and how the choice of method may have affected the result. The conclusion from the empirical findings and the discussion is that a relocation of the pre-hanging activities to the retail stores from the suppliers' sites, would be the most optimal option, both from an economic and environmental perspective, in order to for instance enable an immediate reuse of the hangers.

**Keywords:** Logistics, fashion industry, hangers, single-used plastic hangers, pre-hanged clothes, sustainability, circularity

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# 1. Introduction

*This first chapter introduces the background to the subject, followed by a problem discussion, explaining why this research is relevant to conduct. Further on, the purpose, research questions, and delimitations are presented, and lastly, a disposition for the structure of the report is shown.*

## 1.1. Background

Climate change is a major challenge that the world's population are facing today, sustainability has thereby become a highly topical issue (Hibbred, 2019). Sustainable development has many definitions, but one of the most widely accepted definitions originates from the Brundtland Report, defining it as *“the developing model that allows us to meet present needs, without compromising the ability of future generations to meet their needs”* (Gardetti & Torres, 2013). Today, sustainable development can be used in many different contexts and business areas, but it often requires a balance between three elements of economy, environment, and social equity (Gardetti & Torres, 2013), also called the triple bottom line (Turker & Altuntas, 2014). Furthermore, the United Nations (UN) has set 17 goals with the aim of driving global sustainable development. One of these goals is to promote sustainable consumption and production, and more specifically minimize the amount of waste by, among other things, applying a circular mindset (Globala Målen, n.d.).

The fashion industry, with its global and fragmented supply chains and short product life cycles, also known as fast fashion, can be considered as one of the most polluting industries (Macchion, Da Giau, Caniato, Caridi, Danese, Rinaldi & Vinelli, 2018). In order to stay competitive, the fast fashion supply chains require a high level of responsiveness combined with an assured level of efficiency. To be able to achieve this, it is necessary for the industry to attain a structure of shortened lead times, fast inventory turnovers, low prices, and high order fulfillment rates to meet customer demands (Turker & Altuntas, 2014). The increasing environmental awareness of both fashion companies and its customers, combined with the rapid growth of e-commerce, has made it necessary for the industry to adapt their business according to new market conditions and environmental requirements in order to stay competitive. The steep growth of e-commerce has led to changes in customer behaviors and



market conditions (Ye, Lau & Teo, 2018), which have been further accelerated in line with the Covid-19 pandemic<sup>1</sup> (Beckers, Weekx, Beutels & Verhetsel, 2021).

## 1.2. Problem Discussion

As previously mentioned, the fashion industry can be considered as one of the most challenging industries regarding sustainability (Macchion, et. al., 2018). Bertram and Chi (2018) argues that the recent trend and development of e-commerce and online shopping has shifted the way in which the customers consume clothing and fashion. This shift can further be illustrated by comparing it to the shopping behavior during the 1980s, where there were two main fashion seasons: spring/summer and fall/winter, in contrast with today were the digital developments and the constant availability of the latest trends, low production costs with short lead times, and growth of e-commerce, has led to an increase in consumption of fashion products, often known as fast fashion (Bertram & Chi, 2018). In order to achieve competitiveness as a supply chain within the fast fashion industry, responsiveness and costs are two of the most important success factors. Responsiveness is important in order to secure the right timing of the products in line with both market demands and market trends. The second factor, costs, is critical in a business environment where the end customers are highly price sensitive (Yang, Shen & Gu, 2018). Usually, the fashion supply chain is geographically dispersed which poses some challenges regarding managing information, product flow, etc., throughout the value chain (Wen, Choi & Chung, 2019).

Furthermore, as today, when the internet and the digital world is an essential part of many peoples' and customers' lives, it has led to an evolution of customer behavior and market conditions. As previously mentioned, during the recent decade, e-commerce has experienced a real upswing, not least in the fashion industry (Ye, Lau & Teo, 2018). According to Gaudenzi, Mola and Rossignoli (2021), online sales is expected to stand for 36% of total fashion retail sales by year 2022. For traditional retailers, the emergence of e-commerce has had a large impact, and digitization of sales activities is thereby a must in order to stay competitive in today's business environment. The increased rate of online sales in its turn also requires an understanding and adaptation of this distribution channel, due to the different conditions and requirements compared to the in-store retailing distribution channel (Gaudenzi, Mola & Rossignoli, 2021).

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<sup>1</sup> An infection that first appeared in Wuhan, China in 2019 and led to a pandemic that affected the global economy and consumption habits to a large extent (European Centre for Disease Prevention and Control, 2022).

In line with the growth of e-commerce, multichannel retailers have increasingly been growing where the most common combination is to offer products both online and in-store retailing (Bertram & Chi, 2018). This in turn leads to an often forgotten, but more or less vital part of the in-store retailing, i.e., the hangers. A countless amount of hangers are used during transportation of garments from manufacturing sites to retail stores. Not uncommon, it consists of single-use plastic hangers where clothes are being shipped on these hangers to ensure that the pieces arrive in the right quality, ready to immediately be exposed in the physical clothing stores (Transport Information Service [TIS], n.d.). It is estimated that around 85 billion single-used plastic hangers are discarded within the fashion industry every year (Living Circular Veolia, 2020). This has a great impact on the environment, especially since many of them end up in landfills where they take thousands of years to decompose. Due to this, the hangers have in some contexts been compared with the increasingly phased out plastic straws occurring within the restaurant and beverage industry (BBC News, 2019).

Furthermore, the increasing awareness regarding environmental sustainability and the harmful effects that the fashion industry has on the earth, has increased the pressure on the companies active within the fashion industry to adapt, and integrate green and sustainable practices in order to stay competitive (Mariadoss, Chi, Tansuhaj & Pomirleanu, 2016). However, until today, the main focus has been on making the product and production process itself more sustainable, but there are several other important aspects to consider regarding sustainability within the fashion industry. According to Bertram and Chi (2018), some of these aspects are the waste and pollution caused by logistics activities within the supply chain, such as transport and packaging, along with the post-purchase decisions made by the customers, for instance disposal and recycling decisions.

As mentioned, due to the increasingly common multichannel retail approach, the pre-hanged clothes using single-used plastic hangers could be questioned as it throughout the distribution channel of e-commerce and online sales does not serve a purpose. Generally, when customers order clothes online, the selected pieces are being packed into a parcel. To ensure the freight to be as lightweight as possible and less bulky, the hangers are removed before the garment is placed in the parcel, and the hanger is being thrown away as garbage, or in best cases, being sorted for recycling (Living Circular Veolia, 2020). On the other hand, a significant amount of clothes is still being sold in retail stores, and in this distribution channel, the pre-hanged solution saves a lot of both time, since the handling process for the in-store employees

becomes very effective, as they can immediately hang up clothes at display shelves. In addition, the cost advantages for outsourcing activities to developing countries, where most of the production and pre-hanging activities take place (Gunasekaran, Irani, Choy, Filippi & Papadopoulos, 2015), initially constitutes an economic barrier in the matter of a possible relocation of the pre-hanging activities.

On the contrary, shipping garments on hangers requires an increased transportation capacity, which results in both higher costs and increased emissions per item of clothing (Fitchette, 2021). Due to the Covid-19 pandemic, which led to container shortage and port congestion, has caused a sharp rise in the ocean freight rates which makes it even more important with cost effective transportations with a maximum filling rate (Leng, 2021). For instance, in some cases the container prices for sea freight have risen as much as 840% (Lundin, 2021). Additionally, the current increasing oil prices is expected to further affect transportation costs, which makes it even more important for companies to consider their transportation operations (Jensen, 2022).

### 1.3. Research Purpose

The purpose of this study is to map out the value chain of single-used plastic hangers of baby garments, and also investigate the potential of improved sustainability. Taking the two mentioned distribution channels into account, especially as e-commerce is predicted to continue to grow. In order to do so, means of a case study at Company X will be used.

### 1.4. Research Questions

*Q1:* What does the value chain of the single-used plastic hangers look like today at Company X?

*Q2:* How can the process of single-used plastic hangers become more sustainable from an economic and environmental perspective?

### 1.5. Delimitations

In order to conduct a valid study, some delimitations have been made. The first limitation is to only evaluate one specific hanger used for one product category of pre-hanged clothes at Company X, which is baby garments. The study is also limited to primarily investigate two

out of three distribution flows, which are the in-store retailing distribution flow and the online distribution flow, and thus the third flow - third parties is only mentioned briefly. Furthermore, some geographical limitations were made regarding investigating the disposal and recycling processes of single-used plastic hangers, to only investigate these processes in stores and warehouses located in Sweden. Additionally, some limitations have been made regarding the sustainability approach, where focus will be on the economic and environmental aspects, and thus exclude the social aspect due to timeconstraints and the given scope of this research. Lastly, the production of the hangers has also been eliminated in this research.

## 1.6. Disposition

*Chapter 1:* Gives an introducing background to the research topic, including a problem discussion, purpose, delimitations, and disposition of the report.

*Chapter 2:* Presents the theoretical framework behind the research topic, e.g., supply chain management, logistics activities, sustainability, etc. It starts in a broad perspective to be narrowed down to how it relates to the fashion industry.

*Chapter 3:* Describes selected methods and methodologies that have been used to collect and analyze the data.

*Chapter 4:* Empirical chapter that describes the current value chain of single-used plastic hangers. This chapter highlights the areas that this report will focus on.

*Chapter 5:* Contains an analysis of the empirical findings in relation to the theoretical framework and also discusses a possible future scenario.

*Chapter 6:* Conclusions of the research, and additionally future research that would be interesting to further investigate.

## 2. Theoretical Framework

*This chapter aims to review existing literature within the subject and forms the theoretical framework of the report. At first, the chapter introduces a general insight in supply chain management, logistic activities, and sustainability, to further on discuss more specific literature connected to the fashion industry and sustainability, and lastly, plastic hangers.*

### 2.1. Supply Chain Management

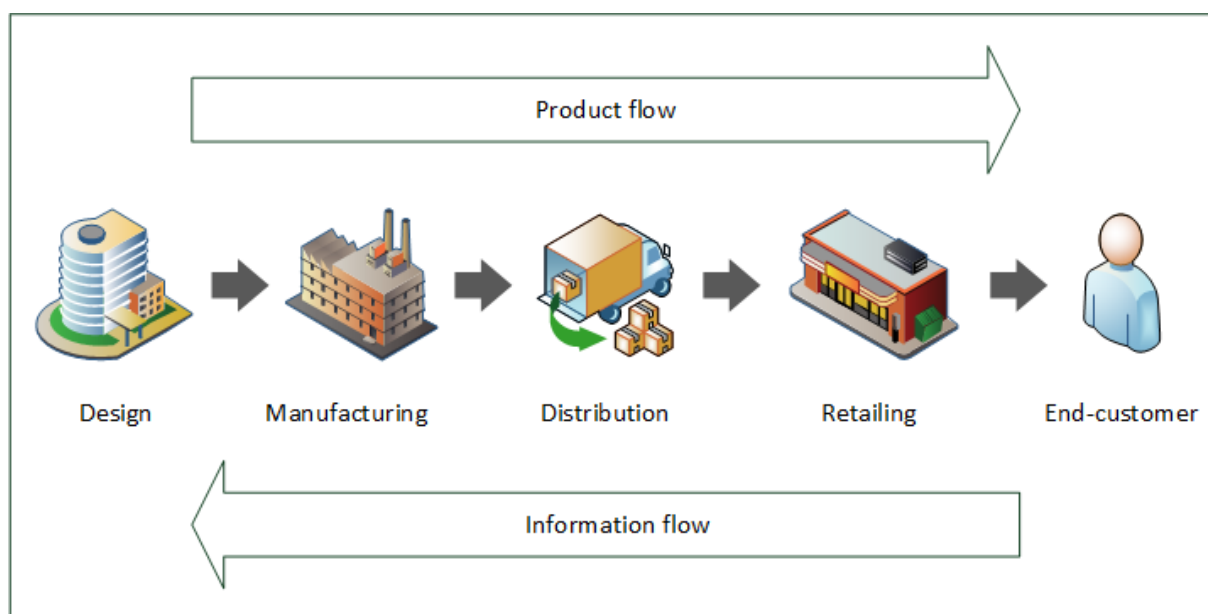
The term Supply Chain Management (SCM) was first minted in 1982, and today, SCM is one of the most important considerations for businesses and organizations in order to achieve competitive advantage and to improve the overall performance. According to LeMay (2017), the concept and definition of SCM is continuously evolving in line with the global dynamic needs and demands. But in general terms, SCM is as much a practice as a mindset and can be defined as planning and managing of all activities that are involved in the business operations with the aim to meet the needs of the end customers. The concept includes all the activities and stakeholders that are integrated in the process from raw materials to the movement of finished goods into the end customers' hands, such as logistics activities, collaboration between suppliers, warehouses, transporters, and the customers (Simchi-Levi, Kaminsky & McGraw-Hill, 2007).

The fact that a supply chain consists of several different actors, which also have their own interests, objectives and goals, makes it highly complex (Yang, Shen & Gu, 2018). Thereby, collaboration and coordination between the involved partners is a prerequisite in order to create conditions for the chain and its actors to stay competitive and maximize the benefits of the supply chain (ibid). One common approach for cutting costs is the strive to reduce and minimize inventories at all levels, from raw materials to finished goods. In order to achieve this goal, the implementation of advanced technologies is an important success factor, as it supports, for instance, sales forecasting activities and efficient information flows, and real time information (Zuckerman, 2002).

#### 2.1.1. Supply Chain Management within the Fashion Industry

The fashion industry is known to have a large variety of products with relatively short life cycles and combined with uncertain demand this often leads to difficulties in adopting

efficient supply chain practices, and there is a fine line between success and failure (Kalyani, 2021). A traditional supply chain of the fashion industry can be seen in figure 1 below, and most typically it includes raw material farmers or producers, fiber and textile producers, apparel manufacturers, transporters, warehouse, and retailers (Yang, Shen & Gu, 2018; Kalyani, 2021). A typical fashion supply chain starts with an initial fiber supplier followed by several intermediate steps of processing, such as planning, manufacturing, and marketing, to finally reach the end customer for final consumption. An efficient supply chain within the fashion industry must be able to handle the flow of demand and supply, which moves in the opposite direction of each other (Kalyani, 2021).



*Figure 1: Simplified traditional fashion supply chain. (Own interpretation by the authors, inspired by Kalyani, 2021).*

One of the main challenges that the fashion industry faces is the recent development towards fast fashion. Fast fashion refers to rapid changes and unpredictable market volatilities together with short product life cycles, meaning that fashion companies have to constantly produce new designs, at an extremely high pace and to a cheap price, which in turn causes uncertainties in calculating forecasts (Yang, Shen & Gu, 2018). Dealing with fashion articles includes a well-functioning inventory management, meaning that the inventory levels should never be in excess or too less. Excess inventory levels increase the risk of overstocking, which can lead to obsolescence of the products which may lead to drop in profit. On the other hand, too low inventory levels increase the risk of selling out that may result in loss of sales

(Kalyani, 2021). Bearing this in mind, it is easy to understand the importance of a well-functioning, reliable, and robust supply chain with a high level of flexibility (Majumdar & Sinha, 2018). Another challenge for a fashion supply chain is the fact that the fashion company often must place their manufacturing orders six months to one year before the forthcoming season. Ordering fashion products based on forecasts this long in advance, poses significant risks as the customer choices and market trends might change before the products are available for the public. Long lead times often lowers the responsiveness, which can be rather problematic for the fashion industry and its short product life cycles (Kalyani, 2021).

Due to the development towards fast fashion, there have been major changes within the industry during the last 30 years, with the main drivers of internationalization and further segmentation of the market. In order to maintain low prices, many companies within the industry have chosen to outsource production and manufacturing facilities to different locations around the world (Fernie & Sparks, 2018). The result of this globalization puts a lot of pressure on the supply chain management as well as logistics activities, which will be further discussed in later chapters.

## 2.2. Logistics Activities

Logistics can be defined as “right quantity, right quality, and right price” (Fernie & Sparks, 2018; Jonsson & Mattsson, 2016). Fernie and Sparks (2018), however, describes this as a quite unfair expression as it makes logistics activities sound easy, while the truth is the opposite, as the logistic management of today’s global supply chains is very complex to operate. The Council of Supply Chain Management Professionals (CSCMP) (2022) defines logistics as a vital part within the supply chain that plans, implements, and controls inbound and outbound flow of goods, services and information from the point of origin to the point of consumption, in order to meet the customer requirements (Council of Supply Chain Management Professionals, 2022). Logistics can be seen as a system of coherent activities that moves goods throughout the supply chain and it constitutes a vital part of the value chain as it enables a transformation of supply of raw materials, i.e., input, into finished products, and output. The aim of logistics is to improve efficiency within the company and bring value to the end customers (Jonsson & Mattsson, 2016).

As previously mentioned, shopping habits have rapidly changed during the last decade, where customers always expect the latest trends to be available in good condition and ready to wear

(Ferne & Sparks, 2018). The emergence of e-commerce has come to always demand complete availability with deliveries at all times, and places of our choices, which results in high pressure on the logistic systems. This has led to a transformation of the industry from a manufacturer-push to a demand-led pull system, from domestic to offshore sourcing strategies, where clothing companies only focus on their core competencies in design, branding and retailing of fashion products. As a result of these changes, the fashion industry forms a dynamic sector, facing high pressure of shorter lead times and reduced costs. Ferne and Sparks (2018) further explains that to succeed in these challenging conditions, it puts large dependency on organizational flexibility and responsiveness.

A successful logistic system must be managed in terms of product movement and demand, i.e., selling rate of a specific item must always be up to date to maintain correct replenishment orders and to be able to react quickly to changes in the demand (Ferne & Sparks, 2018). Furthermore, the authors also explain that logistic activities can be extremely expensive if not handled and controlled efficiently. On the other side, holding stocks or inventory levels is highly costly, while it also increases the risk of the products not selling out or becoming obsolete. It is also very expensive to build, operate, and maintain warehouses and distribution centers, as transporting goods between warehouses and shops by vehicles is not cheap. A logistic system must be assured to be carried out efficiently and effectively, through the most appropriate locations and resources along the supply chain. If handled properly, a logistic system can enable reduced costs and improved service, as it assures quality and reduces the instances of stockouts, which provides a competitive advantage (Ferne & Sparks, 2018).

### 2.2.1. Logistics within the Fashion Industry

An efficient logistic system within the fashion industry requires highly effective supply chains in order of being able to deliver the latest trends (Kalyani, 2021). According to Manners-Bell (2017) the modal choice for shipping depends mainly on four driving forces: value of the goods, time sensibility, weight, and product attribute. Apparels within the fashion industry fall into either category. In most cases the retailer strives to forecast the demand far enough ahead to enable sea freight to move its products, as it lowers the shipping costs. On the other hand, if the demand is higher than expected, airfreight can be used for fast replenishment of stock levels, although at a lower margin (Manners-Bell, 2017).

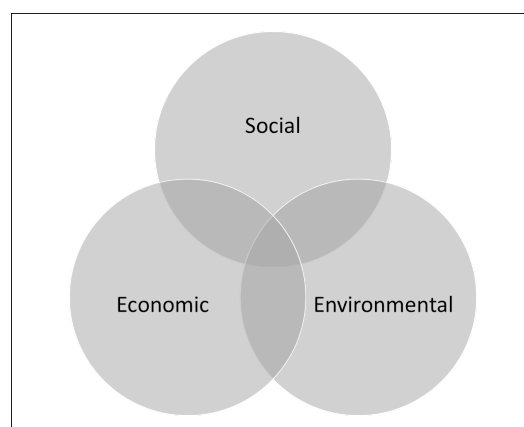


The major portion of fashion items are moved by sea freight, with the use of standardized container vessels. This enables great efficiencies in terms of loading, unloading, storage and onward deliveries of garments (Manners-Bell, 2017). Clothes can either be transported folded in cartons or as hanging garments, either way, the shipments are primarily carried out as containerized (Transport Information Service [TIS], n.d.).

The way of transporting goods by sea has had a major impact on the global economy as it enables retailers and manufacturers to source goods from remote locations on a much larger scale, but at the same time to a reasonable transportation cost (Manners-Bell, 2017). This has led to a globalization of the industry and has a direct link to the interconnected world we are living in today. It is estimated that half of the world's trade in terms of value is being moved by container ships (ibid).

### 2.3. Sustainability

The concept of sustainability integrates a sustainable approach of the whole supply chain (Turker & Altuntas, 2014). This includes the management of material, information, and capital flows, cooperation among different companies within the supply chain, and taking accounts of requirements from stakeholders and customers, derived from the three dimensions; social, economic, and environmental sustainability (see figure 2 below). Further on, as an attempt to respond to the negative impact on both the environment and society caused by the fashion industry, many companies within the industry are trying to adapt sustainable strategies and practices (ibid).



*Figure 2: The three dimensions of sustainability. (Own interpretation by the authors, inspired by Turker & Altuntas, 2014).*

### 2.3.1. Economic Perspective

The economic aspect of sustainability has gained an increased attention during the last decade. However, the concept often lacks a joint definition, as well as how it connects to sustainability (Loiseau, Saikku, Antikainen, Droste, Hansjürgens, Pitkänen, Leskinen, Kuikman, Thomsen, 2016). According to Farchi, Touzi, Farchi and Mousrij (2021) companies that consider economic, environmental, and social issues generally produce a higher long-term value compared with companies that are solely focusing on financial and profit-generating issues. Economic sustainability can be defined as the net value that a firm generates after environmental and social values have been taken into account. However, this often implies a connection between a company's triple bottom line values and their financial performance (Harrison & Van Hoek, 2011). Economic sustainability refers to costs and benefits where supply chain members meet their needs together with their shareholders, by implementing innovative and value creation strategies. By these initiatives it is possible to provide economic guarantees and achieve sustainable development which can improve profitability and competitiveness (Farchi, et. al., 2021). The concept of economic sustainability has become popular among international organizations and has widely been used to address the financial and climate change crisis (Loiseau, et. al., 2016).

In today's "wear and tear society" the world's consumers spend a lot of their money on clothes and fashion (Gardetti & Torres, 2013). To be able to meet the demand of customers, many companies have outsourced their production to developing countries in order to decrease e.g., labor costs. The clothing sector is recognized as one of the most labor-intensive industries, and by placing manufacturing processes in low-wage countries the sector jeopardizes to contribute to exploiting the people who works with making clothes, from child labor in cotton production to forced labor in factories, often contained by young females with no rights to negotiate about their wages or working conditions (Pero, Arrigo & Fionda-Douglas, 2020).

Today, developing countries generate around three-quarters of the world's garment exports. Due to the size of the sector, the industry has received increasing attention from political interests and has been significantly reinforced by international trading agreements. In the past years, garment production has mainly been outsourced to China, Bangladesh, Pakistan, India, Turkey, Mexico, Romania, and Cambodia (Gardetti & Torres, 2013). The globalization of the industry has also affected the European market. By relocating manufacturing sites to

emerging economies, it has had a negative impact on workers in the traditional European industry, resulting in unemployment (Turker & Altuntas, 2014). Bearing this in mind, there is no doubt that the fashion industry has a significant impact on the world's economy, however, the focus regarding sustainability mostly relies on the environmental and social factors (Gardetti & Torres, 2013).

### 2.3.2. Environmental Perspective

The fashion industry is one of the main villains in the rapid development of climate changes, being responsible for 5% of global emissions. Every stage of a fashion supply chain creates pollution and emissions, from sourcing and use of scarce water resources in the farming of cotton, to the transportation of finished goods on a global scale (Hibbred, 2019). The dispersed and global supply chain have led to heavy environmental burdens, imposed by, for instance, increased transportation mileage. The intensified time pressure on each fashion order requires short lead times that significantly increases CO<sub>2</sub> emissions connected to transportation. Apart from globalization, the industry in itself causes further environmental impacts as the production of textile harms the planet and environment as chemicals and many non-renewable resources are used in its processes (Turker & Altuntas, 2014).

According to Gardetti and Torres (2013) clothes are essential for our well-being. However, as every stage of the production and distribution has a direct link to the environment, the impact is therefore embedded in our everyday life. In order to create sustainable fashion, the process has to be developed so that it has no harm to people or our planet, but lack of international regulations creates a scenario that is hard to tackle. Further on, to develop a more sustainable fashion industry it has to allow processes for a fair distribution of profit throughout the supply chain and we need to commit ourselves with these issues to the level they correspond to and connect with other industries, communities, and international groups, beyond their own boundaries (Gardetti & Torres, 2013).

On the other hand, it can be argued that the fashion industry can take advantage of its high-profile status to bring attention to the current climate change and highlight the urgent need to take actions against it through publicity and media attention (Hibbred, 2019).

### 2.3.3. Sustainable Logistics

Supply chain management was initially developed with the goal to optimize business value by ensuring that the product reaches the end customer in the most efficient way. Global supply chains have resulted in great economic benefits, both in developed as well as emerging countries (Manners-Bell, 2017). From a business economic perspective, the aim is to achieve high customer service, low costs, and low tied up capital. This can in some cases result in conflicts between a company's traditional economic goals and the company's environmental goals. Therefore, it is important to consider the environmental impacts of the logistic systems total efficiency (Jonsson & Mattsson, 2016). It can be said to be three hard objectives for creating logistics advantage, those are quality, time, and costs. However, controlling variability, dealing with uncertainty, and sustainability are three supportive capabilities to further improve logistics advantages (Harrison & Van Hoek, 2011).

As mentioned above, the economic gains from logistic activities, does not come without a cost related to the environment (Manners-Bell, 2017). The physical material flow affects the environment in many ways (Jonsson & Mattsson, 2016; Harrison & Van Hoek, 2011), where the choice of transportation mode is crucial for the level of impact. Therefore, the logistic sector has in recent years been under loop due to its potential to mitigate its damages on the environment (Harrison & Van Hoek, 2011). It is not yet possible to talk about environmentally friendly logistics, but how to make it as sustainable as possible. By different measures it is possible to affect the environmental impact caused by logistics activities. This can be through choice of transportation mode, technical solutions to improve vehicles and infrastructure, alternative fuels, improved transportation and loading planning, and improved techniques for driving (Jonsson & Mattsson, 2016). Due to political pressure, many manufacturers, retailers, and logistics companies have become more aware of how their business affects the environment and have adopted carbon reduction measures as integral parts in their strategic development plans (Manners-Bell, 2017).

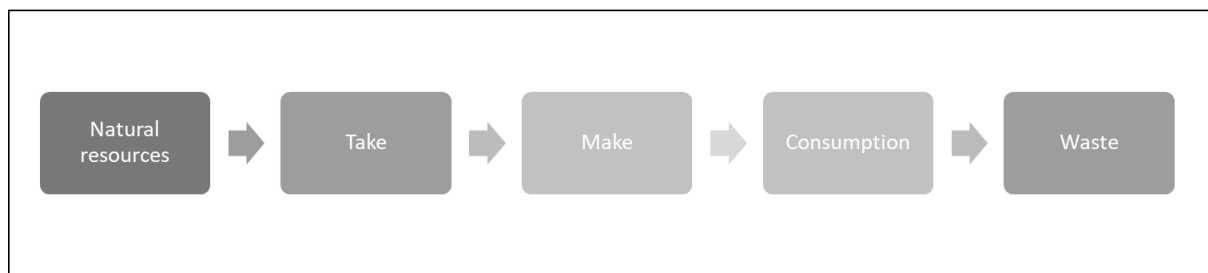
The transportation industry is well-known to contribute to global warming because of green-house gas (GHG) emissions, such as carbon dioxide (CO<sub>2</sub>) and nitrous oxides (NO<sub>x</sub>) that is released from combustion of fossil fuels. According to the European Commission (n.d.), by the year of 2050 the emission levels of the shipping sector are calculated to increase by 50 to 250%. Dust and soot particles are also connected to the transportation industry, which are regarded as a cancer risk (Manners-Bell, 2017). However, the factors that

determine the level of environmental impact caused by freight transport are many. One deciding factor is the choice of transportation mode: truck, rail, ship, or aircraft. Each transportation mode has a maximum degree of loading capacity. A good level of loading capacity can be achieved based on weight, therefore, a vehicle that is full due to volume may not achieve full utilization capacity in terms of weight (Jonsson & Mattsson, 2016; Manners-Bell, 2017). Manners-Bell (2017) claims that the transportation sector is responsible for 24% of the world's GHG emissions, where road freight is the most dominant polluter, accounting for almost 72% of the emissions. Transportations is today the only sector in the EU where GHG emissions are still rising. However, sea freight is recognized as the most carbon-efficient transportation mode as it is only claimed for approximately 2% of the world's CO<sub>2</sub> emissions. Also, design of the vessels has been in progress in the recent past to further lower the emissions while still being able to ship as much goods as possible (Manners-Bell, 2017).

The increasing environmental dimension in logistics and supply chain management has emerged from both external and internal drivers. The awareness of environmental and sustainable issues has externally increased, and forces retailers to respond to those pressures, under voluntary and legal requirements. Internally drivers have emerged from retailers becoming more aware of the benefits generated from efficient and effective systems that meet customer demands and have environmental benefits. Not at least logistic operations that are properly executed can bring sustainable benefits, from e.g., less miles, reduced packaging, lower CO<sub>2</sub> emissions, etc. (Ferne & Sparks, 2018). In many cases it is no longer morally acceptable to outsource production to suppliers without having full transparency of their processes. To successfully ensure long-term sustainability it is important to strike a balance of those three core pillars; economic viability, environmental accountability, and social responsibility – which is not done without challenges in today's dispersed supply chains. Outsourcing production or logistic activities does not mean that you can also outsource the moral responsibility – the core company is still responsible for environmental practices of the supplier (Manners-Bell, 2017). Sustainable logistics emerges as a way of considering environmental and social aspects, alongside economic decisions (Harrison & Van Hoek, 2011).

## 2.4. Linear Economy

The concept of linear economy (see figure 3 below) emerged during the early industrial revolution, this model is based on take, make, and waste (Weetman, 2017), and follows a consumption pattern of take-make-dispose (Ellen MacArthur Foundation, 2013). This means that companies harvest and extract raw materials, manufacture a product out of it, and sell it to the customers, afterwards when the product no longer fulfills any purpose for the customer it is being discarded (Ellen MacArthur Foundation, 2013). Many of those raw materials and resources that we rely on to manufacture products are either finite or constrained by the speed of renewal, or due availability of land. It is easy to forget that it is the earth and its living system that provides us with everything we use or consume, all from air, water, food, housing, clothes, to possibilities of transportation (Weetman, 2017).

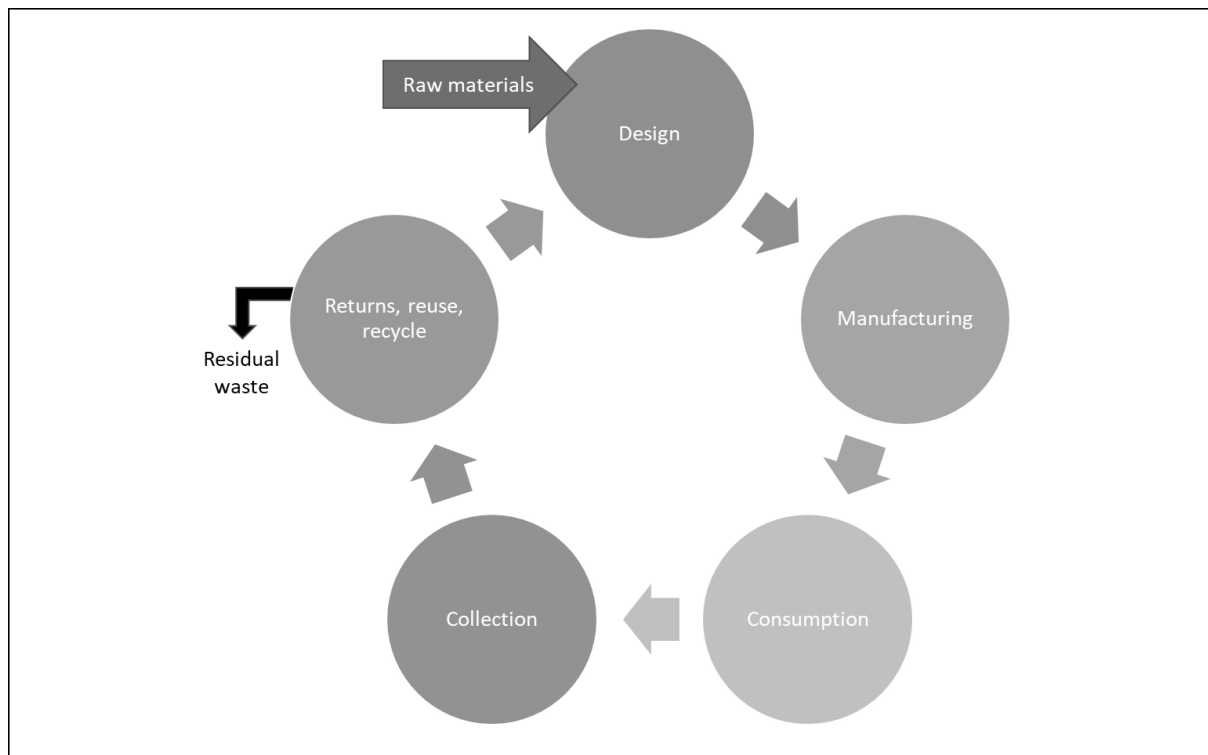


*Figure 3: The concept of a linear economy. (Own interpretation by the authors, inspired by Ellen MacArthur Foundation, 2013).*

## 2.5. Circular Economy

It is expected that three billion new middle-class consumers will enter the market by 2023 (Ellen MacArthur Foundation, 2013), alongside this continued exponential growth of human population will result in increased levels of consumption (Weetman, 2017). The increasing demand has reached a tipping point in supply of resources, which puts us in front of major environmental challenges, not least to ensure human rights such as clean air, safe water, access to food, medicine, etc. The current linear manufacturing method creates waste at the end of the life cycle, as well as throughout the manufacturing process. The waste that this creates is endangering our living systems, and fails to provide us with clean air, pure water, healthy soil, and climate controls, therefore, many leaders are rethinking their business models in order to develop new, and sustainable concepts. A recurring concept is the circular economy model (Weetman, 2017).

This way of living and creating products contributes to a problem and companies must rethink their product design. Instead of just selling and discarding products, they must sell products with opportunities for continuous value creation and profitability that support long-term customer relationships (Weetman, 2017). A circular economy replaces the end-of-life concept with restoration, which shifts towards use of renewable resources and aims for elimination of waste through better design of materials, products, system, and ways of doing business (Ellen MacArthur Foundation, 2013). A circular economy has been inspired by nature, where one's waste is another's food, where the sun provides energy (Weetman, 2017), and is based upon a few principles. At its core it aims to eliminate waste by creating products that are designed and optimized for a cycle of disassembly and reuse, which is illustrated in figure 4 below (Ellen MacArthur Foundation, 2013). This even distinguishes the concept from disposal and recycling as those processes require a large amount of added energy, therefore, products are from the start designed to be reused. Also, the required energy to fuel these cycles should by nature be renewable, this is to decrease resource dependency and to increase system resilience, e.g., to oil shocks (Ellen MacArthur Foundation, 2013).



*Figure 4: The concept of a circular economy. (Own interpretation by the authors, inspired by Ellen MacArthur Foundation, 2013).*

According to Benn, Edwards and Williams (2018), a circular economy can be described as an eco-efficient approach, meaning that it takes a system perspective to maintain and more efficiently utilize materials, resources, energy, and information flows throughout the production process and consumption. This creates closed loops within the supply chain through close collaboration between organizations and their entire platform of stakeholders. Business models of circular economy are designed to reduce, reuse, and re-circulate, and when possible, redesign processes and materials to enable renewability (Benn, 2018).

With increased volatility of the global economy, it has never been more urgent to make adoptions in the traditional way of doing business. Therefore, business leaders must take the concept of a circular economy one step further and move it from the sideline and make it to the mainstream model in order to tackle resource scarcity and tighter environmental standards, which are here to stay (Ellen MacArthur Foundation, 2013).

### 2.5.1. Circularity within the Fashion Industry

The fashion industry is a typical linear economy that is dependent on increased consumption (Weetman, 2017), due to this business approach the industry is a major contributor of plastic microfibers entering our oceans. Every second, the equivalent to a garbage truck is loaded with clothes to be burnt or buried in landfills (Ellen MacArthur Foundation, n.d.a.).

The concept of fast fashion has urged clothing brands and retailers to develop quick responses by moving the production to low-cost countries across the world in order to gain competitive prices. Around 80 billion pieces of clothes are produced every year at a worldwide basis and sold through retail stores, outlets, catalogs, and online channels. The fast fashion industry has been blamed for becoming a “throwaway fashion” as clothes are relatively cheap and often only worn for a few occasions (Weetman, 2017). With the fact that the amount of produced clothes within the fashion industry has kept growing during the recent decades, profit margins have at the same time shrunk and the environmental impact has increased (Ellen MacArthur Foundation, n.d.b.).

To turn this trend around it is necessary to make drastic changes. By infusing a circular economy approach into the industry, it will create better products and services for customers, it will contribute to a resilient and thriving fashion industry that regenerates the environment. A circular business model will prioritize the rights and equality for everyone within the



fashion value chain and create new opportunities for growth that are distributed, diverse, and inclusive (Ellen MacArthur Foundation, n.d.a.). A circular business model within the fashion industry would allow companies to make revenues without making new clothes, which would mean significant opportunities for new and better growth by resale, rental, repair, and remaking that would provide remarkable saving in greenhouse gas emissions (Ellen MacArthur Foundation, n.d.b.).

Infusing a circular economy in the industry would require product design to be used more, being made to be made again, and being made from safe and recycled or renewable inputs. With this concept it would be possible to tackle global challenges such as, climate change, biodiversity loss, and pollution (Ellen MacArthur Foundation, n.d.a.), as well as ensuring materials to be safe for both humans and living systems, with the aim to provide secure supplies for future generations (Weetman, 2017).

Adopting a circular business approach can enable both revenue and cost benefits (Ellen MacArthur Foundation, n.d.b.), since it both maximizes the use of raw materials and products, but it also requires significant efforts by industry leaders and governments, heavy investments, large-scale innovation, and transparency and traceability. To achieve the vision of a circular business model it will require transparency and traceability across the whole value chain, such as product specification, chemical inputs, materials used, and production practices. This kind of information will be necessary for after-use practices, such as sorting, remaking, and recycling. The time to act is now, and by taking actions together it is possible to achieve radical improvements (Ellen MacArthur Foundation, 2020).

## 2.6. Hangers in the Fashion Industry

Within the fashion industry, billions of hangers are being used every single year across the world (Tamhangers, n.d.). The purpose of the hanger is to give the clothes the protection and presentation they deserve. Due to this approach, the hanger is much more than just a functional tool, as for fashion designers it is also an integral part of branding with the aim to effectively attract and display clothing items for the customers (Mainetti, n.d.). According to Lonergan, Patterson and Lichrou (2018) the hanger also represents something cultural within the fashion industry and can be similar to symbolic codes for cultural commodities that are used to achieve certain desires to further influence consumers perception of aesthetic taste.

There are several different models available, to enhance the look of the hangers, protect the garment, and simplify organization and browsing of clothes (Mainetti, n.d.).

As mentioned in previous chapters, due to the globalization of today's economy, the importance of manufacturing and delivering the right product in a timely and cost-efficient way is under more pressure than ever. Since the fashion industry is facing the pressure to stay competitive it has forced many retailers to examine their end-to-end supply chains in order to improve efficiency and effectiveness of the business. By pre-hanging clothes in the production, it can enable improved quality of the products during deliveries to warehouses or retail stores, which saves both time and money (Cui & Yan, 2015). Another reason to pre-hang clothes at the manufacturing sites is that it is more time efficient, especially for the employees in the retail stores (Triantafyllou, Mariolis, Kargakos, Malassiotis & Asperagathos, 2016).

## 2.7. Plastic Production and Recycling

Due to its cost efficiency, together with its reliable and stable quality, plastic hangers are the most common kind used today in the fashion industry (Instore Agency, 2017). Every year, a huge amount of plastic hangers are thrown away, where many end up in landfills where it takes centuries for them to decompose, also releasing toxic gasses, and polluting soil and water during this time. According to Svenska Miljö Emissions Data (2019), the supply of new plastics to Sweden is estimated to be around 1.3 million tons per year, corresponding to approximately 130 kilogram per inhabitant. This in turn leads to an increased amount of plastic waste where a small amount, in relation to the scope, is being recycled (Svenska Miljö Emissions Data, 2019). It is thought possible to recycle plastic hangers, and companies are working on solutions to prevent hangers from ending up in landfill or being incinerated. In those cases, hangers are being sent to recycling sites where the plastic is shredded and the metal is separated with magnets and the material is later on turned into new products (Firstmile, n.d.).

Plastic in general, is a universal material that has contributed to a number of product innovations that simplifies the everyday life for all of us (Milios, Davani & Yu, 2018; Milios, Holm Christensen, McKinnon, Christensen, Rasch & Hallstrøm Eriksen, 2018). Plastic has many potential areas of use due to its ability to be thin and flexible as well as strong and durable (Stena Recycling, n.d.). During the last 50 years plastic production has increased

twenty-fold, and by 2036 this number is estimated to further double in use. Inevitable, this accelerated use of plastic, combined with an increasing world population, results in significant generation of plastic waste. In many cases, waste management is insufficient which further results in plastic leakage that damages the environment and affects the ecosystem, such as GHG emissions. Due to this, the EU has infused measures to increase the recycling of plastic followed with higher targets and waste legislation. Sweden takes its responsibility on this path by prioritizing actions to improve their handling of plastic waste, in line with EU targets (Milios, Davani & Yu, 2018).

In traditional ways, plastic production consists of fossil-based resources, such as crude oil and natural gas as raw materials. Furthermore, it is important to bear in mind that those resources are finite and raise several environmental concerns throughout its life cycle, despite the many benefits that plastic has given us (Milios, et. al., 2018). Poor plastic waste management does not only result in hazardous emissions, but millions of tons of plastic that ends up in the ocean. It can be compared with one garbage truck that is emptying its whole content into the ocean every minute. The chemical structure of plastic generates a very slow process of degradation that takes centuries and is fragmented into smaller pieces, i.e., macro- and microplastic, which causes severe damages as it works its way up in the food chain (Milios, Davani & Yu, 2018; Milios, et. al., 2018).

Fortunately, it is possible to recycle plastic, which enables it to be reused for many times and still retain its value and functional properties (Milios, Davani & Yu, 2018; Milios, et. al., 2018). If plastic is designed and manufactured in the right way from the beginning it enhances the possibilities to be recycled and reused into new products, thereby contributing to a circular economy. When the plastic enters into this loop, and remains there, it can live on as material and create new products that contribute to new value for every time it is recycled (Stena Recycling, n.d.). Milios, Davani and Yu (2018) describes that the recycling rate of plastic in Sweden is around 40% higher compared to other EU countries. This rate is remarkable due to the fact that Sweden possesses a significant over-capacity and reliance on waste incineration. Due to this, Sweden is importing waste, including plastic, from other EU countries and has introduced higher targets compared with EU legislation regarding plastic recycling (Milios, Davani & Yu, 2018).

### 3. Methods and Methodology

*This chapter describes applied methods and methodologies to conduct the research. At first it outlines research strategy and research design, where a qualitative approach is presented. This follows with a description of the research process, concluding with a description of data analysis and research quality. Lastly, the chapter concludes with a discussion of selected and used methodologies.*

#### 3.1. Research Strategy

According to Collis and Hussey (2014), there are two main options of methodology when doing research studies, qualitative or quantitative methods. The choice of research method is primarily dependent on the research question, meaning that the choice of method is an important part in order to be able to conduct the best possible answer and interpretation of the collected data. This report was mainly conducted by a qualitative research strategy, with a main focus on interviews, but certain quantitative elements in form of numerical data and calculations were also used. The choice of a qualitative research was considered as a suitable choice since it required a holistic and an in-depth understanding of the research field. Additionally, a qualitative research strategy also allows the researchers to stay flexible and adaptive for any unpredicted or new information that might appear during the process of the research (Bryman & Bell, 2015).

In terms of research approach, there are three main ones, which are inductive, deductive, and abductive. As described by Collis and Hussey (2014), a study which is formed by an inductive approach has the theory developed from observations of reality and/or empirical observations. And the reverse goes for the deductive approach, where the theory first is developed, to then be tested by reality and/or empirical observations. The third one, the abductive approach, which is more or less a combination of the two previous approaches, means that the research is based both on the inductive and deductive approach, and the researcher is pending between the theory and the empirical data in order to allow the result to gradually emerge. Due to the requirements of flexibility during this study, an abductive approach was applied. By adopting this approach, the researchers could be kept open to all information that arose during the empirical research and not be limited to previous research.

## 3.2. Research Design

An important part when conducting research is awareness about the research paradigm. This is because the paradigm defines and explains the researcher's philosophies and assumptions about the world, which in turn has an impact on how the research problem will be defined and how the study is conducted (Collis & Hussey, 2014). The two main paradigms are; positivism and interpretivism. One of the basic beliefs within the interpretive paradigm is that reality is highly subjective rather than objective, meaning that people are strongly connected to their perceptions. While positivism is strongly objective and convinced that there is only one reality which applies for everyone. Furthermore, interpretative research derives from any research but statistical analyses of data, which provides greater opportunities to gain a deeper understanding within the research field (ibid). Thereby, this research was characterized by the interpretative paradigm that primarily contains interpretation of qualitative data. As mentioned, interpretative research enables in-depth understanding and flexibility during the study; this makes it important to have a well-defined and limited scope in order to keep the data collection efficient and at a manageable level, based on, for instance, time constraints (Collis & Hussey, 2014).

### 3.2.1. Case Studies

Furthermore, the qualitative study of this report was conducted at a Swedish case company, active within the fashion industry. Case studies is a methodology that is used in order to investigate or explore a phenomenon in real life, in order to gain in-depth knowledge. In general, there are two types of case studies, exploratory and opportunist. The exploratory case study approach means that existing literature is used to explain and understand a specific phenomenon. While the opportunist case study approach means understanding a phenomenon by gaining access to data through a real situation (Collis & Hussey, 2014). This research has been based on a mix between an exploratory and opportunist case study. Meaning that specific information was collected at a case company, and existing research and theories were being used in order to explain the current situation of the case. According to Collis and Hussey (2014), there are five main stages of a case study, which can be seen in figure 5 below.

The case study approach has met some criticism regarding the generalizability of the results, and thus the ability to apply the information in other situations as well (Yin, 1994). But since

the qualitative data collection has been supplemented with both secondary data and certain elements of quantitative methods, in the form of numerical data and calculations, the generalizability of the result in this research has increased (Bryman & Bell, 2015). Furthermore, some difficulties regarding a case study methodology are defining the scope since the studied activities and organization does not exist in a vacuum, without any relations or interactions with other parties. Thereby, methodological triangulation is an important aspect of this study, meaning that more than one method was used to collect and analyze the data (Collis & Hussey, 2014). Methodological triangulation means that both qualitative and quantitative research approaches have been employed for this study.

Using different methods and techniques in the same study enables the possibility to overcome potential ambiguities that may arise if only one method is used. It also provides a multidimensional insight to facilitate the decision-making process (Mangan, Lalwani & Gardner, 2004). As mentioned, the main focus for this study was to collect data by qualitative methods, but quantitative methods were also used in forms of calculation for certain aspects to give the researchers a more comprehensive and holistic understanding about the research area.



Figure 5: The main stages of a case study. (Own interpretation by the authors, inspired by Collis & Hussey, 2014).

### 3.3. Collection of Data

This report is based on both primary and secondary data. According to Collis and Hussey (2014), primary data can be defined as data gathered from an original source, by for instance, interviews, surveys, or experiments. While secondary data can be defined as data gathered from an already existing source, such as company documents, scientific articles, webpages, books, etc. In order to answer the first research question; *What does the value chain of the single-used plastic hangers look like today at Company X?* a qualitative research method was applied, in the form of both primary and secondary data. As to the second research question;

*How can the process of single-used plastic hangers become more sustainable from an economic and environmental perspective?* primarily a qualitative research method was used, but with some elements of quantitative methods due to the numerical data and calculations that were made in order to measure potential improvements.

### 3.3.1. Collection of Primary data

As mentioned above, according to Collis and Hussey (2014), primary data refers to the data that is gathered from an original source. Different methods can be used for this data collection. In this following section, the methods for collecting primary data for this research will be described.

#### 3.3.1.1. Interviews

For this research, primary data has been collected through interviews with selected respondents, with the purpose to get a deep and comprehensive understanding about the research topic by finding out their own experiences. The main advantages of interviews as primary data collection are the possibilities of asking both specific and open questions, with the possibility of follow-up questions to avoid any misconceptions. When collecting research data interviews are a commonly used method. Before conducting interviews, some preparation is required, which for instance is to clarify what information you need and expect to get, and how you will be able to collect it (Collis & Hussey, 2014).

Respondents for this study have been selected from different key areas that affect the research topic in different ways. To build trust the respondents were kept anonymous with an anticipation to encourage them to provide the researchers with necessary information. The interviews have been conducted in a face-to-face approach, both over teams and IRL with one individual interviewees at the time, and both researchers participating to ensure to collect as much data as possible. Each interview has been recorded and has either been carried through live or as an online appointment. Additionally, a continuous dialogue and feedback loop was held with Respondent 6 during the whole research process. This was done in order to continuously ensure that the collected data and information collected at the case company were interpreted correctly and to ensure confidential information.

### 3.3.1.1.1. Semi-structured Interviews

*Table 1. Summary of conducted interviews. (Authors, 2022).*

<b>Respondent</b>	<b>Department</b>	<b>Role</b>	<b>Interview Location</b>	<b>Date of interview</b>	<b>Time of interview</b>
1	Sales Department	Store Operation Coordinator	Teams	2022-02-24	35 min
2	E-commerce Department	DC Supervisor	Teams	2022-02-24	22 min
3	Purchase Department	Labels & Pack Coordinator	Teams	2022-02-28	1 h 17 min
4	Logistics Department	Transport & Customs Manager	Teams	2022-03-04	25 min
5	Purchase Department	Global Label & Packaging Manager	Teams	2022-03-11	45 min
6	Logistics Department	Supply Chain Developer	Teams & IRL	Continuous discussion during project	Continuous discussion during project
7	Sales Department	Store Sales Manager	IRL	2022-04-01	1 h
8	Logistics Department	Logistics Coordinator	IRL	2022-04-07	1 h

A semi-structured interview is designed by open-ended questions with the purpose of encouraging the respondent to talk about some selected main topics with possibilities of asking follow-up questions and be flexible about the order in which the questions are asked,



in line with the direction of the interview. According to Easterby-Smith, Thorpe and Jackson (2015), semi-structured interviews are suitable when the information and subject is highly confidential or commercially sensitive, which is the case of this research.

The first contact with the respondents was by email, where we shortly presented our research and asked if they were interested in participating in an interview. The interviews were then conducted both face-to-face and web-based, where the respondents had the opportunity to choose themselves what suited them best. Table 1 shows a summary of the conducted interviews. The interviewers asked the respondent for permission to record the interview, and the respondents were also informed that their names were not going to be exposed due to the confidentiality of the case company. The interview-guide (see appendix 1) were tested at test-respondents before the interviews with respondents at the case company in order to ensure that the questions were designed in a way that minimized the risk of misinterpretations.

In terms of the selection of respondents to the interviews, there are several different sampling methods available, and one of them being snowball sampling selection. This method means that respondents were not selected in advance, instead the researcher was recommended to new participants for the research during the process. This sampling method also requires that the respondents have knowledge about the field of study (Collis & Hussey, 2014). Additionally, the sample selection of respondents was done in dialogue with Respondent 6, a well-informed employee at the case company, who has a good insight into the research area and has worked for the company for many years.

#### 3.3.1.2. Observations

Collection of data through observations can be used either in a natural setting or in a laboratory. The most common type of observational studies is non-participant observations, meaning that the researcher observes the situation without being involved (Collis & Hussey, 2014). The observations in this study were non-participant observations, conducted in order to gather information and form the basis for the calculations in the improvement proposals. The observed processes were studied in an everyday setting in one of the case companies' physical stores, with the purpose to conduct time measurements on the unpacking process of the specific product category. Both the current process where the products were pre-hanged, and the time consumed when the store staff themselves hanged the clothes in the store.

One recurring problem with observations, known as demand characteristics, can lead to that bias might arise, meaning that, for instance, the individuals become more productive than usual while being observed. The common solution in order to minimize the risk of biases that could affect the results, is that the employees being present in the observed situations are informed about the research but not about the exact purpose (Collis & Hussey, 2014). According to ethical codes, the observed employees were informed about the purpose of the research and the observations, but since the main purpose, as mentioned, was to compare time difference and difference in filling rate between the two possible alternatives, the risk of bias was not considered as something that would affect the results in large.

### 3.3.2. Collection of Secondary Data: Literature study

As mentioned previously, secondary data can be defined as data that are previously collected, for another purpose, often presented in the form of books, articles, company documents, or webpages. According to Collis and Hussey (2014), the purpose of conducting a literature review is to collect as much relevant information as possible in order to learn more about the research field and the common methods used in the previous research, and then be able to make a critical analysis of the literature.

Furthermore, in order to conduct a systematic literature review, it is important to first define the scope, as regards, time and geography. In this study, secondary sources no older than 20 years have been used, in order to keep the information as accurate as possible. Furthermore, a number of keywords were identified in order to make the information search as effective, narrowed, and accurate as possible. The primary databases used were Google Scholar and the library of University of Gothenburg. Keywords used in the information searching were logistics, sustainability, fashion industry, hangers, pre-hanged clothes, single-used plastic hangers.

### 3.4. Analyzing the Data

The compilation and analysis of a large amount of qualitative data could be challenging, which is why a general analytical procedure is preferred. The procedure of analyzing qualitative data primarily contains three main elements: reducing the data, displaying the data, drawing conclusions and verifying the validity of those conclusions. Furthermore, these elements are overlapping each other and usually takes place both during and after data

collection. Additionally, an important part of conducting an efficient research process is categorizing the data. This supports the researchers to be able to identify important variables and visualizes any connections to the literature, which in turn increases the credibility of the results (Collis & Hussey, 2014). The Empirical Findings and Analysis and Discussion section of this report was categorized into three main parts; (1) Current situation, (2) Current situation connected to the theory, and (3) Possible future situation.

In this report, secondary data was collected in order to conduct a literature study to be able to make a critical analysis of the literature and also to draw conclusions together with the primary data, and thereby be able to answer the research questions. The fact that previous research within the field of hangers is a relatively unexplored research area, the problem discussion and theoretical framework contains some secondary data obtained from sources that is considered as non-scientific. This was something that the researchers of this report were aware of and have critically used the information from these sources. To methodically analyze the literature a thematic approach was applied. The thematic approach is a common method to systematically analyze the gathered literature. Basically, the method aims to categorize the literature in relevant themes, i.e., supply chain, logistics, fashion industry, and circularity, in order to present the review in an organized way (Collis & Hussey, 2014).

### 3.5. Research Quality

In order to evaluate the quality of the results in a research, reliability and validity are two important factors to consider. The validity of the research refers to the accuracy of the data and measurements, as it is an important factor when evaluating how well the research questions are answered. While reliability refers to the probability of obtaining the same result if the same research was conducted once again (Collis & Hussey, 2014). However, Bryman and Bell (2015) states that a research based on a qualitative method most preferably should examine trustworthiness rather than reliability and validity. In order to evaluate trustworthiness of a research, four benchmarks are generally used, which are dependability, credibility, conformability, and transferability (Bryman & Bell, 2015).

Dependability could be compared with and interpreted similarly as reliability, in other words the probability of obtaining the same result of the same research was conducted once again (Bryman & Bell, 2015). As mentioned, this research was mainly based on a case company, which posed some doubts regarding the probability of generating the same result if the

research was to be conducted at another case company. Furthermore, regarding credibility, which can be compared to validity, and thereby refers to the accuracy of the data and the measurements and eventual systematic errors, in the case of this research the majority of the data collected was through interviews and observations at the case company. Thereby, systematic errors can be considered as most likely occurring. Anyway, the transparency of the interview guide could increase the credibility of the research even if the anonymity has an impact. In terms of conformability, which measures the level of biases occurring due to the participants of the research, to then be measured towards the results of the research (Bryman & Bell, 2015). In the case of this report, where the study was conducted in a qualitative manner, and thereby with a high degree of subjectivity, the biases could be assumed to be present. Lastly, regarding transferability, refers to how well the results could be generalized (ibid). As mentioned, the study was executed at a case company which could be an important factor affecting the generalizability. And since the research field was rather unexplored, the amount of previous studies was quite limited, but a large part of secondary-sources that were used were non-company specific, which in turn increases the generalizability of the research.

In general, the research quality of this report could be considered high enough for the result to be reliable. The confidentiality and anonymity of both the case company and the respondents in the interviews could be considered as both a strength and a weakness of the research, as it encouraged the respondent to be transparent and answer the questions freely as possible as they know that their answers were not going to be traceable. At the same time, it could also be considered as a weakness as certain information was not allowed to be shared in the final report, which implied that some important information was forced to be excluded.

### 3.6. Research Ethics

Research ethics refers to the procedure of the research and to the way in which the findings and results were presented. As mentioned by Collis and Hussey (2014), some of the most relevant research ethics to consider is privacy, confidentiality, anonymity, transparency, honesty, dignity, and voluntary participation. In the case of this report, the research ethics was carefully considered and summarized in table 2 below. By carefully taking these ethical issues into account the integrity of the respondents and the case company was secured.

Table 2. Summary of research ethics. (Own elaboration by the authors, based on Collis & Hussey, 2014).

Ethical Issue	Approach for this report
Privacy	The privacy towards the research participants has been respected by keeping them well-informed and always asking for their consent in advance.
Confidentiality	All information has been considered as confidential and the participants will thereby be untraceable.
Anonymity	All respondents were participating anonymously, as well as the name of the case company.
Transparency	The authors of this report intended to always act as transparent as possible, thus no received information was excluded.
Honesty	The authors did inform the respondents and participants about the purpose of the research in advance.
Dignity	Participants have been treated with dignity and respect by staying on related topics and acting neutral regarding opinions and attitudes.
Voluntary participation	Everyone involved in this research has been informed that participation is voluntary, with the possibility to withdraw at any time.

### 3.7. Methodological Discussion

Due to fear of leaking sensitive information, the research has been conducted in an anonymous manner. This includes the case company, Company X, as well as respondents during interviews for collection of data. Regarding the desired wish from the case company to stay anonymous, some data have been required to be manipulated or gathered from more general sources, such as transportation costs based on Shanghai Index. This may lead to results that are more generalized and not fully accurate for the case company. On the other hand, to keep the respondents anonymous may be beneficial as they feel more confident to share confidential information without hesitation.

When conducting qualitative research, it can be criticized that the findings tend to be too subjective. This refers to the collected data as it will be based on someone's perception of the reality. Due to this it can be hard to generalize the findings as it is based on people's personal opinions. A qualitative researcher often introduces their research in a broad way, which is why transparency regarding the reason why the research was conducted in a certain way is common for qualitative studies (Bryman & Bell, 2015). To overcome this potential criticism some quantitative data in forms of calculations have been included in the research to support the findings with trustworthy calculations and numerical evidence.

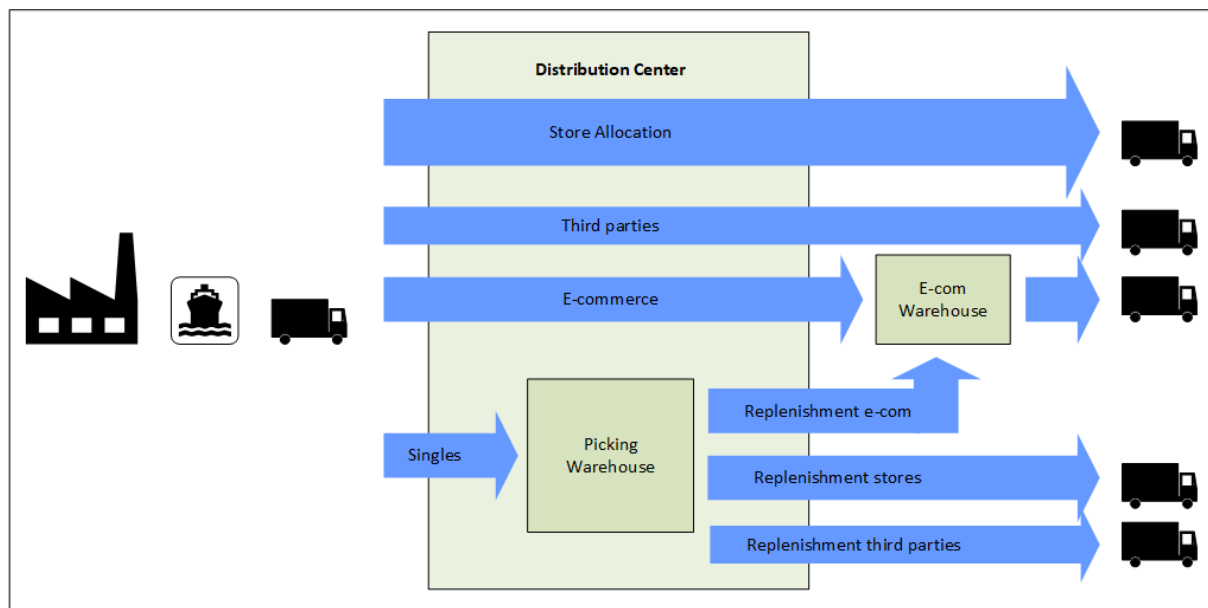
Difficulties that have arisen during the process are mostly connected to the wish from the case company of being completely anonymous due to the risk of spreading confidential information. The use of general numbers, such as Shanghai Index, might lead to not having the exact results for the examined case company, which can affect the validity of the report. On the other hand, this increases the possibilities of having a result that will be usable for other companies within the industry as well, which improves the reliability. Conducting a case study without being allowed to mention the case company or real numbers has its challenges. Certain parts of the report could have been more developed if more information could have been accessed from the case company, for instance numbers on emissions per transportation mode. Due to the given conditions, enough information has been accessed in order to produce a reliable result.

## 4. Empirical Findings

*This chapter initially gives a short description of the case company, Company X. Followed by a compilation of the collected data. The chapter constitutes the current situation of single-used plastic hangers within the case company.*

### 4.1. About Company X

As previously clarified, this research was conducted at a case company active within the fashion industry. Company X was founded in Sweden but is today a global fashion company. The company has developed from being a pure brick-and-mortar company to a company selling in several different additional distribution channels, such as e-commerce and through third parties. Company X focuses on offering sustainable fashion.



*Figure 6: The value flows for Company X. (Own elaboration by the authors, 2022).*

Explained in a simplified manner, Company X has three different value flows, one for retail stores, one for e-commerce, and one for third parties. The purchase team places an order but has to take different things into consideration depending on which distribution flow it concerns. The majority of the clothes are manufactured in Asia and are shipped by sea to the case company's distribution center in Sweden. The case company has transitioned to 100% biofuel for all sea transport. The last mile from the harbor to the distribution center is being shipped by truck. A smaller share of the garments is produced in Europe, these are being

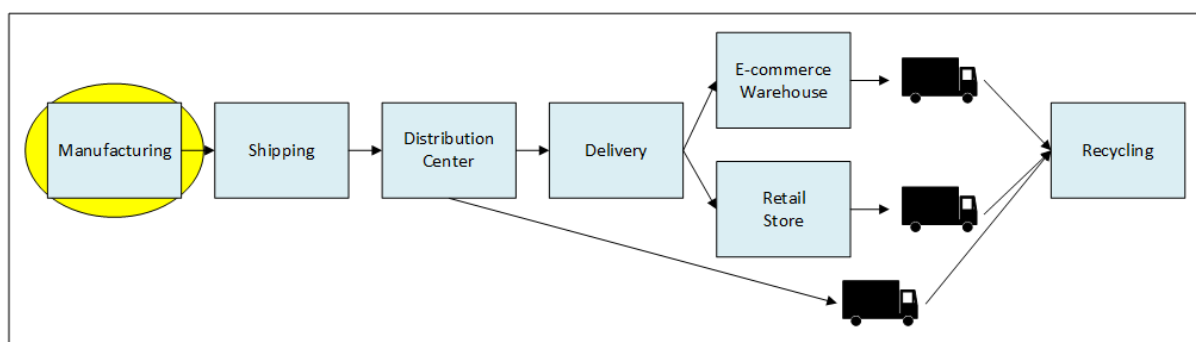
delivered to the distribution center in Sweden either by truck or train. Thereafter, from the distribution center, the clothes are being shipped by truck to respective customers, i.e., retail stores, e-commerce, and third parties (see figure 6).

## 4.2. Current Situation

In the following section the current value chain of the single-used plastic hangers, used for baby garments, will be described. The value chain of the hangers implies how the hangers move during its life cycle, from manufacturing to recycling. This section is solely based on the empirical findings, i.e., the interviews by the participating respondents from Company X, and will constitute the empirical result of this research. To give the reader a clearer picture, we have chosen to add footnotes behind valuable information, e.g., specific numbers, etc.

### 4.2.1. Current Value Chain of the Single-used Hangers for Baby Garments

Through the interviews, the current value chain of the single-used plastic hangers has been mapped out (see figure 7). As previously described, Company X has three different distribution flows, one for in-store retailing, one for e-commerce, and one for third parties. One of the major differences between these flows in this context, is that baby garments which are ordered for physical stores are pre-hanged at the manufacturing site. The flow of clothes to e-commerce and third-parties distribution channels are not being put on hangers at any point of the value chain, as the hangers do not serve any purpose in this flow.



*Figure 7: The value chain of the single-used plastic hangers of baby garments. The yellow marking indicates where in the value chain the single-used hangers are added to the baby garments for retail store flow and replenishment orders. (Own elaboration by the authors, 2022).*



On the other hand, forecasts for the different distribution flows do not always correspond to the actual sales, which is regulated by replenishing clothes from the so-called, central picking warehouse, where the clothes are pre-hanged since those replenishment orders are adopted for the retail flow. Approximately 550 000 pieces of baby garments are sent from the picking warehouse to the e-commerce warehouse each year<sup>2</sup>, corresponding to the fact that approximately the same amount of single-used hangers are being produced, transported, and handled at different parts in the value chain without fulfilling any purpose. This in turn leads to pre-hanged baby garments being used in the distribution channels, e-commerce and third parties, where the hangers do not serve any purpose. In these cases, the hangers are being removed from the baby garments either at the distribution center if it concerns third party customers, or at the e-commerce warehouse if it concerns this distribution channel, and thereafter sent for recycling, which causes a large amount of waste of plastics from both an environmental and economic perspective.

Each distribution flow, i.e., retail stores, e-commerce, and third parties, has its own ordering system that inquires e.g., different labels and if the baby garment should be purchased with or without hangers. Baby garment and underwear are the two product categories that Company X are currently pre-hanging at the manufacturing sites. Baby garment accounts for approximately 8,5% of the total sales per year, in terms of the number of total garments being sold by Company X<sup>3</sup>. The purchase team places the orders based on forecasts, and in this step the required amount of single-used hangers are also calculated. Since baby garments only require one specific hanger, it is easy to outsource this pre-hanging activity to the garment supplier<sup>4</sup>.

As seen in figure 8 below, the majority of baby garments are sourced from Bangladesh, India, and China, and some from Turkey<sup>5</sup>. The hangers are locally sourced and produced in the same countries as where the manufacturing activities take place, this is in order to shorten the distance of transportation and thereby minimize the environmental footprint<sup>6</sup>. The garments (including the hangers) are then being shipped to Company X's distribution center in Sweden, primarily by sea freight from the Asian manufacturing countries, or from manufacturing sites located in Europe, e.g., Turkey, the garment is delivered by truck. The manufacturing sites

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<sup>2</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>3</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>4</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

<sup>5</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

<sup>6</sup> Respondent 5, Global Label & Packaging Manager, 2022-03-11

base the purchase of hangers on forecasts to ensure to have the required amounts of hangers ready before the production starts<sup>7</sup>. The manufacturers have the responsibility to ensure to have the required amount of hangers at their production centers before production starts, otherwise they have to place an order from contracted hanger suppliers. However, if something unpredictable occurs, e.g., disruptions or delays, the purchase department of Company X will step in to support their suppliers with ordering the hangers.

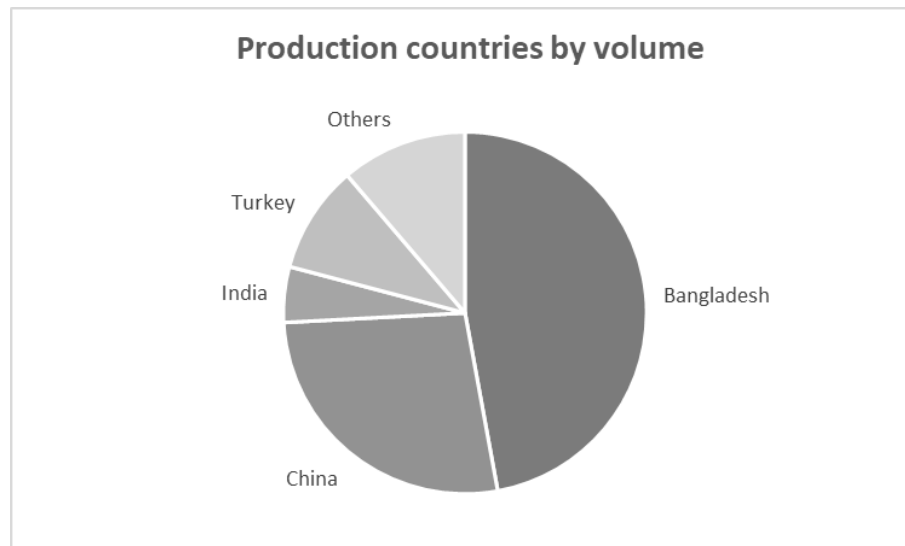


Figure 8: Production countries. (Own interpretation by the authors, inspired by the Sustainability Report of Company X, 2021).

#### 4.2.1.1. The Single-used Plastic Hanger

The hanger that is used for baby garments is a transparent plastic hanger, it can be seen in figure 9 below, and contains at least 50% virgin raw materials and the rest consisting of recycled materials, the weight of each hanger is 19 grams. It was designed in this way by the interior team around 10-15 years ago, with the aim to give a nice and selling impression in the retail stores, allowing the tiny baby clothing item to get all of the attention (compared to e.g., a black hanger which is considered to not be advantageous for baby clothes). A transparent hanger also indicates to give a clean and Scandinavian impression, but the color of a hanger can vary depending on trends. As already mentioned, the transparent color requires at least 50% virgin raw materials, therefore it is not possible to recycle transparent plastic hangers to create new transparent hangers out of them, though, it is possible to create new recycled products in other colors.

<sup>7</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28



*Figure 9: Visualization of the single-used, plastic baby hanger. (Company X, 2022).*

#### 4.2.1.2. Hangers on Baby Garments for Retail Stores

The majority of baby garments ordered for the retail distribution channel are being pre-hanged by the garment suppliers, which facilitates and saves time for employees in physical stores<sup>8</sup>. After the clothes have been pre-hanged in production, they are sorted and packed in two different ways depending on if it is first allocation of new items to store or replenishments (central picking warehouse). First allocation is packed as sales packs with several pieces per plastic bag (usually approximately 8-20 pieces per bag). The replenishment part is packed into one plastic bag per export carton, no individual plastic bags are used for baby garments. The purpose of the plastic bag is to protect the garments during transportation and also keep the sales packs containing several pieces together.

The pre-hanging process reduces the need for human resources in each retail store. This in turn leads to economic advantages for stores, since these activities are performed in more labor-intensive countries, where labor is less costly. However, the main advantage by having the baby garments pre-hanged by the suppliers is that it streamlines the unpack activities in the stores<sup>9</sup>. In Sweden, each store gets daily deliveries which makes it reasonable that the pre-hanged, ready-made baby clothes contribute to optimize the working process in the retail

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<sup>8</sup> Respondent 1 Store Operation Coordinator, 2022-02-24

<sup>9</sup> Respondent 5, Global Label & Packaging Manager, 2022-03-11

stores. The goal is that everything should immediately get out of the sales areas in the stores after delivery, as the possibilities to store clothes in stock rooms has decreased radically during the last years.

#### 4.2.1.3. Hangers on Baby Garments for E-commerce

In 2022, the in-store retail distribution channel is still the predominant part for Company X, but the e-commerce is steady increasing and is expected to further grow, which might result in a decreasing proportion of retailing<sup>10</sup>. The e-commerce flow has a different system compared to the retail flow. The clothes included in the e-commerce flow passes through the distribution center, and from there generally one full truck load is delivered to the e-commerce warehouse each day. The first allocation for e-commerce is ordered directly from the supplier and is purchased without hangers. But if the stock runs out, the e-commerce will get replenishment from the picking warehouse at the distribution center. The first allocation for e-commerce contains around 50-60% of the total volume, which is the quantity that usually is delivered without hangers.

When the e-commerce warehouse needs replenishment to balance their inventory levels, there is a reserved part for this from the picking warehouse. The problem with this is that the clothes in the picking warehouse are common for all sales channels, including retail, meaning that the baby garments here are already pre-hanged by the supplier. This in turn, means that the hangers must be removed from the baby garment before it is sent to the end customer. This causes a lot of extra work for the employees at the e-commerce warehouse.

#### 4.2.1.4. Hangers on Baby Garments for Third Parties

The distribution channel for third parties is very similar to the one for e-commerce. Some parties receive separate orders that are sent directly from suppliers to the partner. For partners located close to the distribution center, the first allocation passes through the distribution center and the baby garments are ordered without a hanger. Since Company X has several different third party customers, the delivery frequencies look different depending on each customer. However, just as for e-commerce, if any of the third party customers require replenishment of their inventory levels this is sent from the central picking warehouse, meaning that the plastic hanger is already added to the baby garment. In these cases, the

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<sup>10</sup> Respondent 1, Store Operation Coordinator, 2022-02-24

plastic hangers must be removed at the distribution center before the baby garments can be sent to the third party customers, since they do not wish to get any hangers included in their deliveries. Also, this causes extra work for the employees at the warehouse<sup>11</sup>.

The replenishment process, both for e-commerce and third parties, is a process where the hangers do not fulfill any purpose. The purchase team is constantly working on optimizing the inventory levels in order to avoid as much pre-hanged clothes as possible for e-commerce and third parties. But since Company X started out its business as a brick-and-mortar company, one of their priorities has been to be “store-friendly”, meaning that all processes should be as optimized as possible for physical stores, which in turn affects other parts of the organization<sup>12</sup>. As Company X’s sales are increasing in digital sales channels, the company is now looking over processes in order to optimize the flows for the combination of different sales channels, physical as well as digital.

#### 4.2.1.5. The Recycling Process of Single-used Baby Hangers

When a piece of baby garment is being sold in one of Company X’s retail stores in Sweden, the customer gets a question from the store employees whether they want to keep the hanger or not. The majority of the customers do not wish to keep the hanger, which is then removed from the baby garment by the store employees. This indicates that Company X is taking responsibility for the recycling process of most of the hangers. The cashier sorts the hangers for recycling behind the checkout counter in large barrels. Most hangers are reused in the stores, it is only single-used hangers for baby, lingerie, and other broken hangers that are sent for recycling. When a barrel with hangers for recycling is full the hangers are packed into a carton and sent for recycling<sup>13</sup>. Pickups of the hangers sent for recycling from the retail stores are consolidated with the daily deliveries of products, this is to lower transportation costs, but also lower the environmental footprint related to emissions. Hangers that have been removed from the replenishment orders for e-commerce or third parties are also collected and sent for recycling in the same way as for the retail stores. Regardless of distribution flow, it means that the plastic hangers for baby garments are only being used for one single time before it is sent away for a recycling process.

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<sup>11</sup> Respondent 8, Logistics Coordinator, 2022-04-04

<sup>12</sup> Respondent 2, DC Supervisor, 2022-03-11

<sup>13</sup> Respondent 1 Store Operation Coordinator, 2022-02-24

The plastic hangers that are collected in the Swedish retail stores, distribution center or e-commerce warehouse are also recycled in Sweden, and thereafter is the material sent to Europe for production of new products. Unfortunately, it would not be possible to return the single-used hangers to the manufacturing sites in Asia. The main reason for this is due to high transportation costs, but also as it would require too many intermediaries, followed by a predominant risk that the hangers would not arrive in time for production. It is worth mentioning again that Company X nowadays consists of different distribution channels, where single-used hangers only fulfill a purpose in the physical stores. As of today, the orders are split per sales channel, which means an increased risk of miscalculations of the forecasts and therefore requires advanced system logic and.

For women's and children's clothes, the process looks different as the clothing items are being put on hangers in the retail stores by store employees. When women's or children's clothes are sold in the retail store the hanger is being removed by the staff at the checkout counter to be reused for the next delivery. These hangers are being purchased by each retail store, to be reused for its whole life cycle. Company X's store-hangers are stamped with a unique number and manufacturing year, which enables it to see their exact age, and it is not uncommon for a retail-hanger to last for 10-15 years. When the hangers are obsolete or broken, they are sent for recycling, and thereby entering a circular loop. Based on the information provided from the interviews, it can be argued that the respondents of Company X who participated in the interviews consider the approach of moving all hanging activities to the retail stores being more sustainable, both from an environmental and economic perspective.

#### 4.2.2. Economic Perspective

In 2020, the total annual amount of purchased baby hangers were approximately 3,5 million pieces, and in 2021 approximately 2,9 million pieces. This gives an average of 3,2 million pieces of single-used baby hangers purchased annually. The price for adding the hangers to the clothing items at the manufacturing sites are included in the purchase price<sup>14</sup>. This means that there is no difference in terms of garment price whether the clothing is bought with or without a hanger<sup>15</sup>.

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<sup>14</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

<sup>15</sup> Respondent 4, Transport & Customs Manager, 2022-03-04

Additionally, the single-used hangers create an extra volume during shipping, resulting in, for instance, higher transportation costs. All of Company X's baby garments are shipped in cartons from the garment suppliers to the warehouse in Sweden. Company X is constantly working to maximize the filling rate in each carton. As the situation of today, the single-used hangers lead to a less carried volume of garment per carton, and *“from a filling rate perspective, there are only negative aspects when shipping pre-hanged clothes”*<sup>16</sup>.

Furthermore, a large amount of hangers are currently purchased in the countries where the garments are manufactured and then shipped from the garment supplier, mainly situated in Asia, to the distribution center in Sweden and then to respective retail stores around Europe. The hangers are transported a long distance and still only being used for one single time before being sent for recycling. According to one of the respondents of the case company it is *“a process that requires a lot of energy”*<sup>17</sup>. To keep the freight rates to the recycling centers down, the pickups are consolidated with the daily deliveries to the stores.

In addition, the process of sending the baby hangers for recycling is more or less a non-profitable activity. Company X gets a refund per kg of plastic, and due to the transportation costs, it takes more or less out the profitability. As already mentioned, the transparent plastic hanger that is currently being used for the baby garment would be possible to reuse for several times, but collecting them from all different retail stores, distribution center, and e-commerce warehouse and then shipping them back to the manufacturing sites in Asia would be too expensive due to the complexity of the flow in combination with freight costs<sup>18</sup>. Therefore, in the current set up it is more efficient to buy new hangers close to the garment suppliers<sup>19</sup>. However, the transparent plastic hangers are sent for recycling in local areas, in return, Company X receives a refund based on the amount of returned plastics. To minimize transportation work and to keep freight rates down, the pickups of plastic hangers sent for recycling are consolidated with the daily deliveries to the retail stores.

#### 4.2.2.1. Calculations for Company X by sea freight

Due to confidentiality reasons, the calculations of transportation costs will be based on the Shanghai Containerized Freight Index. The Shanghai Containerized Freight Index shows the

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<sup>16</sup> Respondent 4, Transport & Customs Manager, 2022-03-04

<sup>17</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

<sup>18</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

<sup>19</sup> Respondent 5, Global Label & Packaging Manager, 2022-03-11

price of sending one 20FT container from the port of Shanghai to the first port in Europe, i.e., Rotterdam. This might be a bit misleading regarding this case study but will however give an indication of the ocean freight prices. As previously described, as a result of the Covid-19 pandemic, the ocean freight rates have sharply increased, due to container shortage and port congestions (Leng, 2021). In some cases, the price for one container has risen as much as 840% (Lundin, 2021), which makes the current situation of ocean freight rates unique. In order to get an idea of how the single-used plastic hangers affect the case company from an economic point of view, the calculations below were conducted.

Dimension of one carton:  $0,57\text{ m} \times 0,34\text{ m} \times 0,30\text{ m} = 0,0581\text{ m}^3$ .

Number of cartons per cubic meter:

$1 \div 0,0581 = 17,1998 \rightarrow \sim 17\text{ cartons fit in one cubic meter.}$

Dimensions of a standard 20FT container is

$2,35\text{ m} \times 2,39\text{ m} \times 5,9\text{ m} = 33,137\text{ m}^3 \rightarrow \sim 33\text{ m}^3$ .

According to Shanghai Index, in April 2022, the price for transporting one 20FT container from China to Europe is 5 162,23 USD (Freight Indices, 2022.),  $\rightarrow$

$5162,23\text{ USD} \div 33\text{ m}^3 = 156,431212 \sim 156\text{ USD per m}^3$ .

This means that on average the transportation cost is 156 USD to ship 17 cartons of clothes from Asia to Europe. The inland transportations, to and from the distribution center, is almost exclusively carried out by truck. Due to confidentiality reasons the transportation costs for these operations could not be calculated. But according to the calculations for the maritime transports above, the costs for inland transportations could be considered to be affected similarly. These calculations will be further discussed and elaborated in the analysis and discussion section.

#### 4.2.3. Environmental Perspective

As already mentioned, in order to produce a transparent plastic hanger for baby garments, the hanger must contain at least 50% virgin raw materials, while the remaining consists of recycled materials. Those raw materials are endangering our environment as it contains e.g., large amounts of oil which also results in expensive processes. However, it can still be argued



that plastic is a suitable material for hangers as it is lightweight and durable with a long life cycle if it is produced, handled, and later on recycled in a proper manner.

To be allowed to classify clothing items as sustainable it must fulfill some requirements, e.g., it requires that the plastic can be 100% recycled, or if the hangers are reused in the stores and thereby enables a circular business model, it could also be considered as sustainable. However, the company or brand must be able to demonstrate that they are sustainable, i.e., Company X must prove that the transparent hanger that contains 50% raw materials is being recycled and not only thrown into combustible waste<sup>20</sup>. There are routines for sorting and recycling hangers in all stores as well in the warehouses of Company X. New employees at Company X must therefore receive an introduction to the company's environmental policy and how the sustainability goals work at an overall level<sup>21</sup>.

For the retail stores located in Sweden, the hangers are also being recycled in Sweden, and then the material is sent for productions of new products in Europe. Since the baby hanger does not contain any metal hook, the whole hanger is melted down and pressed together to a mass, and then transported to the next step in the value chain of becoming new products. The transparent baby hanger is possible to use to create all kinds of new colors, therefore it is beholden in this process, while e.g., a black hanger cannot be used to create lighter colors.

An exception to this flow is a few of the stores that are located in shopping malls that have their own recycling centers. In those cases, these retail stores' hangers are recycled by using the shopping malls' recycling bins, since the shopping malls in these cases have efficient recycling flows. This leads to more efficient recycling flows since all plastic from the stores in the shopping malls is consolidated, but also economic savings connected to less transportation costs and less CO<sub>2</sub> emissions<sup>22</sup>.

All hanger suppliers are carefully selected, and it also happens that Company X executes audits to ensure that the hangers achieve the required certification. The material of the hangers must contain the correct specification that Company X requires, if a supplier breaches this agreement, they will be held guilty. The signed agreement is valid for two years, but Company X is constantly seeking for new suppliers that can offer better and more

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<sup>20</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

<sup>21</sup> Respondent 1, Store Operation Coordinator, 2022-02-24

<sup>22</sup> Respondent 1, Store Operation Coordinator, 2022-02-24

sustainable options of hangers. In the aftermath of the Covid-19 pandemic, many parts of the value chain have been exposed. Not at least in the process of hangers as the prices are going up, especially related to the rising oil prices. It also seems to be difficult to find new solutions or suppliers at this time, as few companies are investing to make developments in this area right now.

Currently, Company X only applies the circular model, described above for the stores, in the Scandinavian countries, 85% of the total number of the stores. Other countries, with approximately 15% of the stores, are required to take responsibility for the recycling process themselves. At the moment it is not possible to have all of the countries included in the same recycling loop, but each store and country must report how they recycle and how plastic hangers they are sending for recycling on an annual basis<sup>23</sup>.

#### 4.2.3.1. Transportation and CO<sub>2</sub> emissions

In line with the increased volumes of international trade, there is a significant increase in traffic, and thereby also increased GHG emissions. The emissions from international flight traffic and maritime transports are the two most rapidly growing sources of emissions throughout the transportation sector. Until the year of 2050 the emission levels of the shipping sector are calculated to increase with 50 to 250% (European Commission, n.d.).

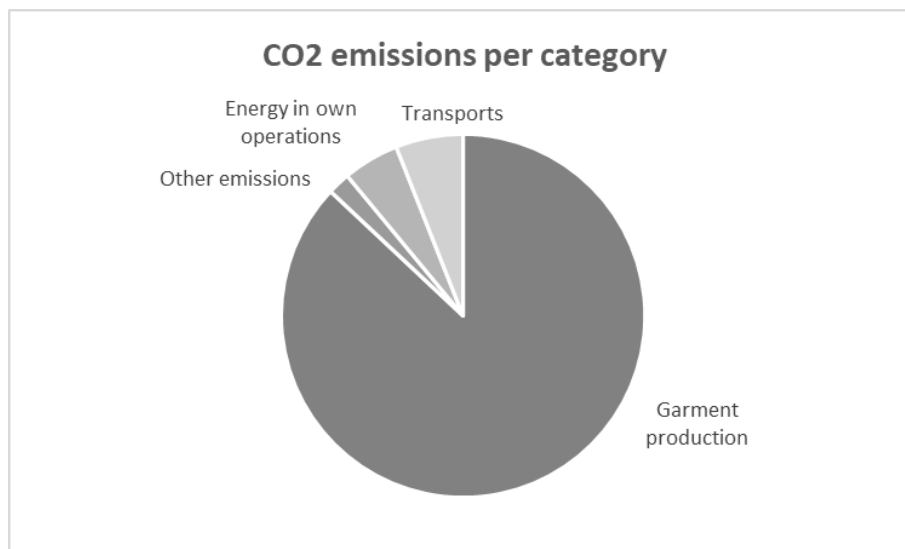


Figure 10: Total CO<sub>2</sub> emissions per category, 2021. (Own interpretation by the authors, inspired by the Sustainability Report of Company X, 2021).

<sup>23</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

Company X is almost exclusively transporting the baby garments by sea freight, which is a conscious choice, both in order to minimize their environmental footprint and optimize transportation costs. Other modes of transport are only being used if something unpredictable happens and it is urgent to get the deliveries home in time. Company X also focuses on the filling rate, not only in export cartons but also in containers. By having large volumes, the company has the possibility to fill the containers, leaving no empty space within export cartons or containers. According to figure 10 above, transportation activities are the second largest category in terms of CO<sub>2</sub> emissions, but significantly less compared to the emissions caused by garment production.

#### 4.2.3.2. Plastic Consumption

Baby garments stand on average for approximately 8,5% of the total annual sales of Company X<sup>24</sup>. As previously mentioned, an average of 3,2 million pieces of single-used baby hangers are purchased annually. Additionally, approximately 550 000 pieces of baby garments are being replenished from the picking warehouse to the e-commerce warehouse each year. In these cases, the hangers cause a large amount of both economic and environmental waste. The weight of the hangers that are being used for this product category is 19 grams per hanger<sup>25</sup>.

Calculating the total amount of hangers used for baby garments indicates how much plastic being produced on an annual basis:

$$19 \text{ g} \times 3\,200\,000 \text{ pcs} = 60\,800\,000 \text{ g} \rightarrow \sim 60\,800 \text{ kgs.}$$

Calculating the total amount of hangers sent from the picking warehouse to the e-commerce indicates how much plastic that only goes to waste:

$$19 \text{ g} \times 550\,000 \text{ pcs} = 10\,450\,000 \text{ g} \rightarrow \sim 10\,450 \text{ kgs.}$$

This indicates that approximately 60 800 kgs of plastic are annually produced, transported, and finally recycled each year by Company X, to be used for one single time. Additionally, 10 450 kgs of this amount of plastic is produced, transported, and recycled without even fulfilling a purpose in the value chain at all. Seen both from the perspective of the case

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<sup>24</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>25</sup> Respondent 5, Global label and packaging manager, 2022-03-11

company, but also the end customer, this is a cost, from both an economic and environmental perspective that does not add any value.

## 5. Analysis and Discussion

*This chapter involves a detailed analysis of the current situation and a possible future scenario founded on the theoretical framework and empirical findings. The chapter analyzes different situations and how it affects the value chain. Additionally, this chapter contains a discussion of particular interesting results and possible areas of improvement. Lastly, there will be a final discussion about the research in entirety.*

### 5.1. Analysis of the Current Value Chain

After collecting all the data, the empirical findings have been analyzed combined with the theoretical framework, which later on results in a proposal of a possible future scenario. The empirical findings have been collected by identifying the current value chain of the single-used plastic hangers, with the main focus on economic and environmental sustainability.

#### 5.1.1. Current Value Chain of the Single-used Hangers

Sustainability is highly relevant for many companies and businesses today (Turker & Altuntas, 2014). At the same time, according to Yang, Shen and Gu (2018), cost is a critical factor within the fashion industry where the end customers are highly price sensitive. Therefore, in order to stay competitive, environmental sustainability and sustainable development in combination with cost effectiveness is vital for companies to survive, not least in the clothing and fashion industry, due to both increased customer awareness and to be able to meet new legal requirements (Mariadoss, et al., 2016). As previously mentioned, the focus of the debate today is mostly on sustainable transportations and development of sustainable materials (Globala Målen, n.d.), and the impact of the hangers has ended up in the shadow of this. Sustainability is always about collaboration between the social, economic, and environmental dimension (Farchi, et. al., 2021). Furthermore, hangers are an important exposure tool and play a central marketing role in the retail stores (Mainetti, n.d.). At the same time an increasing part of the sales are moving to online distribution channels (Bertram & Chi, 2018) where the hanger does not fulfill any purpose.

As shown in the current situation analysis, what separates the three distribution flows of Company X in this context is that the in-store retailing flows of baby garments are

pre-hanged at the manufacturers site. The main reasons for pre-hanging the clothes by the garment suppliers are to make the hanging process more cost efficient, and also streamlining the handling process in the stores. This setup can be confirmed by Triantafyllou, et.al., (2016) who describes that it can be more time efficient if the garment is already pre-hanged, Logwin (2009) further explains that pre-hanged clothes facilitate crease-free deliveries that reduces time spent on the unpacking process. This concept connects well to Company X, and their statement of being “store-friendly”, meaning that their processes are adopted by the retail distribution channel. From the beginning when only being a pure brick-and-mortar company it is easy to understand this setup, but today as the market conditions and customer expectations have changed it would be more advantageous to reconsider this concept, especially since online sales are expected to further increase.

The current design of the value chain of Company X and their single-used hangers were designed around 10-15 years ago, and since then a lot has happened around environmental awareness, regulations, and especially the increased degree of online shopping. Company X has therefore started an initiative reviewing the current value chain of the hangers and pre-hanging activities in order to determine if this still is the most effective and sustainable solution according to the current conditions. Infusing a circular approach within the fashion industry will not only mean better products and customer service, but it will also contribute to a thriving and regenerating environment (Ellen MacArthur Foundation, n.d.a.).

Furthermore, one important aspect of sustainability is that it starts with the design (Weetman, 2017; Ellen MacArthur Foundation, 2013), meaning that both design of the product, i.e., the hanger, and the design of the value chain must be designed in such a way that it promotes sustainability. The hanger that is used today already has a sufficient design that enables it to be reused for several times, which could considerably expand its life cycle. Therefore, the main focus for Company X in this question, would primarily be to reconsider the design of the value chain of the hanger, while the design of the specific hanger could at this initial stage remain the way it is, if that would be preferable. According to Benn (2018) circularity starts with products that are designed to reduce the need of resources, and that can be reused in a re-circular approach. By redesigning the process of hangers for baby garments to be the same as for women’s and children’s clothes, i.e., relocate the hanging activities to the retail stores, would promote circularity by closing the loop at an earlier stage. In this way it would be possible to reuse the transparent plastic hanger used for baby garments several times, in the

same way as the current in-store hangers, used for women and children's clothes. This approach of reusing the hangers in the retail stores over and over again, corresponds to the theories of Benn (2018) where he explains that it is possible to more efficiently utilize materials, resources, and energy by creating closed loops, as it would not be necessary to constantly seek for new raw materials in the production of new hangers.

Reusing the hanger would save enormous amounts of resources and energy which would facilitate the environment by reducing extraction of natural resources. Furthermore, to enable the baby hanger to contain a higher amount of recyclable materials, the color can be discussed. For instance, redesigning the hanger to become white or grey, facilitates the increase of recycled materials in the production of new hangers. Redesigning the color of the hanger would further facilitate savings of natural resources. But with regard to the marketing reasons behind the choice of the transparent hanger (Loneragan, Patterson & Lichrou, 2018), the design for sustainability must lie elsewhere. If the new suggestion of the handling process of the single-used hangers in physical stores would be implemented, the hangers would be purchased at one time, and then remain in the stores for its whole life cycle. This would then be a more sustainable choice, which can be seen in the circular business model infused in the fashion industry described by Ellen MacArthur Foundation (n.d.b.). If so, new hangers would be bought each 5<sup>th</sup> to 10<sup>th</sup> year. When the hangers eventually would be obsolete or broken, they would be sent for recycling, which enables the plastic to be reused for other purposes, which makes it retain its value and functional properties (Milios, Davani, & Yu, 2018; Milios, et. al., 2018). In this way, it would have an impact in all three dimensions of sustainability (Gardetti & Torres, 2013).

### 5.1.2. Economic Perspective

As described in the theoretical framework, Farchi, et. al., (2021) explained that companies that focus on all three dimensions of sustainability; social, economic, and environmental, often assimilate long-term values, compared to companies only focusing on short-term financial results. The current design of the value chain of the baby hangers is obviously made out of the perspective of short-term economic gain, as it would be more expensive to have the store employees in developed countries conduct the task of adding the hangers to the clothes in the physical stores. Furthermore, economic sustainability can only be achieved when both social and environmental sustainability aspects have also been taken into account (Harrison & Van Hoek, 2011). In this aspect the environmental perspective of sustainability is less taken

into account as each new order of baby garments also includes an order of producing new plastic hangers, which require extraction of natural resources that has a direct impact on the environment. Additionally, an important aspect of creating value throughout the value chain is to create value for the end customer, and thereby get rid of unnecessary waste (Jonsson & Mattsson, 2016). As seen from the calculation in the previous chapter (page 44), a huge amount of hangers are sent for e-commerce, which does not bring any value for the end customer, and results in enormous amounts of waste. As a result, the circular business model has become increasingly more important in order to maximize the use of each resource (Ellen MacArthur Foundation, 2013).

According to Pero, Arrigo and Fionda-Douglas (2020), the choice of locating the production of clothes and pre-hanging activities in developing countries can be very cost beneficial, as in this case it enables Company X to make economic savings linked to production costs. A circular business model often contributes to both revenue and cost benefits (Ellen MacArthur Foundation, n.d.b.), but in the case of Company X, for instance taking the filling rate, transportation costs, and the cost of the recycling activities of the hangers into consideration, both from an environmental and economic point of view the circular loop could possibly be designed in a more efficient way. By redesigning the current process of the single-used hangers by infusing circularity where the loop is being closed at an earlier stage can bring significant savings due to both production as well as transportation costs but also provide savings in GHG emissions (Ellen MacArthur Foundation, n.d.b.).

What could be questioned is whether the current value chain, and specifically the pre-hanging activities, has been analyzing the overall perspective of sustainability described by Turker and Altuntas (2014). The new suggestion of relocating the hanging activities to the physical stores is also closely related to the sustainability aspect of the transportations, both environmentally and economically, as it would increase the filling rate by approximately 47%. According to Leng (2021), the sharp rise in the ocean freight rates makes it even more important to maximize the filling rate, which further supports the suggestion of relocating the hanging activities, as it has a direct impact on the transportation costs. A new setup of the value chain of the hangers can further be supported by Jensen (2022), who describes increased oil prices connected to the Covid-19 pandemic, making it more important than ever for companies to optimize their transportations.



### 5.1.3. Environmental Perspective

According to Turker and Altuntas (2014) a sustainable approach integrates the whole supply chain, including all of its stakeholders. Further on the authors describe that many companies, not at least within the fashion industry, are implementing sustainable strategies in order to minimize their environmental footprint. With the aim to create better products, with better design towards a better world through having all working together to make a difference for future generations, there is no doubt that Company X are conscious in their way of doing business with high ambition of being sustainable<sup>26</sup>. This can be underpinned with the purpose of this report and the fact that Company X are not only rethinking their garments of being sustainable, but also their hangers. According to Ellen MacArthur Foundation (n.d.a.) the work towards a better future starts with the design of the products, which enables them to be reused and recycled to reach its full potential, and thereby being less harmful for us and our planet. On the other hand, the sustainability ambitions of Company X can be questioned with the current value chain of the baby hangers, as this operation results in enormous amounts of waste, extraction of natural resources, and emissions connected to the transportations on a global scale. Redesigning the value chain to promote circularity by closing the loop at an earlier stage would have a direct, positive effect on the environment.

Company X does not own any of the factories themselves, either for clothes or hangers, and as described by Pero, Arrigo and Fionda-Douglas (2020) this is a common setup of the supply chain within the fashion industry. Outsourcing activities does mean outsourcing the responsibility. In fact, outsourcing includes a lot of work in ensuring that the processes are conducted under fair conditions, meaning that the processes should either be harmful for the workers or the environment. Company X states that they only want to partner up with suppliers with the same vision as themselves, i.e., creating a transparent and sustainable fashion industry, which makes them very selective when choosing supply chain partners. Just like Turker and Altuntas (2014), Company X explains sustainability as a team effort. By well thought out structures and with the help of code of conducts they are hoping to find the right partners, aligned towards a sustainable way of working<sup>27</sup>. Working proactively by identifying, preventing, and minimizing negative impacts of business activities is of high importance, not least due to the fact that every stage of the fashion industry's supply chain creates pollution and emissions, being responsible for 5% of the world's total emissions (Hibbred, 2019). This

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<sup>26</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>27</sup> Respondent 6, Supply Chain Developer, 2022-04-20

approach of only partnering up with suppliers with the same visions can be proven due to the way that Company X selects their hanger suppliers. These suppliers are selected throughout certifications, with recurring supervisions, and if the supplier in any way breaches the agreement, they will risk to get a fine or to be exchanged. According to Manners-Bell (2017) it is acceptable to outsource the production when the company can have full transparency of the suppliers' processes, which also is a requirement in order to enable a circular business model (Ellen MacArthur Foundation, 2020). However, the overall goal for Company X is to find partners who take sustainable responsibilities that will result in long-term relationships, which coincides with the theories of Yang, Shen and Gu (2018) to create collaborative partnerships.

#### 5.1.3.1. Transportation and CO<sub>2</sub> emissions

Intensified time pressures and dispersed supply chains have resulted in increased CO<sub>2</sub> emissions connected to transportations (Turker & Altuntas, 2014). However, Manners-Bell (2017) understates that choice of transportation mode can have significant impacts on a company's total emissions, where sea freight can be recognized as the most carbon-efficient transportation mode. In a statement of being sustainable, Company X is almost exclusively transporting their baby garments by sea freight. Road freight is carried out for shorter distances, e.g., manufacturing sites located in Europe and for outbound logistics. Air freight may occur only in extreme and unpredictable situations when the clothes still require deliveries according to the set time schedule, this is though never planned and avoided to the greatest extent<sup>28</sup>. This approach can be confirmed by Manners-Bell (2017) as he describes that the fashion industry strives to forecast their demands far enough to enable sea freight, but if unexpected situations occur, air freight is considered for fast deliveries. Transporting apparels by sea has enabled many retailers to source their clothes over far distances while remaining cost efficient, not least Company X.

Well aware about the emerging climate crisis as have been described by Hibbred (2019), Company X aims to reduce their climate footprint, by examining material choices, production processes, energy sources, and their transportation systems. Looking at each operation it is possible to see where GHG emissions could be minimized in day-to-day activities to reach the goal of becoming climate neutral by 2030<sup>29</sup>. In order to achieve this goal, Company X

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<sup>28</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>29</sup> Respondent 6, Supply Chain Developer, 2022-04-20

transmitted their sea transportation to 100% biofuel in 2021, which further reduces CO<sub>2</sub> emissions, as well as sulfur emissions. Also in 2021, Company X fueled the majority of their outbound logistics, i.e., road freight, with HVO (hydrotreated vegetable oil) biofuel<sup>30</sup>. This action can be reinforced by the theories of Jonsson and Mattsson (2016), that it is important to consider the total environmental impact of the logistic system. The wish of becoming climate neutral has become a highly topical area for many enterprises in different industries, not only connected to the transportation sector, but the company's overall operations. Though, to reduce emissions connected to logistic activities, the choice of fuel is a significant starting point.

However, it may not be sufficient to only look at which fuel is used or choice of transportation mode as there are several more aspects to consider, such as the age of the transportation mode or vehicle, as an older engine most likely has a poorer combustion capacity compared to newer technology in more modern engines. Carefully considering transportation mode and source of fuel are of course important factors, but also in this question it is important to have a holistic viewpoint, taking all possible factors into account when becoming sustainable. Therefore, selecting a more environmentally friendly fuel for sea freight and inland transport is not considering the impact of producing millions of new hangers on an annual basis, that require enormous amounts of raw material, resulting in high levels of emissions.

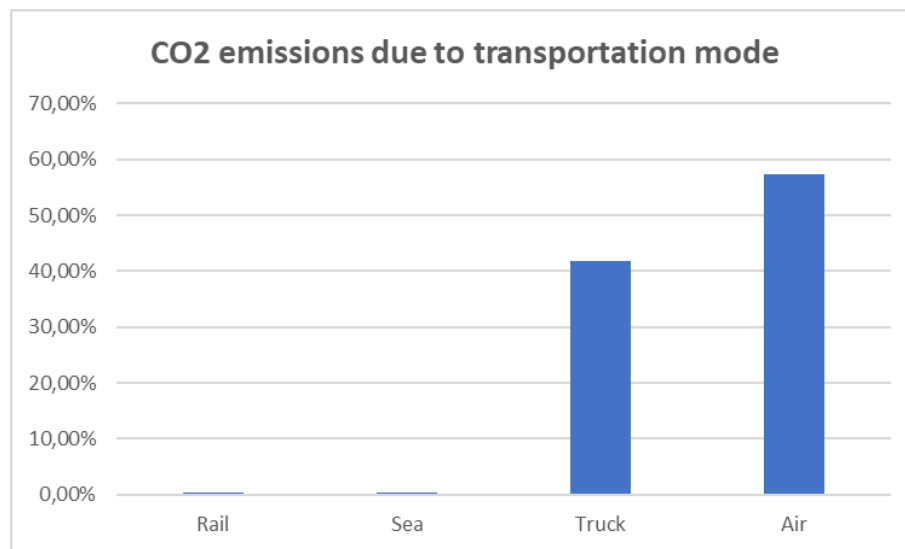
It has not escaped anyone that fashion has become a global industry during the last decades, with changed shopping habits where customers always expect the latest trends to be available (Ferne & Sparks, 2018), puts intriguing challenges on the transportation sector. Also, the Covid-19 pandemic intensified those challenges regarding the fast-growing e-commerce where customers demand fast deliveries at all times. It is therefore no surprise that transportation represents a significant part of the total global footprint<sup>31</sup>. This is though not only connected to the fashion industry, as the transportation sector of many industries stands for a large part of the global footprint, in relation to emissions. Therefore, the question of continuing to outsource operations is not only vital for Company X. Re-shoring activities, or at least some activities to local areas would have a great impact on the environment and emissions connected to it. Relocating the hanging activities to the retail stores for instance,

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<sup>30</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>31</sup> Respondent 6, Supply Chain Developer, 2022-04-20

would be a small change with great influence, as the transportations would become more efficient, both in relation to costs and emissions.



*Figure 11: Total CO<sub>2</sub> emissions by transportation mode, 2021. (Own interpretation by the authors, inspired by the Sustainability Report of Company X, 2021).*

The overall purpose with a well-functioning logistic system is to optimize business value and offer customer service in an efficient way (Manners-Bell, 2017). However, in order to achieve economic benefits connected to transportation, there is inevitably an indirect cost on the environment, therefore, the choice of transportation mode is of highest importance. Company X is well aware of the negative impact related to air freight, which is thereby only used in exceptional cases. Sea freight on the other hand has a much smaller footprint and is therefore the most commonly used transportation mode by Company X, especially for deliveries with baby garments from Asia. The overall CO<sub>2</sub> emission share per transportation mode carried out by Company X can be seen in figure 11 above. It clearly indicates that sea transportation contains a small part of the total levels of emissions. However, as mentioned in the previous chapter, the international trade is expected to further grow, also resulting in higher emissions connected to transportations (European Commission, n.d.), therefore, the choice of transportation mode, as well as choice of fuel to power the vessels or vehicles will be of additional importance.

Another important factor related to the level of emissions due to transportation refers to the filling rate (Fernie & Sparks, 2018). As Company X always strives to have fully loaded shipments, they conduct regular measures of loading efficiency to ensure the filling rate.

According to Leng (2021) the filling rate has been even more important in order to achieve cost efficient transportations due to the rising sea freight rates connected to the Covid-19 pandemic. However, since Company X is shipping baby garments including a hanger this cannot be justifiable. This is due to the fact that the hanger requires a lot of extra space in each carton which makes it impossible to reach a maximal filling rate, which results in higher transportation costs and higher environmental impact due to emissions. Manners-Bell (2017) explains that each transportation mode has a maximum degree of loading capacity, and that a good level of loading capacity is achieved through weight and not volume. Thereby, shipping the clothes including a hanger makes it almost impossible to reach the full loading capacity as the hanger takes up too much space and volume in the boxes, which further opposes the sustainable commitment of Company X with the current value chain of single-used plastic hangers.

#### 5.1.3.2. Plastic Consumption

The transparent single-used baby hanger is completely made from plastic, as it does not contain any metal hook, which can be seen in the visualizing picture on page 36 in the empirical findings. Based on the interviews, using plastic as material for the hangers is a suitable choice as it is light and durable<sup>32</sup>. The choice of plastic hangers can be confirmed by the Instore Agency (2017) as they describe plastic as cost efficient and reliable due to its stable quality. Therefore, plastic hangers are also the most common kinds within the fashion industry.

However, the plastic hanger used by Company X has been designed to be transparent, with the reason to give the clothing items a nice look in the retail stores. The backside of this is that the hanger then must consist of at least 50% raw materials, i.e., crude oil. As mentioned by Milios, Davani and Yu (2018), these raw materials are finite, which in addition to the environmental aspects makes it even more important to not waste those kinds of raw materials in unnecessary processes for short-term financial gain. Ellen MacArthur Foundation (2013) further explains the importance of business leaders taking the concepts of a circular business one step ahead by making it to the mainstream model in order to eliminate extraction of raw materials and thereby reduce the risk of resource scarcity. According to these theories, the sustainability commitment of Company X can be further questioned as they have designed the baby hanger to be transparent, despite the fact that it requires a large

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<sup>32</sup> Respondent 3, Labels & Pack Coordinator, 2022-02-28

amount of raw materials. Changing the color of the hanger to e.g., white or grey, would enable an increase of recycled materials in the production process.

By this time, we are all well aware of the fact that fossil resources are finite and cause large damages to the environment, such as GHG emission, which is described by Milios, et. al., (2018). Also, since plastic is constructed in a chemical manner, it has a very slow process of degradation, which results in macro- and micro plastic particles that damage our planet (Milios, Davani & Yu, 2018; Milios, et. al., 2018). Therefore, redesigning the hanger into a different color would decrease the need of finite resources, such as crude oil, as well as lower emissions connected to those extracting processes.

Today, it is possible to recycle and reuse 100% of the material and turn it into new products, if the plastic is designed and manufactured in a correct way from the beginning, (Stena Recycling, n.d.). In this way the plastic can be reused many times and still retain its value and functional properties (Milios, Davani & Yu, 2018; Milios, et. al., 2018). Due to the increased awareness and new regulations, companies today are working on maximizing their recycling rates, including hangers (Firstmile, n.d.) Translating this to Company X, we know by now that they have strict policies of recycling their plastic hangers, at least in their Swedish retail stores, which is an ambitious setup. According to Milios, Davani and Yu (2018) we also know that Sweden's recycling rate of plastic is approximately 40% higher compared with other EU countries. However, it can never be assured that the recycling process turns up into new hangers, nor that the recycled materials become products for Company X. Company X claims to strive for a circular business approach, but circularity initially aims to reuse products in its original form, where recycling is the option when the products are obsolete or broken. It is therefore not justified by Company X to claim themselves of using a circular business approach, when the baby hangers are only being used for one single time before they are sent for recycling, when their actual life cycle could last for 5 to 10 years.

However, Company X states to have high ambitions of reducing their plastic consumption, which is part of their sustainability goal. This goal further consists of reducing the overall plastic usage, but particularly phasing out single-used plastics articles, which makes the question regarding single-used plastic hangers of baby garments further interesting. This goal of Company X can be supported by the UN's global sustainable development, by promoting sustainable consumption and production (Globala Målen, n.d.). When Company X mapped their plastic usage, it was clear that the largest part of plastic consumption comes from the

inbound logistics and transportation packages<sup>33</sup>, seen in figure 12 below, which is where the single-used hangers come into picture.

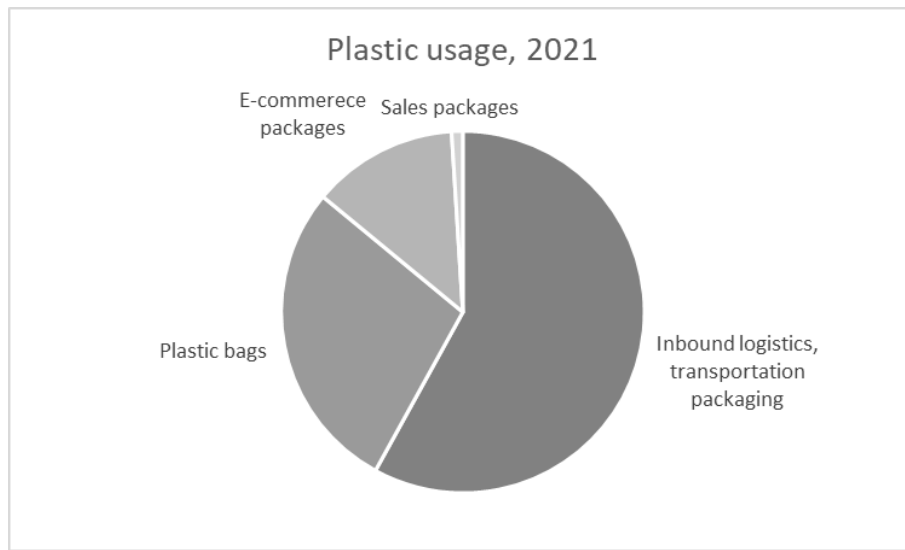


Figure 12: Plastic usage per stream, 2021. (Own interpretation by the authors, inspired by the Sustainability Report of Company X, 2021).

Since all of Company X's plastic materials are being recycled, even if the baby hanger is sent for recycling after only one single usage, it can anyhow be said to follow into a circular approach, which is part of Company X's sustainability goals. Company X says that a transformational change toward a circular business approach is necessary as it becomes increasingly clear that it is no longer possible to rely on raw materials<sup>34</sup>. The traditional concept of a linear economy, that is based on take, make, and waste (Weetman, 2017) can partly be connected to the single-used plastic hangers of Company X, as it is manufactured and shipped a far distance, only to be used for one single time. The difference though, is that at the end of its life cycle it is sent for recycling and can thereby enter a circular loop. Replacing a linear economy with a circular approach is vital, not only for the survival of the planet but also for the survival of humanity, as it aims to eliminate waste through better designs of materials, products, and systems (Ellen MacArthur Foundation, 2013). The current value chain of the baby hangers contributes to waste in several different aspects, which therefore does not enable it into a circular approach, as it according to the definition aims to eliminate waste.

<sup>33</sup> Respondent 6, Supply Chain Developer, 2022-04-20

<sup>34</sup> Respondent 6, Supply Chain Developer, 2022-04-20

According to the calculations above (page 44), it can be seen that more than 60 800 kgs of plastic is generated only from hangers on baby garments every year, which can be compared with approximately ten elephants. As mentioned previously by Milios, Davani and Yu (2018), the plastic usage is expected to further increase which results in significant amounts of plastic waste as well. Pre-hanging baby garments have the purpose to facilitate the working environment for the store staff as it enables deliveries with ready-for-sale clothes that radically shorten down the handling process. It will also bring cost savings as it is cheaper to have workers in the manufacturing sites to conduct this task, compared with the store staff in our developed economy. This setup can be confirmed by Cui and Yan (2015) as they describe that pre-hanged clothes can improve efficiency and effectiveness of the value chain.

The decision of pre-hanging baby garments was made many years ago when the majority of the case company's sales still was based on pure retailing with only physical stores. As of today, customer habits have changed (Bertram & Chi, 2018), and Company X has now become a multichannel retailer. Additionally, based on the calculations, more than 10 450 kgs of the plastic hangers are sent to the e-commerce warehouse, where the hangers are removed from the garment and sent for recycling, without fulfilling any purpose, meaning that it will not bring any value, either for Company X or their end customers. In line with the accelerating online sales, multichannel retailers have increasingly popped up within the sector, offering products both online and in traditional retail stores (Bertram & Chi, 2018). However, this new way of selling clothes makes it important to understand that it requires adoption of the different distribution channels as they may have different demands (Gaudenzi, Mola & Rossignoli, 2021), and redesigning the value chain is inevitable for many companies, including Company X.

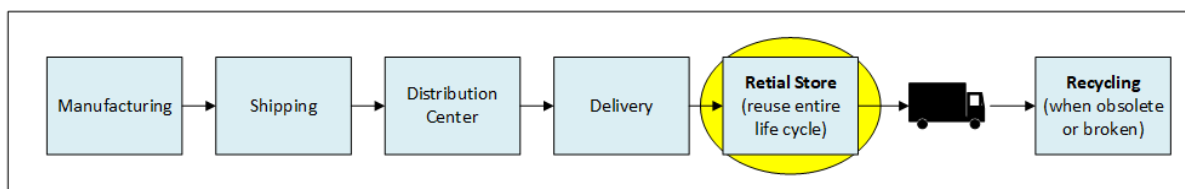
## 5.2. Improved Value Chain of Plastic Hangers for Baby Garments

In this section a proposal of a possible future value chain of plastic hangers will be discussed and presented. The proposals are based on the previous analysis of the current value chain, combined with the theoretical framework, with a focus on economic and environmental sustainability.



### 5.2.1. Proposal of a Future Value Chain

The focus of this study has been to map out the current value chain of single-used plastic hangers for baby garments and how this process can become more sustainable. In order to do so, we have come up with suggestions of a possible future value chain of the hangers. In this case, the proposal of improvement has been developed with the premise that the current baby hanger should remain as an exposure tool in the retail stores. Proposals of how the value chain can become more sustainable is based on that the hanging activities are being moved to the retail stores, as visualized in figure 13 below. A relocation of the hanging activities of baby garments to the retail stores would have an effect both from an economic and environmental point of view, which will be further discussed in the following paragraphs.



*Figure 13: Proposal of a possible future value chain of plastic hangers used for baby garments. The yellow marking indicates where the hangers could be added to the baby garments in order to make the value chain more sustainable. (Own elaboration by the authors, 2022).*

It is convenient for the store employees when the clothes are being delivered pre-hanged, as it facilitates and streamlines their work. But since baby garments constitute a quite small volume of the total sale, it would not imply much of a difference if they were about to conduct the hanging activity of baby garments in the retail stores.

A relocation of the hanging activity from the supplier, and instead locate it at the retail stores would facilitate the work for the purchase team. As of today, the purchase team must take several aspects into consideration when creating orders for respective distribution channels, such as if the garment should be pre-hanged by the supplier and with different types of labels. In the case where the baby garments are sent from the central picking warehouse, the clothes contain a hanger, the hangers must be removed before the garment can be sent to the end customer, i.e., online customers. Hence, in those cases the hanger has been shipped a far distance for being removed and sent for recycling without having added any value, either for

Company X or the end customer. Therefore, removing the hanger from this process would be beneficial from several sustainability aspects, not least for the environment.

In the aftermath of the Covid-19 pandemic it can be argued that it would be beneficial to phase out the pre-hanging activities of clothes, considering the volatile and unpredictable world we are facing today, which increases the risk of disruptions along the supply chain. Since today's global supply chains are all connected, they become more sensitive and there is no guarantee that the transportations will run smoothly, therefore, re-shoring the activity of adding the hangers to the clothes would at least eliminate the risk of disruptions in this step.

### 5.2.2. Economic Perspective

Company X is determined to become sustainable in all aspects. Not at least in the question of achieving the business model of a circular economy which can bring many advantages. By skipping the step of having pre-hanged clothes and instead making a one-time purchase of hangers in each retail store would promote an improvement of their circular approach. It would also result in cost savings related to shipping cost, as the added hangers can be seen as a bulky part of the boxes, and by removing the hangers, the filling rate would increase. Making a one-time purchase of hangers would also lead to lower manufacturing costs of the hangers.

There have also been discussions of having the same hangers being sent back to the manufacturing sites for reuse, and in this way entering a circular approach. But due to the outsourcing situation, the manufacturers are too far away which would make the transportations too expensive, and the process should include many intermediaries which increases the risk of not being able to deliver the hangers in time, and thereby Company X would maybe need to both pay for new hangers in the last minutes, but also for the absent delivery. Also, for this reason, it would be more beneficial to move the hanging activities to the retail stores, as it would increase the economic aspect of sustainability.

#### 5.2.2.1. Calculations for filling rate and transportation costs without hangers

These calculations have been conducted in order to see how the proposals of a future value chain could be affected by removing the hangers. The tests and calculations were conducted on cartons used for inbound transportations, where the clothes were first removed from the cartons and counted. In the next step the hangers were removed from each garment and then

put into the carton again in order to measure the filling rate of each carton. The specific items of clothing were pajamas, bodies, and t-shirts, which were chosen since they stand for the majority of the baby garment category.

Test 1:

48 pieces (initially) → 20 pieces (increase without a hanger)

$20 \div 48 = 0,42 \rightarrow \sim 42\% \text{ increase}$

Test 2:

40 pieces (initially) → 20 pieces (increase without a hanger)

$20 \div 40 = 0,5 \rightarrow \sim 50\% \text{ increase}$

Test 3:

40 pieces (initially) → 20 pieces (increase without a hanger)

$20 \div 40 = 0,5 \rightarrow \sim 50\% \text{ increase}$

Average increase:  $(20 + 20 + 20) \div (48 + 40 + 40) = 0,47 \rightarrow \sim 47\% \text{ increase}^*$

Regardless of which baby garment that was tested, the result turned out to be very similar, i.e., the filling rate increased by approximately 47% per carton without a hanger, as seen in the calculations above. Due to confidentiality reasons, this report could not account for any specific information about the purchase price to the hangers. Thereby, financial differences are calculated in transportation costs for the hangers, compared to differences in personnel costs in the case of moving the hanging activities to the retail stores.

Table 3: Explanation of numbers to carry through calculations. (Authors, 2022)

Price/number	Explanation
9,92 USD	Rate of exchange
156 USD/m <sup>3</sup>	See calculations, page 41
40 pieces of garments/carton	Average, based on observations
47% increase if hanger is removed/carton	See calculations above*
58,8 pieces of garments/carton after increase	See calculations below*

\*Pieces of garments/carton after increase:  $40 \times 1,47 = 58,8$  pcs

Volume per carton:  $0,57 \times 0,34 \times 0,3 = 0,05814 \text{ m}^3$

Volume per garment:  $0,05814 \div 58,8 = 0,000989 \text{ m}^3$

Volume per hanger:  $(0,05814 - 0,000989 \times 40) \div 40 = 0,000465 \text{ m}^3$

Transportation cost per hanger (SEK):

$9,92 \text{ USD} \times 156 \text{ USD/m}^3 \times 0,000465 \text{ m}^3/\text{hanger} = 0,72 \text{ SEK}$

Transportation cost per carton (SEK):

$9,92 \text{ USD} \times 156 \text{ USD/m}^3 \times 0,05814 \text{ m}^2/\text{carton} = 89,97 \text{ SEK}$

Based on the information in table 3, unit price of transportations costs for one hanger were possible to carry through. These calculations show that it costs 0,72 SEK/hanger to transport one plastic baby hanger by sea freight from Asia to Europe.

#### 5.2.2.2. Calculations for personnel costs

In the case of a possible implementation of moving the hanging activities from the suppliers to the retail stores in Sweden, it would increase the costs for the hanging activity. As of today, the hanging activities at the suppliers is embedded in the purchasing price. However, the purchasing price would not differ significantly in a possible event of restructure, but what would have affected an economic aspect is an increase in personnel costs in the retail stores. According to Handels, a Swedish union for employees active within the Swedish retail industry, the average salary is reported as shown in table 4 below.

*Table 4: Average salary for employees within the Swedish retail industry, at the age of 18 and based on experience within the industry, (Handels, 2022).*

1 year	142:37 SEK
2 years	144:30 SEK
3 years	152:07 SEK

Average salary for store employees in Sweden:

$(142,27 + 144,30 + 152,07) \div 3 = 146,21 \text{ SEK/h.}$

The average salary for store employees in Sweden is 146,21 SEK/h. However, taking other fees into consideration, such as employer fees of 31,42% and holiday pay of 12% (Skatteverket, 2022), resulting in:

$$(1 + 0,3142 + 0,12) \times 146,21 = 209,69 \text{ SEK/h (including employer fees)}$$

When baby garments are pre-hanged by the supplier it takes one store employee approximately 15 minutes to handle one box of delivered baby garments in a Swedish retail store,<sup>35</sup> this gives a cost of:  $209,69 \div 4 = 52,42 \text{ SEK/box of delivery}$ .

The amount of pieces in one box can vary, but on average there are approximately 40 pieces in one box, which means that it takes 22,5 seconds\* per each piece to be handled.

$$* 15 \text{ minutes} \times 60 \text{ seconds} = 900 \text{ seconds.}$$

$$900 \div 4 = 22,5 \text{ seconds/piece.}$$

From the time studies it appears that it took on average 8-10 seconds to put one piece of baby garment on a hanger. This time would then be added in the handling process, resulting in:  $22,5 + 10 = 32,5 \text{ seconds/piece}$ .

If one box still contains 40 pieces this would give us:

$$32,5 \times 40 = 1300 \text{ seconds} = 0,36 \text{ h, resulting in a cost of:}$$

$$0,36 \times 209,69 = 75,49 \text{ SEK for the store staff to first put the clothing items on a hanger.}$$

$$75,49 \text{ SEK} - 52,42 \text{ SEK} = 23,07 \text{ SEK}$$

Increase in personnel cost of having the store employees adding the hangers to the baby garments:

$$23,07 \text{ SEK} \div 52,42 \text{ SEK} = 0,44 \rightarrow \sim 44\%$$

Calculations for salary of having the store employees in Sweden execute the activity of putting the baby garments on hangers is:

$$(10 \div 3600) \times 209,69 = 0,58 \text{ SEK/hanger}$$

\*Second per hour

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<sup>35</sup> Respondent 7, Store Sales Manager, 2022-04-01

According to the calculations, the personnel cost would increase by approximately 44% by having the store employees in Sweden execute the activity of adding the hangers to the baby garments. However, the personnel cost per hanger indicates to be 0,58 SEK/hanger, according to the calculations. Which means that the unit price per hanger is still lower when having the store employees execute the hanging activity, compared with the unit price per hanger connected to transportation costs, which was 0,72 SEK/hanger, according to the calculations on page 61.

What must be considered though, is that when this time studies were conducted, all of the hangers were already close at hand. Therefore, if the store employees will do the same activity, they first have to find the correct hangers and ensure the right amount, which further adds up the time and thereby also increases the personnel costs. On the other hand, the cost for transporting the hangers to the recycling centers is more or less a plus-minus-zero business for Company X, due to expensive transportations and a low refund of the plastics. Thereby, a conversion of the value chain where these costly recycling activities would decrease remarkably, the increased personnel costs would in contrast not play a decisive role.

### 5.2.3. Environmental Perspective

There are many indicators that Company X has a high ambition of being sustainable in all aspects of their operations. During their time on the market, they have grown from being a pure brick-and-mortar company, till today having several different distribution channels. Since the beginning they have always been on a journey towards better products, better designs and a better world. They are well aware that they are far from perfect, but they are also determined that they are far from done<sup>36</sup>.

#### 5.2.3.1. Transportation and CO<sub>2</sub> emissions

Based on the calculations above (page 60), the filling rate could increase by approximately 47% by instead shipping baby garments without hangers, which would also result in a decrease of emissions due to optimized transportations. Moving the activity of adding the hanger to the garment from the supplier to the retail stores would enable the shipments to consist of only clothes and not clothes plus hangers. In this way it would utilize the whole

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<sup>36</sup> Respondent 6, Supply Chain Developer, 2022-04-20

filling rate which would result in cost savings related to transportations, both for inbound and outbound transportation.

As of how the process looks like today, the hangers are being produced in the same country as the manufacturing sites are located in. It is performed in this way to lower the environmental impact and freight rates connected to transportations, since there are no long distances between the hanger suppliers and the garment suppliers. Many of the recycled hangers stay in Europe which also results in shorter transportation distances and thereby, less CO<sub>2</sub> emissions. On the contrary, removing the hanging activity from the garment supplier to the retail stores would completely remove these concerning transportations, and thereby also eliminate connected CO<sub>2</sub> emissions.

As all of the baby garments are being shipped by sea freight, Company X has already chosen the most emission-efficient transportation mode for inbound logistics. Further on, Company X has even transmitted all of their sea freight to be powered by 100% biofuels to further reduce their CO<sub>2</sub> emissions, which once again shows their concerns of being sustainable. On the other hand, the outbound logistics is carried out by truck, but as of today there are still no other options. Also, for road freight, Company X has selected conscious choices of more environmentally friendly fuels.

#### 5.2.3.2. Plastic Consumption

Even though plastic is a material that is advantageous to recycle, the best option would be to reuse the hangers for its whole life cycles in the retail stores in order to reduce the energy-intensive processes related to recycling activities. At present, when a piece of baby garment is being sold in a retail store, the hanger is removed and sent for recycling, meaning that its life cycle only lasts for one single usage, despite the fact that the same hanger could be reused for several times over several years. However, the current process could be defined as a circular approach as the loop is closed as the plastic is being reused (Stena Recycling, n.d.). But if the hanger were instead reused, its whole life cycle would extend to last around 5 to 10 years, and the loop would thereby be closed at an earlier stage, where environmental and economic costs would be significantly reduced. Additionally, according to Ellen MacArthur Foundation (n.d.b), a well-designed circular business model allows companies to cut both economic and environmental costs by, for example, in this case reuse the hangers and utilize its whole life cycle.

According to the calculations on page 44, the current annual plastic consumption is around 60 800 kgs, which solely includes the baby hanger. By maximizing the use of these hangers and taking advantage of its possible lifespan of 5-10 years, the plastic consumption would decrease with the same amount, minus, for instance, broken hangers. Instead of having the purchase team buy approximately 3,2 million pieces of single-used baby hangers every year, this would instead mean that each store manager makes a purchase of plastic hangers every 5<sup>th</sup> to 10<sup>th</sup> year, which would save enormous amounts of plastics that would be beneficial both from an environmental and economic perspective. Reusing the same hanger in the retail stores for its whole life cycle would also result in more efficient processes that saves e.g., large amounts of water and energy which helps Company X to reduce their total environmental footprint.

As mentioned above, the plastic hanger that is used today has been designed to be transparent to allow the customers eyes to only focus on the clothing item, as it gives a light and neutral impression. However, from an environmental perspective, using a transparent hanger is one of the most unsustainable choices as it contains a high amount of raw materials, i.e., at least 50%. Changing the color to become e.g., white or light grey would make it possible to increase the amount of recycled materials, which would make the plastic hanger more sustainable. On the other hand, retaining the process of today would still require the same annual amount of plastic usage. Hence, moving the activity of putting the clothes on hangers from the supplier to the retail stores, and at the same time changing the color, would not only decrease the annual plastic usage, but also increase the amount of recycled material, which would from an environmental perspective, be the most profitable choice. Despite the fact that transparent hangers are expensive, sticking with them would, however, not be that much of a problem if they stayed their whole life cycle in the retail stores. Especially compared with today's process where the hangers are only used for one single time, which makes it unsustainable with a waste of resources.

To be able to create a transparent plastic hanger, we know by now that it can consist of a maximum 50% recycled materials, while the remaining part must consist of raw materials. This is because of its color, i.e., transparent. Since recycled materials consist of granulated plastic from many different products it is not possible to ensure the color, this is also why it is beneficial to dye products made of 100% recyclable materials black, because then it is not possible to see different nuances of the recycled plastic. But since the baby hanger has been



designed to be transparent, it is therefore not possible to produce them only containing recycled plastics. On the other hand, the transparent hanger can be used in a recycling process to create any other new color, which somehow makes them partly justifiable. Other options for Company X might be to change the color of the baby hanger. Company X has another product group that is pre-hanged by the supplier as well, namely, underwear. The difference here though, is that this hanger is instead black, and therefore it can be made out of 100% recyclable materials. However, due to the visual impression in the retail stores, Company X are not willing to shift the baby hanger into black, anyhow, they might reconsider to change the color to e.g., light grey. In this way it would facilitate the possibilities to increase the amount of recyclable materials in their baby hangers.

Lately it has been trendy to have wooden or paper hangers instead of plastic ones. But it has been shown that e.g., wooden hangers require a huge amount of resources, which leads to dizzying levels of deforestation, water and transportation in the production processes. As for paper hangers they are heavier and require three times more resources than today's plastic hangers, which also results in more waste and therefore makes it less sustainable. Many customers, though, believes that wooden or paper hangers are more sustainable, and therefore, if Company X for example decides to stay with the plastic hanger but changing the color, it would be beneficial for them to communicate to their customers that this is, from a holistic perspective, the most sustainable and environmentally friendly choice. Also, if the plastic is produced in a correct manner, and the recycling loop can be ensured, as of today, a plastic hanger is the most sustainable material on the market. It was found in the interviews that the color and material of hangers' changes in line with trends, but what could be more trendy than designing a hanger based on the most sustainable options?

### 5.3. Final Discussion

The calculations above indicate that a relocation of the hanging activities of the baby garments to the retail stores would lead to both economic and environmental improvements. As of today, the cost of shipping one hanger from Asia is 0,72 SEK, while a re-shoring of the hanging activity to the retail stores would give a unit cost of 0,58 SEK/hanger, regarding personnel costs in the retail stores. In addition, the shipping costs for the inland transportations, as well as purchase price of the hangers are excluded in this report due to

confidentiality reasons, but including these costs would further imply economic advantages for Company X.

Despite pure economic savings, a relocation of the hanging activity would also facilitate the handling process of baby garments at both the distribution center and the e-commerce warehouse, as the employees would not have to remove the hangers before the garments could be sent to the end customers. The handling process for store employees would also be facilitated as they would not have to add up working time to send the single-used plastic hangers for recycling on a weekly basis.

In addition, a relocation would yield environmental improvements as the new process would lead to a drastic decrease in plastic consumption, meaning that the dependability of raw materials would also radically decrease. Environmental improvements would also be achieved through reduced emissions due to shipping, e.g., an increased filling rate and improved utilization of transportation activities. As well as the process of sending the single-used hangers for recycling would lead to lower emissions due to less need for transportations. In the case of a relocation, the only required transportation would be at the time when the hangers are being purchased by the retail stores, and then at the end of the hangers life-cycles when sending them to recycling centers.

## 6. Conclusion

*This concluding chapter aims to highlight the conclusions and main takeaways of the research. Additionally, this chapter emphasizes areas/subjects that would be interesting to further study in future research.*

### 6.1. Concluding Findings of this Research

In line with the growth of e-commerce, not at least of fashion products, has changed the conditions for businesses and value chains. Many companies active within the fashion industry have moved from being pure brick-and-mortar companies with one distribution channel, to multichannel retailers with several distribution channels to take into account. This development comes with both opportunities and challenges for the companies, since the value chain has different requirements and conditions. Continued development, new technologies, new laws, and regulations makes the improvement work a part of the business that must be looked over continuously.

The purpose of this study was to map out the value chain of single-used plastic hangers at a case company, and focus on improvements for potential improvement of the sustainability, with a main focus on environmental and economic sustainability aspects. This was fulfilled by answering two research questions, of which the first research question was: *What does the value chain of the single-used plastic hangers look like today at Company X?* The result, compiled from empirical findings from interviews at the case company along with theories from the literature review, shows that the current design of the value chain primarily takes the aspect of economic sustainability into account. At present, there are three distribution flows, and the baby garments included in the flow for the physical retail stores are pre-hanged at the supplier's site. This enables fast and smooth handling processes of baby garments in the retail stores, where the hangers are sent for recycling once a piece of clothing has been sold. The baby garments included in the online distribution flow are not being hanged at any point of the value chain, since it does not fulfill any purpose there. One of the main challenges is to manage and streamline these two distribution flows to minimize the waste and use of plastics.

And concerning the second research question: *How can the process of single-used plastic hangers become more sustainable from an economic and environmental perspective?* The result clearly indicates that Company X should consider moving the hanging activities to the

retail stores in order to increase the filling rate, maximize transportations, and reuse the hangers in order to make use of its whole life cycle. The environmental and economic aspects seem to be closely interlinked, meaning for instance that an increased filling rate leads to both reduced transportation costs and emissions. Furthermore, a relocation of the hanging activities to the physical stores would both increase the personnel costs, but also reduce the use of plastic remarkably, while also reducing the costs for transporting and recycling the single-used hangers. By doing this, the environmental sustainability would become more included without compromising with either the economic or social aspects of their sustainability commitment. However, based on the calculations, the unit price per hanger during transportation is 0,72 SEK, while the unit price per hanger after a relocation to the retail stores is 0,58 SEK, which further proves and promotes a relocation of this activity.

It becomes clear that it is important to have a holistic view, taking the whole value chain, including different distribution channels, and concerned aspects into consideration, and to continuously re-evaluate to enable continuous improvements. As online sales are expected to continue to grow, the role of the hanger will most likely look different in the future.

## 6.2. Contribution

In this master thesis, the value chain of the single-used plastic hangers, used for baby garments at Company X, have been mapped out. Also, possible improvements have been assessed connected to environmental and economic sustainability by analyzing the current situation, and thereafter coming up with a possible future scenario. Sustainability has an increasing importance within the fashion industry in general as it is claimed to be one of the biggest polluters. Therefore, the main focus for this study has been on the environmental and economic sustainability aspects, in order to analyze the case company's processes connected to the single-used plastic hangers. Since the focus and delimitations has been to only study selected parts of the case company's operations, it has led to disappearance of other processes, therefore, analyses and improvements for the whole organization cannot be reported. With the underlying theories as a support, there is a great possibility that the presented proposals can lead to improvements. However, it would be necessary to implement and analyze those proposals in reality to further strengthen if the hypothesis actually could help to improve the value chain.

Despite the fact that general numbers have been used, due to the risk of spreading confidential information, the aim of this report has been to create an as trustworthy picture of the case company as possible. By our awareness of external influences combined with self-criticism, the study has constantly been scrutinized in order to reach the best possible results, out of the conditions that have been given.

### 6.3. Future Research

During the research it has been clear that there is a huge room and need for further research, within the research field of plastic hangers in the fashion industry, which indicates great possibilities of continuing work where this report ends. Due to the scope of this research and time constraints, some related areas have been absent that would be interesting to highlight in future studies. Especially interesting to further investigate is the production of the hangers, how it affects the environment. Also, the social aspects have not been considered in this research, which is an important part of the triple bottom line of sustainability. Hence, social sustainability would have been of interest to include in future research.

Furthermore, to further evaluate the result, it would be needed to base the calculations out of the exact numbers of the case company, which were not possible in this report due to confidentiality reasons. The exclusion of the company-specific numbers and the anonymity reduced the possibility to measure real, possible improvements. Further evaluations of the study would be to conduct relevant measurements before and after an implementation of shipping the baby garments, to see, e.g., the exact reduction of CO<sub>2</sub> emissions or financial savings related to transportation. Additionally, this study was based on the findings from one specific case company, but in order to gain a deeper and transparent understanding it would be useful to conduct a similar study at other fashion companies and brands.

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# Appendix

## **Appendix 1: Interview guide - Single-used plastic hangers for baby garments**

### **General:**

- Researchers introduce ourselves shortly
- Researchers gives some short information about our research
- It is voluntary to participate, possible for the respondent to withdraw or skip a question at any time
- Participants has the right to be anonymous and their answers will be handled confidentially
- Ask if we are allowed to mention which department the respondent belongs to. Their names will not be mentioned anywhere
- Ask after permission to record the interview

### **Some introductory questions about the respondent:**

- Your role today? How many years at this position and in the company?
- How do you relate to the topic “sustainability”? How would you define it in one sentence?

### **Current situation/the process of hangers:**

- How does the value chain of this product category (baby garments) look like today?
  - In which step is the clothes put on hangers? What is the reason to do it in this step?
- What is the reason to use hangers for this product category in the first place?
- From where are most of this product category sourced/purchased?

### **Pre retail/ Purchasing:**

- What type of hanger are currently used for this product category, and why? Who decides which type of hanger that is being used?
- Where are the hangers produced? How are they transported to the manufacturing site?

- What does the procurement process of hangers look like? What do you take into consideration?
- When the garments are put on hangers by the manufacturer, do you pay extra for this operation or is it included in the price?

### **Transportation & DC:**

- How does the transportation and distribution process of this product category look like today? (from the manufacturer to the end customer, including the e-commerce flow and retail flow)
- What are the pros/cons to ship the clothes on these hangers?

### **Retail:**

- How does the unpacking process look like today when deliveries get to the stores?
- Do you always remove the hanger before the end customer's purchase?
- Can the customer keep the hanger if they ask for it?
- How are the hangers processed/ handled/ managed in the store after sold garments?

### **Post retail/ recycling/ disposal:**

- How long is the life cycle for these hangers? Is it possible to reuse the same hanger?
- Do you have any recycling/disposal policy for these hangers?
- What does the disposal/ recycling process look like today in Sweden?
- How large of a proportion would you say today goes to recycling vs. disposal?
- Are there any possibilities to further develop the recycling process?

### **Environmental impact:**

- What materials are these hangers made of?
- Do you consider sustainability/ environmental impact when deciding which materials to use?
- Would it be possible to use any other type of material for these hangers in order to improve the environmental sustainability?

### **Concluding:**

- Do you have anything else to add that we haven't already discussed?