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„Future Potential of Reusable Shipping Packaging for Fashion Products in B2C E-Commerce“

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Future Potential of Reusable Shipping Packaging for Fashion Products in B2C E-Commerce

Final work of the bachelor course of study to get the academic degree „ Bachelor of Science “

by

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The topic was elected from the subject of fashion e-commerce and done at the faculty of textile and clothing technology of the Hochschule Niederrhein in Mönchengladbach

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As the literature research proved to be a challenge this thesis could not have been realized without the help of the questioned experts.

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List of Abbreviations

BIEK	Bundesverband Paket & Expresslogistik
BMBF	Bundesministerium für Bildung und Forschung
BMUB	Bundesministerium für Umwelt, Naturschutz und nukleare Sicherheit
B2B	Business to business
B2C	Business to consumer
C2B	Consumer to business
C2C	Consumer to consumer
DSP	Disposable shipping packaging
E-Business	Electronic business
E-Commerce	Electronic commerce
ECR	Efficient consumer response
EUROPEN	European Organization for Packaging and the Environment
HDE	Handelsverband Deutschland
HDPE	High-density polyethylene
IT	Information technology
LDPE	Low-density polyethylene
LOHAS	Lifestyle of Health and Sustainability
M-Commerce	Mobile commerce
PE	Polyethylene
PP	Polypropylene
PVC	Polyvinylchloride
RSP	Reusable shipping packaging
VZBV	Verbraucherzentrale Bundesverband

1 Introduction

When comparing the environmental impact of online shopping with the one of the stationary retailing business, it can be stated that online shopping generally has a lower environmental impact. Warehouses consume less energy than stationary shops, the customer does not have to visit the point of sale by using transport means and no effort is required to create and maintain an attractive shopping environment for the customer.[1]

What is increasing disproportionally is the amount of packaging waste caused by the continuous growth of the e-commerce business. In 2023 4,4 billion parcels are expected to be shipped within Germany.[2]

Fashion products represent a product group which is among the most popular ones that are bought online. They are often subject to returns which again require new packaging for the reshipment.[3] Therefore, this product category can be regarded as one that contributes significantly to an increase in packaging waste.

Retailers using carton or corrugated cardboard boxes for the shipment are often struggling with finding the appropriate size for the shipment. This increases the waste to dispose and the amount of air which is shipped. Also, more and more customers are dissatisfied with the amount of packaging that must be disposed into their proper household waste and with inappropriate packaging sizes.[4]

The packaging industry uses 40% per cent of the yearly produced plastics in Europe and half of all produced paper.[5] Around 30% of the CO^2 emissions that arise in e-commerce are caused by shipping packaging.[6] Conventional single-use shipping packaging is produced, used, and then disposed. A significant discrepancy between the extraction of natural resources and the capacity of nature to regenerate itself can be observed. Large parts of plastic packaging are incinerated or exported to other countries where correct disposal is difficult. A considerable amount of paper and plastic

[1] Cf. Expert B (2020), s. Appendix 3, l. 22 ff., l. 216 ff.

[2] Cf. Bundesverband Express & Paketlogistik (BIEK) (2019), p. 13.

[3] Cf. Stallmann & Wegner (2015), p. 45.

[4] Cf. Expert B (2020), s. Appendix 3, l. 150 ff.

[5] Cf. Coelho et. al. (2020), p. 1.

[6] Cf. Zimmermann & Bliklen (2020), p. 176.

packaging waste is recycled in Germany. However, recycling is not regarded as a strategy to reduce but to recover waste.[7]

So far, not much attention has been paid to the option of reuse. Observing the steadily growing amounts of plastic in the oceans or the ongoing deforestation of the rainforests, the idea of a circular system to reuse packaging becomes more and more relevant. Energy and resources to produce a new packaging for each cycle of use could be saved and the lifetime of the products could be prolonged. Why is reusable shipping packaging (RSP), so far, only used in niches and what hinders online retailers to establish reusable packaging solutions on a wider scale?

1.1 Objectives

Research questions that should be answered within the thesis are the following:

RQ1: What are opportunities and barriers of reusable shipping packaging for fashion products in B2C e-commerce in Germany?

RQ2: By which measures can barriers be reduced or eliminated?

RQ3: What is the future potential of RSP solutions for fashion products?

Ecological, economic, social, and logistical aspects have been considered when determining opportunities and barriers. As many aspects concerning RSP are interrelated it was tried to depict the overall situation of RSP for fashion products.

This thesis shall point out at which stage of development RSP is currently located, which opportunities and barriers do currently exist and if a considerable potential for the future can be observed.

[7] Cf. Blecker (1998), p. 120.

1.2 Methodology

Literature research on RSP solutions proved to be difficult. Reusable shipping packaging for e-commerce purposes is a new and largely unexplored subject. In order to obtain up-to-date information, the author decided to conduct qualitative, semi-structured interviews. The proceeding was therefore rather explorative to gather the highest possible amount of information. Knowledge was gathered from various experts from online trade, circular economy, and logistics.

RSP for e-commerce products is a complex issue. Several subject areas needed to be addressed in advance to create a better understanding for the reader. The frame of reference of this thesis was mainly written with the help of literature review. The e-commerce concept, functions and the most important forms of packaging, the delivery process, lifecycle of packaging and environmental impacts of packaging are illustrated. In the following, existing system types for RSP in e-commerce were identified and companies that are offering these kinds of services. An existing service provider that focuses on reusable packaging for fashion products was described in detail.

For the main part mainly the information from the interviews was utilized. To determine opportunities and barriers various experts were questioned and the author took part in a workshop about reusable packaging hosted by an institution which is developing sustainable strategies that help saving the environment. Current challenges and possible measures concerning the implementation of reusable packaging solutions were discussed and analyzed during the workshop. Additionally, two online retailers were interviewed, one large and medium-sized one, as well as an employee from a center for logistics of a university in North Rhine Westphalia. After having determined barriers and opportunities currently applied or considered measures were presented. Advantages and disadvantages of the individual measures were highlighted. A final evaluation of the overall results concludes on the future potential for reusable solutions for fashion products in Germany.

1.3 Limitations

This thesis will point out key aspects that experts, online retailers, and scientists are currently considering when exploring the potential of RSP solutions.

Most assumptions made were based on one specific service system as it is the only one identified that offers reusable packaging in Germany at the time. It is also the only one that is used by retailers that are currently testing RSP in e-commerce. It was assumed that problems that arise with the use of this specific system (as for example customer acceptance or the effort to return the packaging) can in many cases be transferred to other solutions that might be developed during the next years. Furthermore, it was assumed that most of the orders placed at German online retailers come from Germans, therefore the focus was set on the acceptance of German customers towards RSP and not on the one of international customers.

To determine and compare the environmental impact of RSP and disposable shipping packaging (DSP) it was mainly focused on CO^2 emissions, their equivalents and waste that is caused by shipping packaging. Other types of emissions have not been considered. This thesis does not contain a full lifecycle analysis to compare DSP and RSP, but the carbon footprint of the RSP and DSP was determined during production, usage, and after-life treatment.[8]

The costs for an RSP system have been analyzed to a very limited extent as they can vary significantly from online retailer to online retailer. So far, experts have not gathered many insights about the total costs of RSP systems yet.[9]

This bachelor thesis serves to inform about the current and a possible future development of reusable shipping packaging. It will not give detailed advice to individual online retailers on how to integrate RSP. System adaptations to introduce RSP should be considered individually.

[8] Cf. Expert A (2020), s. Appendix 7, l. 15.

[9] Cf. Expert A (2020), s. Appendix 2, l. 139 f., l. 190.

2 Frame of Reference

This frame of reference shall help to provide an overview of the subject areas relevant to this thesis. It was created to later be able to understand differences, advantages and disadvantages of reusable shipping packaging compared to commonly used packaging solutions for fashion products in e-commerce.

Therefore, the concept of e-commerce and its various forms, fashion products and their importance for the German e-commerce market, functions and materials used for e-commerce packaging are explained first. As the delivery of products sold online is organized by logistics, the logistical processes behind an order will be illustrated as well.

At the end of this chapter indicators for environmental impacts and environmental problems that are related to the use of disposable shipping packaging are explained to point out the relevance of alternative packaging solutions.

2.1 E-Commerce

The term e-commerce is the short form for electronic commerce. Numerous definitions for e-commerce do exist. Generally, it is the purchase and sale of goods and services using the internet or other electronic networks.[10] A definition for e-commerce that combines several common ones is the following by Stallmann and Wegner: “E-commerce is the sum of all digital initiation, negotiation and/ or settlement processes of commercial transactions between economic entities operated via the internet. The purchase and sale of goods and services is in the focus.”[11]

E-commerce represents an important part of the electronic business (also called e-business). Any kind of transaction within a business that uses digital information and communication technology can be regarded as e-business. The role of e-commerce within e-business is to build the bridge for the transactions between a business and its customers.[12]

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[10] Cf. online: Metzger et al. (2020).

[11] Originally: „E-Commerce ist die Summe aller digitalen Anbahnungs-, Aushandlungs- und/oder Abwicklungsprozesse kommerzieller Transaktionen zwischen Wirtschaftssubjekten, die über das Internet abgewickelt werden. Der Kauf und Verkauf von Gütern und Dienstleistungen steht dabei im Fokus.“ Stallmann, Wegner (2015), p.6.

[12] Cf. Heinemann (2020), p.48, online: Kollmann (2020).

Since the commercialization of the internet during the 1990s and due to the constantly evolving information and communication technologies, e-commerce revolutionized customer's buying behavior and became one of the most important forms of trading.[13] Meanwhile also transactions that are processed via mobile phones (The so-called m-commerce) are part of the concept of e-commerce.[14]

2.1.1 Forms and Channels

Stallmann and Wegner differentiate between four types of relationships between businesses and consumers in e-commerce:

Business to business (short B2B) transactions of goods take place between the businesses themselves and all other parties that can create a demand or resell products and services. These for example may be processors, resellers, commercial users, and other institutions.

Business to consumer (often referred to as B2C) transactions on the other hand are carried out between companies and end consumers. In this type of relationship one commercial provider is offering his products to a larger number of frequently changing customers. Compared to B2B a higher number of orders is placed in B2C transactions but at the same time the order volumes are smaller. B2B orders tend to be more predictable because goods are provided at regular intervals to customers who change less frequently.[15]

If consumers are offering their products (and services) to businesses, it is referred to a consumer to business relationship (C2B).

E-commerce activities where customers sell their products to other customers are called C2C e-commerce (or customer to customer e-commerce). In this case, usually no revenue is generated for a business. Therefore, C2C e-commerce may rarely be subject for market research studies.[16]

This bachelor focusses on the B2C e-commerce.

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[13] Cf. Turban et. al. (2018), p. 8.

[14] Cf. online: Handelsverband Deutschland (2020).

[15] Cf. Expert B (2020), s. Appendix 3, l. 131 ff.

[16] Cf. Stallmann, Wegner (2015), p. 11.

To process and distribute transactions in e-commerce so-called “channels” are needed which transfer data between one central unit, for instance a business, to a peripheral device, for example a smartphone or a tablet. Possible channels among others are e-mails, stationary or online shops and catalogues.[17]

Companies using several channels that are not necessarily related to each other are following the principle of “multi-channeling”. Businesses selling their products in stationary as well online channels which are interconnected do “cross-channeling”. “Omni-channeling” is a frequently used term which can be regarded as a designation for both, multi- and cross-channeling as it only refers to the use of various channels to sell goods or services. With the increasing use of multi- and cross channeling approaches also the organizational complexity within the online business is rising.[18]

2.1.2 Characteristics of B2C E-Commerce

Businesses in B2C e-commerce can either sell physical or digital goods or a combination of both. It can be differentiated between businesses that choose to distribute their products right from their birth only via online channels (the so-called “Online Pure Players”) and “Click and Mortar” businesses.[19]

A very prominent example for an online pure player is the online retailer “Amazon” which offers customers a marketplace for shopping and online retailers a platform to sell their products. In case of a click and mortar business one or several online channels support the stationary business, which was founded first.[20] Breuninger for instance is a click and mortar business as its sales are supported by online activities.

More and more mixed forms of the previously mentioned formats start to exist. For example, retailers that originally have been online pure players and which are now starting to open stationary shops.[21]

The online or web shop in B2C e-commerce represents the interface between customer and business. It is the most used sales and communication channel in B2C e-commerce and is therefore indispensable for an online retailer. Nowadays the

[17] Cf. Turban et. al. (2018), p. 9.

[18] Cf. Stallmann & Wegner (2015), p. 31, online: HDE (2020).

[19] Cf. Stallmann & Wegner (2015), p.13.

[20] Cf. Stallmann & Wegner (2015), p. 13; online: HDE (2020).

[21] Cf. HDE (2020), p. 55.

barriers for new entrants for the online business are not that high anymore as there are various opportunities to create a web shop without investing a lot of money. Small businesses can make use of programs that do not charge any costs for the creation. This is a reason for the further growing competition in B2C e-commerce.[22]

“Online shopping” describes the process of buying and selling products and services to end customers in B2C e-commerce.[23]

Activities in B2C e-commerce can be assigned to two different parts. These are called frontend and backend. The place where the customer interacts with the company is the frontend, the user interface of an online shop. It is the platform where the customer explores available products, where he can place his order and where he can contact the customer service to ask for help or advice. The backend comprises all steps that are necessary to process a customer’s order. These are processes which remain hidden from the customer. For example, the logistics behind an order. Basis for frontend and backend is the IT[24] infrastructure of a company.[25]

2.1.3 B2C E-Commerce Today

B2C e-commerce has several advantages compared to the stationary retailing business which constitute some major reasons for the continuously rising popularity of online shopping. Among others, advantages are that online shops are not restricted by opening hours and that the customer does not have to leave his or her home to buy goods. Out of a great variety of products the customer can easily compare reviews, prices, and product characteristics. Products that have not been available before are becoming available across national borders. B2C e-commerce shall become the biggest channel to sell products by 2021. Germany has one of the biggest B2C e-commerce markets in the world. In 2019 the 57.2 billion € revenue were generated by B2C e-commerce activities in Germany.[26]

The German e-commerce market is characterized by many small and medium-sized online retailers and few large sized ones (Amazon, Otto and Zalando for example)

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[22] Cf. Stallmann & Wegner (2015), p. 28.

[23] Cf. online: HDE (2020).

[24] IT (information technology): the collection, storage, processing, and management of computer-based information. Online: Schonscheck & Platten (2017).

[25] Cf. Stallmann & Wegner (2015), p. 34.

[26] Cf. Stallmann &Wegner, p.10, HDE (2020), p. 6.

which make up a large percentage of the yearly generated revenue B2C e-commerce activities. Around 620,000 companies in Germany are running an online shop.[27][28]

A PostNord study, that analyses the e-commerce developments in Europe, states that in 2019 61.5 million Germans bought their products online. 92% of the population between 15- and 79-years old made use of electronic commerce. In average 784€ per person and year are spent on online shopping. The most sold products in 2019 were clothing and footwear (60% of all German e-commerce customers bought something out of this product category), books (42%), home electronics (41%), home furnishing and cosmetics (both 31%).[29]

2.1.4 Fashion Products in B2C E-Commerce

Within this bachelor thesis fashion products sold via e-commerce channels are in the focus. Special technical or functional clothes are excluded as well as household textiles and textile materials that still need further processing. According to the German Trade Association the product category fashion and accessories covers workwear, menswear, womenswear, children's wear, leather goods and accessories, leather clothing, footwear, and fur articles.[30]

Fashion products are present in the everyday life of billions of consumers and count to the most important consumer goods in Germany and Europe.[31] The German market for fashion products is worth about 74.3 billion €. In 2019 18.7 billion € revenue were generated by fashion products sold online.[32]

The fashion industry in general is a very globalized industry characterized by complex supply chains, intense competition and therefore, high pressure on prices and margins. A simplified supply chain of fashion products starts with the acquisition of raw materials such as cotton, silk, or wool. After that, the production is either carried out by the company itself or by contract manufacturing. In recent years, many fashion companies

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[27] Cf. Post Nord (2019), p. 41, Reitz (2020), p. 2 f.

[28] Companies with a revenue up to 10 million € count as small-sized enterprises, those with a revenue up to 50 million € count as medium-sized ones and companies with a revenue higher than 50 million € count as large sized ones. Online: European Comission, (2020).

[29] Cf. online: Statista (2019); PostNord (2019), p. 4., Copello (2019), p. 2.

[30] Cf. HDE (2017), p. 29.

[31] Cf. Fiebrig (2018), p. 1 f.

[32] Cf. online: Fashion United (2020), Statista (2020).

shifted their production facilities to countries with lower wages for labor to save costs. A distributor provides (online) retailers with the finished goods. Retailers then sell their products to their end consumers. B2C e-commerce for fashion products is located at the stage of the distribution from the online retailer to the end customer. [33]

Originally, online shops should support the stationary business of retailers. Nowadays a shift into the opposite is recognizable. Selling products online has become obligatory to stay competitive. E-commerce has led to some constitutional changes as it allows brands to become available on a global market and to contribute to a significant growth of the output of the fashion industry worldwide.[34]

Competition between fashion online retailers is becoming more intense as the number of new entrants to the market is high and several non-clothing online retailers such as Amazon started entering the market. It may also be difficult to clearly define the scope of German fashion e-commerce market as there are many retailers that offer a wide range of different products next to clothes. What can be stated is that fashion products sold online make up about 25% of the yearly revenue that is generated through B2C e-commerce activities in Germany and belong to the most popular and best-selling product categories. It is also the category which is expected to grow most during the next years.[35]

With the increase of competition between the online retailers an increase in customer's requirements can be observed. Prices, quality, and product reviews are analyzed carefully. Satisfying the customer's individual needs is therefore of major importance for retailers.[36] Online shopping should be as comfortable as possible but at the same time it must be a unique experience. An online shop must differ from the broad mass of shops to become attractive. Also, new customers are relatively hard to acquire. On company side the number of fashion businesses and online retailers offering clothes are increasingly using cross- or multichannel strategies to attract the broadest possible number of customers with different channel preferences. Marketplaces, where different brands can offer their products on a common platform, are gaining in popularity. 97% of all German online shoppers indicated that they used at least one marketplace as for

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[33] Cf. online: European Commission (2020).

[34] Cf. TradeMalta (2018); p. 5, online: McDowell (2020).

[35] Cf. Coelho et. al. (2020), p. 5, online: Statista (2019).

[36] Cf. Stallmann (2014), p. 8.

example Otto, Zalando or Wish for shopping of fashion articles within 2019. What can be observed as well is that the number of orders that are placed via smartphones and other mobile devices is steadily increasing.[37]

Compared to other countries Germans spent relatively low amounts per year on fashion products. Germany seems to be a very price sensitive market for fashion items. The option of “free shipping” for the products and a purchase on account play a very important role when making a buying decision. Also, the return rates of fashion products belong to one of the highest in Europe. Many retailers selling fashion products are recording return rates of about 45%.[38]

[37] Cf. online: Henkel (2018); TradeMalta (2018), p. 7 f., PostNord (2019), p. 17.

[38] Cf. online: Hunstig (2019).

2.2 Packaging

To be able to safely deliver products to an end consumer, packaging is indispensable. Packaging is used for all kinds of goods as for example food, cosmetics, clothing, furniture, and many other products that need protection during transport, distribution, storage, and end use. Frequently used materials for packaging among others are cardboard, glass, plastic, and wood. Packaging plays an essential role in supply chains. It makes goods transportable and allows to include important product information such as tracking codes or information on how to use the product as an end consumer.[39] With the help of packaging and the information it includes, goods can be differentiated from each other and from other brands.[40]

Saghir defines packaging as “coordinated system of preparing goods for safe, secure, efficient and effective handling, transport, distribution, storage, retailing, consumption and recovery, reuse or disposal combined with maximizing consumer value, sales and hence profit”.[41]

The German trade association defined five different kinds of packaging used for the business-to-consumer trade of goods:

1. The sales packaging, which is closest to the product and which is shipped to the end consumer.
2. The outer packaging which bundles several units of a product and which is usually offered to the consumer to facilitate handling, for example a carton in a supermarket, containing several packages of milk.
3. Service packaging: Packaging which is filled by final distributors but owned by end consumers, for example coffee-to-go cups.
4. Transport packaging shall facilitate the safe transport and handling of goods (for example pallets or crates used for the loading of trucks).
5. Shipping packaging which supports the transport to the end consumer (including filling material to protect the product) and is usually disposed at the consumer’s place.[42]

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[39] Cf. Grant et. al. (2015), p.139 f.

[40] Cf. Regattieri et. al. (2019), p. 274.

[41] Saghir (2004), p. 6.

[42] Cf. Händlerbund (2019), p. 2.

This bachelor thesis is focusing on shipping packaging used for the B2C online trade.

2.2.1 Shipping Packaging for B2C E-Commerce

B2C shipments are characterized by a high number of individual parcels and therefore a high volume of required packaging material.[43] In 2019 3,6 billion parcels have been shipped (including B2B, C2C and B2C shipments). The increasing number of shipments (shown in the figure below) can be mainly explained by significantly increasing growth rates in B2C online trade. Even higher number of parcel shipments are expected for the upcoming years. Taking a look at all B2B, C2C and B2C shipments in 2018, B2C shipments made up 62% of all shipped parcels. In 2009 the percentage of B2C shipments was only about 45%.[44]

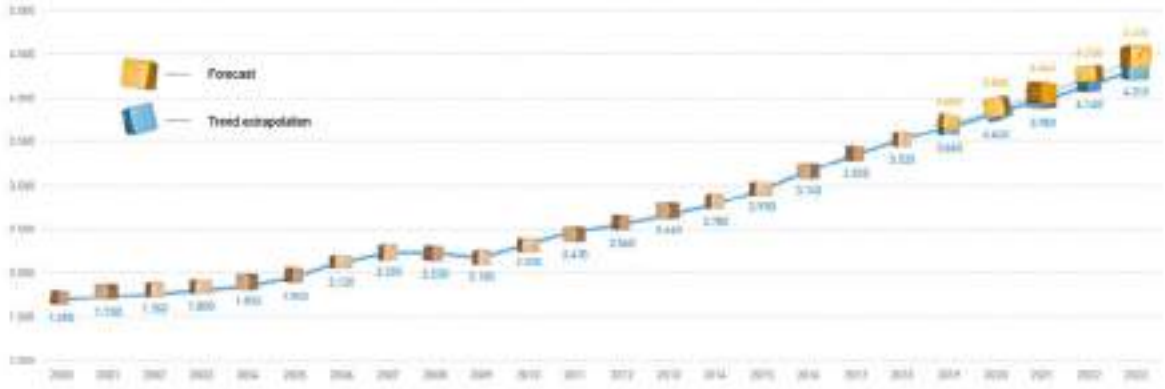

Fig. 1: Forecast of the development of parcel shipments issued by courier, express and parcel services in Germany until 2023 (BIEK, 2019, p.13, translated from German by Naomi Ternes)

Shipping packaging solutions for products sold via e-commerce channels are quite inexperienced. Often, they are developed from packaging solutions used for traditional sales channels.[45]

Wang and Hu created a classification for shipping packaging in e-commerce: Within their description it is defined as "express packaging" which is added to the original product packaging. They differentiate three levels of shipping packaging:

1. The outer shipping packaging
2. Internal fillers
3. Express waybill

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[43] Cf. Stallmann & Wegner (2015), p. 42.

[44] Cf. BIEK (2019), p. 13, 19.

[45] Cf. Palsson (2018), p. 154.

The outer packaging ensures protection and consists mainly out of corrugated cardboard or waterproof plastics. It is usually supported by tape sealing. The internal fillers prevent damage from impact such as vibration or pressure. Often different kinds of foam, paper cushioning or plastic bubbles are used as internal fillers. The express waybill includes all important information for the customer (such as invoice, delivery note and return label) and for the transport of the goods (a barcode which allows the tracking of the order).[46]

Basically, four stakeholders have requirements for the packaging: logistics, the retailer, the customer, and the environment. The logistics want the packaging adapted to transport, storage and handling processes and the customer desires to receive an intact product, preferably in an attractive packaging. The online retailer must consider the needs of the customer and wants to obtain a cost-effective packaging. At the same time, the statutory requirements for a sustainably designed packaging must be respected. Consequently logistics, customer, and environment and costs of a packaging must be considered when evaluating its performance.[47]

Regattieri et. al. summarized five important functions for e-commerce shipping packaging:

1. Protection: The outer packaging must protect from all kinds of damage as the packages are often treated roughly.
2. Handleability: From a consumer's perspective handleability and convenience are the most important features a packaging should have. A packaging that is easy to carry, to open and to close reduces the risk to frustrate the customer. Also, for the logistics it is highly important that the packaging is easy to build up and to grab. A study conducted by DHL states that e-commerce packages on their journey to the customer are handled 20 times more often than parcels for traditional retail.[48]
3. Security: A package must be able to be tracked along its way to the customer to ensure that the product reaches its destination and has not been stolen or got lost. Tracking is usually realized through a radio frequency identification or barcode system.

[46] Cf. Wang & Hu (2016), p. 622.

[47] Cf. Stallmann (2014), p. 67 f.

[48] Cf. DHL (2019), p. 7.

4. Respect for the environment: It is recommended to use packaging material that can be recycled and to avoid hazardous substances within packaging materials. Especially regarding the fact that e-commerce requires more packaging material as more small and individual orders are shipped.
5. Packaging materials that can be reused should be preferred to reduce the environmental impact of the packaging.[49]

In other current literature various other functions are listed. Three of them were mentioned several times and should therefore be added to the previously named functions.

6. Storage function: If parcels are not loaded or moved from one location to another, they are stored in the warehouse together with other packaging aids. Stackability and static load capacity of the packaging is then advantageous. To keep the storage costs low, it is best if the packaging is designed space saving.
7. The transport function is closely related to the protection and handling function. Size and form of the packaging must be adapted to the transport means of a company but still be easily to handle and provide protection. If the packaging is suitable to form loading units, it facilitates the arrangement of the parcels in the truck and the parcels fit into standardized pallets or crates for transportation.
8. Marketing function: It could be stated that in e-commerce the customer already chose the product online and that a special form or design of the sales packaging not necessarily triggered a purchasing decision. However, many fashion brands use branding to commercialize their products and a special packaging is part of their marketing strategy. Also, a special “unboxing experience” can have a positive effect on the consumer’s image of a brand.[50]

Packaging must fulfill many different functions and requirements from various parties. Therefore, target conflicts between them are possible and not all functions can be fulfilled at the same time.[51] Retailers often choose a packaging based on the functions that are most important to them and to the customers.[52] Most important is usually the protection function. Damaged products do represent a critical problem for e-commerce

[49] Cf. Regattieri et. al. (2018), p. 289 f.

[50] Cf. Schumacher Packaging (2015), p. 14, 39.

[51] Cf. Deckert (2016), p. 17.

[52] Cf. Lecovic & Milicevic (2013), p. 90.

shipments. During transport they are often handled roughly and are lifted and loaded multiple times.[53]

2.2.2 Shipping Packaging for Fashion Products

What protects clothes from moisture, dirt and dust underneath the shipping packaging are in most cases polybags. They are present from the production process to the delivery to the end consumer. Most of these polybags are manufactured from low-density (LDPE), a plastic which is known for its lightweight and good protection properties. Within the different steps of the supply chain garments often get unpacked to be checked and afterwards they are wrapped in a new polybag. If a customer returns a fashion product which was ordered online the piece is usually inspected as well, the original polybag is disposed and a new one is used to cover it.[54] For this thesis, the polybag which covers the clothes is not the primary focus but only the outer shipping packaging which covers the polybag.

Cardboard is the most frequently used outer packaging material used for the shipment of fashion products. It derives from cellulose which comes from trees. Chemical and mechanical processes are needed to transform cellulose into paper or packaging material.[55] It can be differentiated between paper, carton, and corrugated cardboard. They are manufactured by similar processes and are usually differentiated by the mass per unit area. Paper has the lowest mass and corrugated cardboard the highest. Furthermore, corrugated cardboard has good transport properties as it is stackable. It is especially robust and tear-resistant and is therefore used most frequently to protect clothes from moisture or damage.[56] In a study performed by Schmidt et. al. 85% of the questioned German online retailers indicated using cardboard packaging and only 15% stated that they would use packaging made from plastics.[57]

However, in recent years a growing number of online retailers started using film packaging made from different types of plastics to ship their clothes. Following standard plastics are most used to produce disposable one-way packaging:

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[53] Cf. Stallmann & Wegner (2015), p. 42.

[54] Cf. Holding & Gendell (2019), p. 3, 8.

[55] Cf. Radhakrishnan (2016), p.167.

[56] Cf. Schumacher Packaging (2015), p. 19 ff.

[57] Cf. Schmidt et. al. (2020), p. 38.

polyvinylchloride (PVC), polyethylene (PE), polypropylene (PP), high-density propylene (HDPE) and low-density polypropylene (LDPE). These plastics are produced based on mineral oils. They all belong to the group of thermoplastics which means that they melt at high temperatures and can be formed when they cool down. This process can be repeated therefore they are called “reversible plastics”.[58] All have in common that they are very lightweight, durable, and resistant against environmental influences.[59]

Plastics have the advantage that they are flexible, and their volume can be reduced when they are used as mailbags. This prevents empty spaces within a shipment. As they are sufficient for the shipment of clothes more and more fashion retailers such as Asos or Zalando started shipping in PE or PP mailbags.[60] On the other hand, plastic packaging is not easily stackable, it often attracts dust and may sometimes be hard to imprint due to its surface characteristics.[61]

According to a DHL guideline e-commerce packaging for clothes should be designed as following:

- Clothes can be either shipped in cartons out of corrugated cardboard or in plastic mailbags.
- In case of using cardboard as packaging material the size of the carton should fit to the amount of clothes shipped as empty spaces could be crushed and offer no protection.
- Empty spaces should, if possible, be filled with a kind of filling material.
- Every single garment within an order should be packed into separate polybags to avoid damages during transport.
- For more sensitive clothes such as evening gowns for example double-walled corrugated cardboard should be used.
- Boxes with shoes need additional support by corrugated cardboard, empty spaces should be filled up as well.[62]

[58] Cf. Schumacher Packaging (2015), p. 19, PlasticsEurope (2019), p. 11, 23.

[59] Cf. Online: Tecoplast (2017).

[60] Cf. Expert B (2020), s. Appendix 3, l. 172 ff.

[61] Cf. Schumacher (2015), p. 19.

[62] Cf. DHL (n.d.), p. 1 f.

Usually, textiles are not at risk from vibration or impact during transport so that lightweight mailbags are also sufficient for the transport.[63] Compared to other products offered online such as electronics or kitchen appliances, the requirements on the packaging of clothes are relatively easy to fulfill but must be adapted to the logistic structures of a company. The importance of logistics and their relation to packaging will be highlighted within the next chapter.

[63] Cf. Kotschick (2015), p. 6.

2.3 Shipping Packaging and Logistics

Besides the packaging, the preparation of the order, the transport of goods between retailers and consumers and the waste that is created during and after this process are in the focus. These aspects are subject to logistics.

Logistics deal with the procurement, storage and transportation of materials or finished goods during and after the production and sales process.[64] They are responsible for the planning, execution, and control of the flow of information, between producers, suppliers, companies, and end customers as well as for the correct placement of the goods. Main functions of logistics are transport, storage, and packaging.[65]

Many common definitions include the “4R” of logistics: Logistics shall ensure that a recipient (a company, customer, or other economic entity) is supplied with the *right* product (in quantity and variety) at the *right* time, in *right* condition, at the *right* place and at lowest possible cost.[66]

Four basic types of logistics are relevant to a business:

1. Procurement logistics deal with the purchasing of raw materials and goods.
2. Production logistics are responsible for the planning of all production processes.
3. Sales and distribution logistics organize and handle all processes that are related to the supply of the customer with the finished goods.
4. All three types of logistics are linked to waste disposal logistics as in each of these steps waste is created.[67]

Logistical processes can further be classified into intra logistic and extra logistic ones. Intralogistics deal primarily with storage processes as well as conveying, handling, and provision of goods while extra logistics organize for example transport and distribution processes.[68]

Most logistical aspects which are discussed within this thesis can be assigned to the field of distribution logistics. Therefore, its main tasks will be defined briefly. Relevant

[64] Cf. Online: Habas (2020).

[65] Cf. Pautsch, 2017, p. 28, Deckert (2016), p. 12 ff.

[66] Cf. Pfohl (2018), p. 12.

[67] Cf. Koether (2018), p. 13, Laudius (n.d.), p. 11.

[68] Cf. Deckert (2016), p. 12.

aspects of waste disposal logistics related to packaging will be explained in chapter 2.3.5.

Distribution logistics deal with all processes related to order transmission and processing, such as handling, storage, warehousing, picking and inventory management of goods as well as the transport, loading and the delivery of the order to the final recipient.[69] They play a crucial role for the e-commerce business. Every time a customer orders a product it needs to be transported from one place to the other. For example, from a warehouse to a pick-up point.[70]

Ineffectively managed distribution logistics, in the form of long delivery times for example, can lead to customer loss and image problems. Therefore, many online retailers outsource their logistics to service providers who are specialized in the field of distribution.[71]

The importance of distribution logistics is constantly rising. In a globalized world that sets its focus more and more on online shopping the efficient transport of goods from a sender to a receiver becomes essential. Also, to ensure an efficient flow of information between all involved parties, the use of information technology is indispensable for logistics nowadays.[72]

Shipping packaging is closely linked to both, intra and extra distributional processes of an online retailer as it is needed to prepare goods for transport (which is a company intern process) and for the transport to the customer which is an extra logistic process. It can also be considered as an interface between intra- and extra-logistics.[73]

Saghir even defined an own field of packaging logistics. It is “the process of planning, implementing and controlling the coordinated packaging system of preparing goods for safe, secure, efficient and effective handling, transport, distribution, storage, retailing, consumption and recovery, reuse or disposal and related information combined with maximizing consumer value, sales and hence profit.”[74]

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[69] Cf. Laudius (n.d.), p.12.

[70] Cf. Sandhaus (2018), p. 598.

[71] Cf. Stallmann (2014), p. 8.

[72] Cf. Deckert (2016), p. 3, Pautsch (2017), p. 28.

[73] Cf. Stallmann (2014), p. 71, online: Hofmann (2019).

[74] Saghir (2004), p. 11.

2.3.1 Order Processing

While the customer picks up the goods himself in stationary trade, in B2C e-commerce the online retailer is responsible to deliver them to the customer.[75]

The logistics behind an order start when the order was placed by the customer. A product or several ones are chosen, the customer deposits his or her data such as name, e-mail for verification, address, and the payment method. In most of the cases the customer can also choose the delivery options such as home delivery or the pick-up in a store.[76] These final steps where the customer confirms order and delivery conditions is the so-called “checkout process”. It is a critical step as the purchase abandonment rate is highest within this process. Often a registration is requested by the online shop or the payment or delivery options are not the ones the customer would like to pay with. These are frequent reasons for customers to cancel their order at this point.[77] Within a Metapack study 53% of the respondents indicated that they stopped ordering at least once if the delivery options are not the preferred ones.[78]

If the checkout was finished successfully the customer receives an order confirmation with all relevant information, such as ordered items, invoice amount and information about the service provider who will ship the parcel.[79]

Once the order is placed it requires so-called fulfilment services which comprise the generation of the shipping data, the picking and packaging of the order, the distribution of the parcels into their individual directions, the delivery to the end customer, the payment, after sales services and the management of returns. The e-commerce value chain shown in figure 2 illustrates the steps of the fulfilment process.[80] Shipping packaging is needed from picking to return management.

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[75] Cf. Stallmann (2014), p. 19.

[76] Cf. Lecovic & Milicevic (2013), p. 90.

[77] Cf. Stallmann & Wegner (2015), p. 213.

[78] Cf. online: Metapack (2016).

[79] Cf. Lecovic & Milicevic (2013), p. 91.

[80] Cf. Muschkiet & Schückhaus (2019), p. 359.

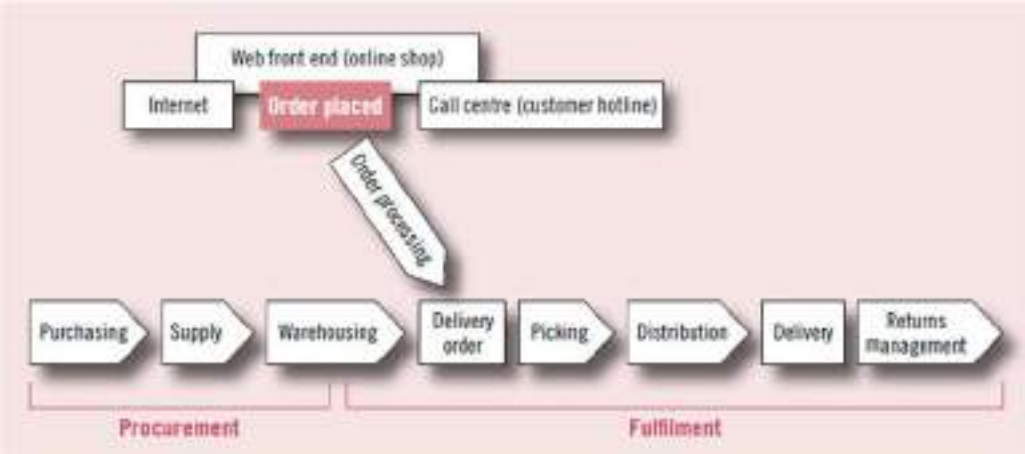

Fig. 2: The e-commerce value chain (Eichener and Heinze, 2005, p. 121, quoted and translated from German by Birner, 2015, p. 60)

Fulfilment or order processing is a core element for every online retailer. Aim of every processed order is a high customer satisfaction at lowest costs and best possible efficiency. Larger online retailers usually use a warehouse management system or enterprise resource planning system which supports the management of fulfilment operations. It helps maintaining an overview over existing resources and designing efficient business processes. The software of this system is usually connected to the software of an online shop.[81] After creating the order confirmation for the customer, the data for the shipment is prepared, such as return label and delivery note. Shipping service providers offer systems that create those data. The address data of the customers is then automatically extracted from the online shops or marketplaces. [82]

Picking is the process of putting together an order. Each item to be shipped is scanned to keep the inventory up to date. A so-called picker or (if the process is automated) a machine is responsible for the correct packing of the parcels. A warehouse management system can help to design the picking process as efficient as possible. It calculates the shortest walking distances from shelves to packaging stations or it determines which packaging would be most suitable for the order to be picked. The packaging of the product takes place at the same location as storage and picking. Packaging material is provided at the packing station. If the packaging is closed the shipping label is stuck onto it. After finishing the picking the shipping papers are

[81] Cf. online: I Logistics USA (2017), Koether (2018), p. 28.

[82] Cf. online: E-Commerce Leitfaden (2020).

completed and additional information such as weight of the shipping is added. Often, the parcel is transported to a collection point via a conveyor belt.[83] Then it is loaded from the fulfilment center into a truck which shall transport the orders to the end customer.[84] The invoicing or processing of the payment can take place either during or before the preparation of the shipment or after it has been shipped.[85]

Small online retailers handle many of these steps manually while in bigger companies they are highly automated.[86] Quick and efficient order processing can usually only be guaranteed if all processes are well coordinated and interlocked. To ensure a smooth flow of information between all kinds of fulfilment services the IT infrastructure and its interfaces need to be quite well developed. Usually, the scope of electronic data processing is smaller if the number of orders or offered articles is lower. A high number of orders and articles usually requires more investment in IT services and has higher demands towards a software to increase efficiency. Small or medium-sized companies often want to stay more flexible and make exceptions within their orders. Therefore, they use not that much support from electronic data processing systems which often require high investments in terms of maintenance and implementation.[87]

Often, not all steps of the order processing are carried out by the online retailer itself. They are outsourced to external service providers which are specialized in these fields. Logistic service providers are for example responsible for the packaging and delivery of the goods. Payment service providers like PayPal or Klarna organize the payment process or external companies handle customer demands.[88]

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[83] Cf. Stallmann (2014), p. 71, online: I Logistics USA (2017), Pfohl (2018), p. 82.

[84] Cf. Rodenhäuser & Rauch (2015), p.18.

[85] Cf. Pfohl (2018), p. 82.

[86] Cf. online: E-Commerce Leitfaden (2020).

[87] Cf. Stallmann (2014), p. 20, Pfohl (2018), p. 83.

[88] Cf. Stallmann & Wegner (2015), p. 306.

2.3.2 The Last Mile

There are various definitions and approaches regarding the so-called last mile. Within this thesis is it regarded as the delivery of the order to the end consumer. First, the order is handed over to a parcel delivery service who pools the packages that have a similar destination. Then they get transported to regional centers where they are sorted to be shipped to the specific addresses of the end consumers. The point where this separation into the individual shipments takes place is called the break-bulk point. It divides the distribution into two sections: shipments with the same general direction are bundled, and, secondly, all transmissions are delivered individually to their recipients. The delivery of the parcels is usually carried out by courier, express and parcel services. Well known courier, express and parcel services in Germany are DHL, DPD Logistics, Hermes Germany, and United Parcel Service (UPS).[89]

There are several delivery options for the customer which are illustrated in the figure below. The customer has three basic alternatives to receive his delivery. Via a store, a pick-up point, or a home delivery.[90]

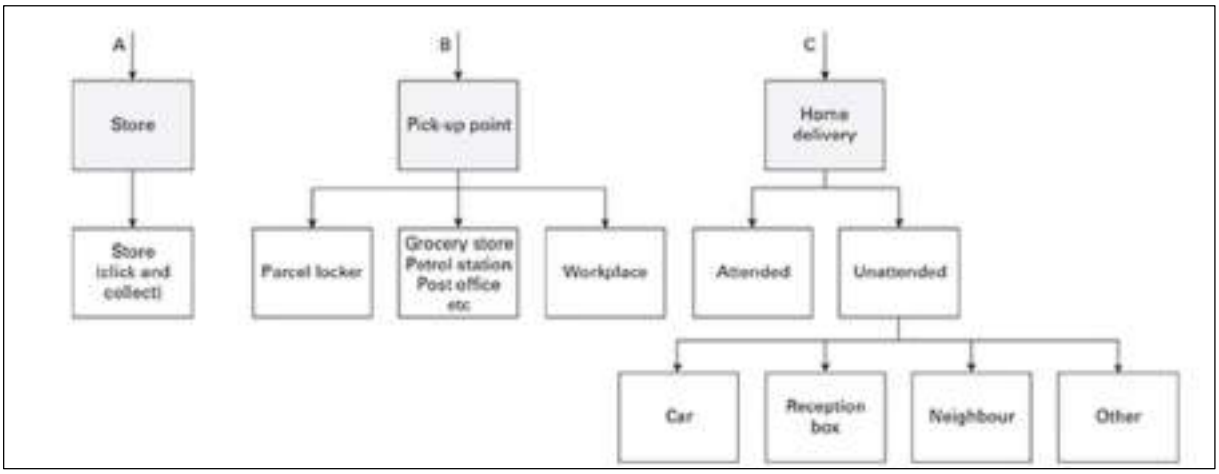

Fig. 3: Delivery options in e-commerce (Palsson, 2018, p.155)

[89] Cf. Stallmann & Wegner (2015), p. 43., Brabänder (2020), p. 13 f.

[90] Cf. Palsson (2018), p. 154.

The last mile is one of the most challenging aspects in B2C e-commerce. Courier, express and parcels services do especially struggle with the constantly rising consumer demands. As customers are not bound to opening hours, orders can be placed at any time. Every single inhabitant of a city is a potential customer. The intervals in which customers order are irregular and hard to predict. In addition, each parcel delivery service has its own delivery network. Different parcel services possibly deliver at the same time in the same districts. This in turn means a higher burden for the infrastructure of a city. Either way a quick delivery is expected by customers. Companies can only take advantage of the unlimited opening hours that online shopping offers as long as the shipping services can handle the constantly rising number of orders.[91]

The costs for the last mile are especially high for online retailers as the customer does not pick up his products at the point of sale and must be delivered to the individual customers.[92] It is estimated that 40% of the total logistic cost of a company are incurred on the last mile. A lack of personnel is also a problem of the last mile. More manpower is needed to handle the steadily increasing number of orders.[93] Currently the online business is growing faster than available logistic structures and an ongoing fusion of logistics and online trade can be observed.[94]

2.3.3 Returns

The process of returning ordered goods to a shop owner usually includes the return shipping, the inspection of the goods, the decision what to do with the goods and finally the repayment. Estimating expected returns beforehand is very difficult. They create a variety of problems such as additional processing costs for the company, an increased need for new packaging material, increasing emissions due to repeated transports, and damaged products that cannot be sold again.[95]

Fashion products represent a very critical product group when it comes to returns. It may be possible that the customer stained, damaged, or already wore the product,

[91] Cf. Stallmann & Wegner (2015), p.44., PwC (2017), p.11 f.

[92] Cf. OC & C (2017), p. 16.

[93] Cf. online: Hecking (2018).

[94] Cf. Engels (2019), p. 15.

[95] Cf. Stallmann & Wegner (2015), p. 44, Schmidt et. al. (2020), p. 40.

especially if it was more expensive, and sent it back after wearing it. Preparing returned clothes to be sold again can be very complex. Every piece must be checked and may has to be washed or ironed again. Returns are a very costly factor for every fashion company and do count as one of the most challenging aspects in fashion e-commerce. According to the German magazine Spiegel up to 50% (depending on the online retailer) of the ordered fashion articles of an online retailer are returned. This is a high rate compared to other product categories.[96]

One reason for high return rates is rooted within the fact that clothes usually must be tried on before making a purchase decision. As in e-commerce this is not possible beforehand, products that do not fit are simply returned.[97] After opening and inspecting returned products the old packaging is usually disposed and a new packaging must be added in case of a reshipment.

2.3.4 Logistic Costs of Shipping Packaging

Generally, logistic costs within a company mainly comprise costs for storage, transport costs, handling costs, administrative costs, and costs for IT.[98]

E-commerce packaging is associated with higher costs and a higher amount of time needed for the individual order preparation, as the goods can no longer be bundled at the goods dispatch as for the traditional stationary business.[99]

The logistics costs that are related to shipping packaging differ from company to company. The most common cost factors that are associated with packaging will be named in the following to later be able to compare them to the ones of alternative packaging solutions. The price that is charged by a supplier for the disposable shipping packaging usually includes material costs, production costs and the costs to transport the packaging to the retailer. Packaging is indirectly related to other logistic costs, mainly handling and storage costs. Often, retailers who ship a high number of parcels per year benefit from economies of scale and therefore, from very low prices per package.[100]

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[96] Cf. Stallmann & Wegner (2015) p. 45, online: Jauernig & Braun (2019).

[97] Cf. Stallmann & Wegner (2015), p. 44.

[98] Cf. online: Weber & Krieger (n.d.).

[99] Cf. Stallmann (2014), p. 69.

[100] Cf. Palsson (2018), p. 87, Fraunhofer IML (2009), p. 24.

Handling costs or also called “co-packing costs” are the costs related to the time that is needed to prepare an order. They can be calculated by measuring the time that is needed to prepare several orders and calculating the average time needed. These are then multiplied with the hourly wage of the picker and show the handling costs per package. Handling costs can make up 80% to 90% of the total packaging costs. Complexity in the picking process is therefore avoided wherever possible. It is very important that the packaging used is easy to build up and close.[101]

If the packaging material must be stored in a warehouse rent and administrative costs arise.

Online retailers pay in average 0,50€ for a medium-sized packaging. The total costs per packaging vary from online retailer to online retailer but including storage and handling costs for a medium-sized packaging roughly amount to 1€ to 1,50€.[102]

2.3.5 End of Life

Waste is created either at the customer’s place, when the shipping packaging is disposed as household waste or at the company’s facilities when returns have to be processed. Regulations on how to process and dispose packaging waste are set by the German circular economy law and the packaging law.[103]

Disposal or processing of packaging waste is carried out by eight different companies in Germany which are called the “dual systems”. They are responsible to hire companies that process the waste. Special requirements are placed on the disposal of hazardous waste.[104] Due to the quickly increasing amounts of packaging waste the German packaging law (§7 III VerpackG) was updated in 2017 and in 2019 it became valid. Every company that initially puts packaging into circulation must pay license fees to the dual system to contribute to proper collection, sorting, recovery, or recycling of packaging waste.[105] In most cases, these fees have already been covered by the manufacturers of the packaging since they are the initial distributors of the packaging.

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[101] Cf. online: Lagerhallen24 (n.d.).

[102] Cf. Expert E (2020), s. Appendix 8.

[103] Cf. Seyring & Kaeding-Koppers (2019), p. 3.

[104] Cf. online: Scherer (2020).

[105] Cf. online: Flemming (2019).

However, online retailers must ensure that all packaging used has been licensed by their packaging suppliers.[106]

Generally, there are four options to treat packaging waste. Either the packaging can be reused, recycled, recovered, or disposed.

Reuse includes the repeated use of the same product or parts of a product.[107] It is only referred to reuse if no reprocessing operations are needed where a conversion of the existing material is necessary.[108]

Recycling can be regarded as any recovery operation by which waste is processed to form a new product either used for original or for other purposes.[109] This is usually realized by sorting, mechanical or chemical processes.[110] The purity of a material is decisive when it comes to recycling. Combining different kinds of materials (for instance cardboard which is strengthened by plastic) or the use of composites complicate recycling processes.[111] The options of reuse and recycling will be further explained in chapter 3.2.1.

By recovery it is usually meant that energy (in form of heat or electricity) is created by burning the packaging waste. If the waste cannot be reused or recycled this option is chosen to retain energy that would have been wasted in case of disposal.[112]

Disposal or landfilling is the burying of waste without any further treatment or recovery option. Landfills in Europe are strictly regulated to prevent contamination of ground water or nature by the disposed waste.[113] However, large parts of plastics that cannot be recovered easily are shipped to Asia. Germany is one of the biggest exporters of plastic waste. In Asia (mainly to Malaysia or Indonesia), non-recyclable plastic waste is collected in incineration plants, landfill sites or wild waste.[114]

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[106] Cf. online: Keller (2019)

[107] Cf. Grant et. al. (2015), p. 183 f.

[108] Cf. Blecker (1998), p.107.

[109] Cf. Seyring & Kaeding-Koppers (2019), p. 6.

[110] Cf. Radhakrishnan (2016), p. 165.

[111] Cf. Kotschick (2015), p. 5.

[112] Cf. Grant et. al. (2015), p. 183 f.

[113] Cf. Grant et al. (2015), p. 183 f.

[114] Cf. Heinrich Böll Stiftung, p. 38.

2.4 Environmental Impacts of Shipping Packaging

An increase in packaging waste can be associated with a faster use up of valuable resources.[115]

Different parameters such as energy and water use, carbon dioxide emissions or amount of waste in kilogram can be analyzed when evaluating the environmental impact of products.[116] Within this thesis it will especially focused on waste and carbon dioxide emissions caused by shipping packaging.

Carbon dioxide, often abbreviated as CO^2, is a greenhouse gas which is regarded as mainly responsible for global warming. The carbon footprint is a common and meaningful tool to measure and evaluate environmental performance by measuring all carbon dioxide emissions either caused of a single product or a company.[117] It is also suitable to evaluate environmental impacts of packaging. It determines all CO^2 emissions a product causes during its lifetime. From the raw material sourcing, over the production and usage, until the waste treatment or recycling.[118]

The environmental impact of disposable shipping packaging strongly depends on the used materials.[119] Producing paper packaging is a very material intensive process that requires a lot of water and energy. To produce one ton of fresh paper approximately 20 trees need to be cut down.[120] The production of paper consumes by far more energy than the production of plastics.[121]

Additionally, shipping packaging from cardboard carries big amounts of air with it which reduces the possibility to efficiently fill trucks for the delivery. A higher number of trucks is needed which results in higher CO^2 emissions. In average cardboard boxes for shipping contain 24% of air. Especially when shipping clothes, the percentage is supposed to be higher as they are more flexible than many other products.[122]

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[115] Cf. Coelho et. al. (2020), p. 1.

[116] Cf. Expert G (2020), s. Appendix 5, l. 29 ff.

[117] Cf. Gruchmann (2019), p. 663.

[118] Cf. Seyring & Kaeding-Koppers (2019), p. 11.

[119] Cf. Kotschick (2015), p. 6.

[120] Cf. Radhakrishnan (2016), p. 167, Expert A (2020), s. Appendix 2, l. 100.

[121] Cf. Grant (2015), p. 140.

[122] Cf. Palsson (2018), p.152, DHL (2019), p. 11.

An advantage that plastics have compared to paper packaging is their lightweight which reduces weight of waste and weight of the transported goods. It is also often possible to reduce the volume of plastic packaging. Without the increasing use of plastic packaging, it is estimated that greenhouse gas emissions caused by packaging would double. On the other hand, plastic waste is often not biodegradable and contains hazardous substances. They can pollute the environment and threaten humans' and animals' health if the waste collection is not properly managed. Improperly disposed waste leads to a higher consumption of raw materials, an increase of pollution due to the growing amounts of waste and the loss of materials that could be used again to form new products.[123] Plastic particles and the toxic chemicals used in the manufacture of plastics can be found in the air, soil and drinking water. Asian countries receiving waste that cannot be recycled also have difficulties the steadily increasing amounts of imported waste. Due to this, illegal recycling factories were built which discharge toxic wastewater into the waterways and polluting the air with pollutants from the incineration of plastics.[124]

It proves to be difficult to evaluate whether paper or plastic packaging is more beneficial for the environment. Although paper packaging often has a more positive connotation within the consumer's mind, current studies analyzing the environmental impact of paper packaging production and use show that paper has no significant benefits compared to plastic packaging and does not represent a suitable replacement.[125]

Most shipping packaging is disposed as household waste. It can be observed that the rise of online shopping in Germany correlates with an increase of the amount of household waste. Paper packaging waste increased about nearly three million tons during the last ten years and cardboard packaging makes up nearly 50% of the total waste collected in Germany.[126] As fashion products count to one of the most sold product categories, they contribute to large parts to the yearly disposed amount of packaging waste.

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[123] Cf. Grant (2015), p. 139 f.

[124] Cf. Heinrich Böll Stiftung & Bund (2019), p. 6, 38.

[125] Cf. Schmidt (2020), p. 3.

[126] Cf. online: Flemming (2019).

Main findings of this chapter:

1. To satisfy existing and to acquire new customers in B2C e-commerce the customer journey within an online shop should be designed as comfortable as possible.
2. Purchase abandonments during the checkout are a frequent problem for online retailers.
3. Order processing is a core element in online retailing, its main aims are low costs and a high efficiency.
4. Shipping packaging for fashion products plays an essential role within the fulfilment process as it makes them transportable and prevents contamination or damage.
5. Shipping packaging must fulfill requirements from at least four different parties: retailer, customer, logistics and environment.
6. Shipping packaging should be designed to support efficient order processing.
7. Packaging waste is either incurred at the customer's place or in case of a return at the company's facilities.
8. There are various options to treat packaging waste: reuse, recycling, incineration, or disposal.
9. Due to the growing amounts of packaging waste correct recycling and disposal become more difficult.
10. Paper packaging is not necessarily less harmful for the environment than plastic packaging.

3 Reusable Shipping Packaging

An alternative to commonly used shipping packaging solutions would be the utilization of reusable ones. Since reusable packaging follows a circular path of use, it complies with the idea of a circular economy. The definition of a circular economy, the difference to the traditionally followed model of a linear economy, and the relationship of a circular economy and sustainability will be explained in the following chapter. Characteristics, forms, and functions of reusable shipping packaging will be presented.

3.1 Shipping Packaging in a Circular Economy

Single-use packaging can be regarded as an example of a linear economy system. A sender ships the goods to the recipient who disposes the packaging into the household waste. Limited amounts are recycled, significant percentages parts are incinerated, or the packaging ends up in a landfill. Very limited or nearly no reuse of packaging takes please in B2C e-commerce.[127]

Fig. 4: Creation of waste in a linear economy (online: TU Delft, n.d.)

Global resources are becoming scarcer, therefore circular economy is an approach that aims at using resources more efficiently. Products are designed in a way that they can be easily degraded and by various processes prepared to enter a cycle of use again. Another alternative is to reduce the impact of the product per period through repeated use of the same product. The overall aim of a circular economy is a society that lives without the production of waste because as many products and materials as possible are kept within usage.[128] Instead of a linear value chain a closed loop value

[127] Cf. Blecker (1998), p. 99.

[128] Cf. Blecker (1998), p. 121., Pietikäinen (2020), p. 50, 56.

chain is pursued.[129] Geissdoerfer et. al. define a circular economy as “a regenerative system” in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling.”[130]

A true circular economy is closely linked to the idea of sustainability.[131] A common definition for sustainability is the one created by the United Nations in 1987 where it is described as a “development which meets the needs of the present without compromising the ability of future generations to meet their needs. This involves addressing economic, social and environmental factors and their interdependence in an organization’s decision-making’s and activities.”[132]

Both approaches aim at taking measures to reduce the speed of the consumption of valuable resources. Also, the obligatory framework for companies to move into a more sustainable direction for packaging is set by the European circular economy package and by the European directive 94/62/EC for sustainable packaging.[133] The transition to a circular economy is pursued by the European member states.[134]

While sustainability aims at generally benefiting environment, society and economy, the circular economy approach can rather be regarded as a strategy proposed for government and economy to use resources more efficiently.[135] Sustainable packaging is defined as packaging that can be recovered, recycled, or reused. Hazardous substances in packaging shall be reduced to a minimum. Packaging weight and volume should also be kept at a minimum but must meet the requirements to provide a safe and hygienic product to the customer. Two important indicators define a sustainably optimized packaging: a reduced amount of packaging waste and a reduction in CO^2 emissions compared to the previously utilized packaging.[136] Whereas

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[129] Cf. Anbumozhi & Kim (2016), p. 2.

[130] Geissdoerfer et. al. (2017), p. 763.

[131] Cf. online: Simon (n.d.)

[132] Cf. United Nations (1987), p. 15.

[133] Cf. Seyring & Kaeding-Koppers (2019), p. 3.

[134] Cf. Seyring & Kaeding Koppers (2019), p. 3.

[135] Cf. online: Simon (n.d.).

[136] Cf. EUROPEN/ECR (2009), p.16., Expert H (2020), s. Appendix 6, l. 58 ff.

the circular economy approach creates a hierarchy between the different options of how to treat packaging waste. The most preferred option according to this pyramid is to prevent the creation of waste. What follows is reuse, then recycling. Among the least preferred options is the thermal recovery of packaging material or the disposal of it without any further use.[137]

According to Weetman some main principles of a circular economy are the following:

1. The lifetime of products shall be increased as much as possible by using products for multiple cycles.
2. Products shall already be designed to be recycled, reused, or reprocessed in any way.
3. Regulations that support product recovery and stewardship shall be encouraged.

Fig. 5: Waste hierarchy (online: Barnsley Hospital, n.d.)

[137] Cf. online: BMU (2016), Anbumozhi & Kim (2016), p. 2.

An ideal lifecycle for packaging in a circular economy is illustrated in the figure below. The packaging is designed in a way that it can be used several times before being recycled. The raw material from the recycling is used to manufacture new packaging which can be sold and used again.

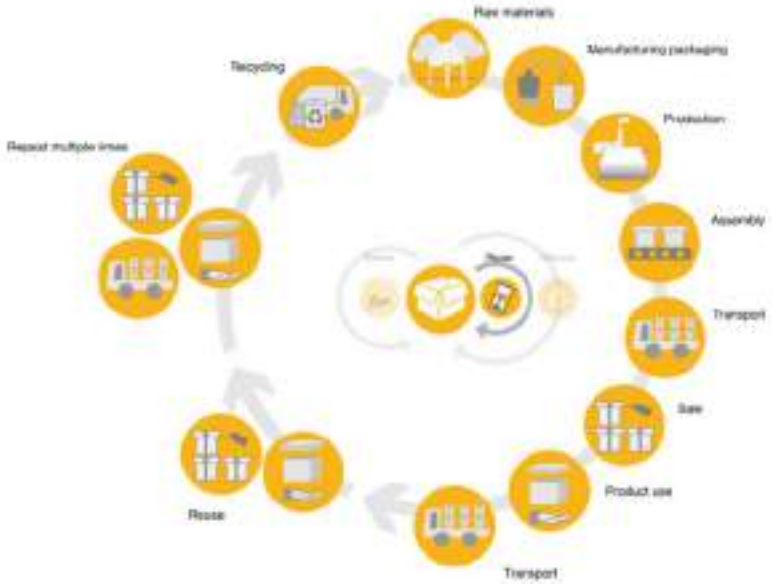

Fig. 6: Packaging lifecycle following to a circular strategy (online: TU Delft, n.d.)

Some experts assume that those who will find intelligent ways to use their resources more efficiently will also be the winners of the intense economic competition as they will know how to create more added value with less resources.[138]

3.1.1 Recycling versus Reuse

The circular economy approach presupposes that products whose components shall be reused in any form are made from a material that can be recycled. Packaging materials that enhance recycling processes are for example pure cellulose, polypropylene, and polyethylene. Since the introduction of the new packaging law (VerpackG), the obligatory recycling rates for paper and plastics have been raised. About 85% of all disposed paper packaging and 60% of the plastic packaging must be recycled in Germany. In 2022 the rates will become even higher.[139]

Less water, chemicals and energy are needed for the recycling process of cardboard as the extraction of fresh paper from wood. It can be recycled five to seven times until

[138] Cf. Pietikäinen (2020), p. 50., online: Scherer (2020).

[139] Cf. Seyring & Kaeding-Koppers (2019), p. 12 f.

the fibers become too fragile. The recycling rates for paper in Germany are very high. In 2016 the recycling rate of the collected paper and cardboard was 99%. Around 70% can be reused every year in form of recycled materials.[140] The recycling of paper consumes around 85 times more energy than the recycling of plastics.[141]

Plastics are commonly recycled by mechanical recycling processes. This means plastics are first separated into different types, they get washed and dried and are then molten at high temperature. During the cooling process they are formed into granulate again and can be used for other purposes. In Europe around 40% of the disposed plastics are recycled during the last years. Usually, recyclable plastics can be recycled five to six times.[142]

Recycling represents a sensible process for waste recovery, but it is regarded as a strategy to recover and not to reduce waste. The amounts of waste can increase despite recycling processes and a significant amount of energy and other resources such as water is needed for every recycling process.[143] Although recycling rates have been increased over the years, a reduction in packaging waste could not have been observed. The packaging waste increased from 192kg per person (1991) to 220kg packaging waste per person (2016).[144] There are also no legal incentives provided for those who want to use more recycled materials. Companies themselves are in charge to decide whether they want to use recycled materials or not.[145] The times a material can be recycled are limited. Therefore, reuse is regarded as more environmentally friendly as the most material value is retained.[146]

3.1.2 Reverse Logistics

Managing waste streams in a sustainable way is subject to reverse logistics. Reverse logistics are also regarded as decisive building block of a sustainable development within logistics. They are essential for a closed loop supply chain system. They shall

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[140] Cf. online: LichtBlick Magazin (2019), Seyring & Kaeding-Koppers (2019), p. 12.

[141] Cf. Grant (2016), p. 140.

[142] Cf. Fashion for Good (2019), p. 9, 21.

[143] Cf. Blecker (1998), p. 120.

[144] Cf. online: Farsen & Kuhlmann (2019).

[145] Cf. BMBF (2019), p. 16.

[146] Cf. Coelho (2020), p. 1.

avoid that waste is mainly disposed by the less favorable options of landfill or incineration as it is typically done within linear supply chains.[147]

Reverse logistic systems enable product reuse, product remanufacturing and other product recovery actions. A reverse logistics system usually involves the online retailer (who is responsible to manage and document the product returns), governmental agencies or local authorities (that offer disposal services), private waste management or return companies (third party logistics that focus on return management), traders (who sell recovered or recycled products), reprocessors (who repair, recycle, or reprocess the products), and the customer. The customer is the purchaser of the reprocessed products. Without him, reverse logistics cannot become economically viable. So far, only very few online retailers focus on the development of reverse logistic chains. The greatest focus currently lies on efficient after sales services to satisfy the customer.[148]

[147] Cf. Grant (2016), p.196 f.

[148] Cf. Grant (2015), p.198 f.

3.2 Reusable Shipping Packaging

Reuse in the context of packaging according to the European directive 92/62/EC is defined as “any operation by which packaging, which has been conceived and designed to accomplish within its life cycle a minimum number of trips or rotations, is refilled or used for the same purpose for which it was conceived […]”. The packaging is only then considered as waste if it cannot longer be reused again.[149]

According to the German packaging law (§ 3 III VerpackG) return and reuse shall be promoted by sufficient logistics and appropriate incentive systems such as a deposit. It is therefore not sufficient that the product is intended for multiple use, reuse must be actively supported by setting up collection points for final consumers.[150]

Reusable packaging can be classified within the field of green logistics. Within green logistics the packaging, storage, and transport are aligned with the principles of sustainability. Main aims of green logistics are a reduced use of resources and the reduction of harmful emissions. For every trip, the packaging can be used, the need to produce a new packaging is eliminated.[151]

Coelho et. al. created a classification of reusable packaging. Shipping packaging for fashion products is included within the category of transit packaging.

A classification of reusable packaging

Type of packaging	Packaging description	Product examples
Refillable by Bulk Dispenser	Customers use their packaging or brand's refillable packaging in-store or at a mobile truck, making the use of further packaging unnecessary.	Cereals, grains, candy, wine, juice, mineral water, beer, olive oil, vinegar, detergent, soap, hair care products, perfume, body and face lotion
Refillable Parent Packaging	**Bottle, container, pouch, pod, tablet, powder**The refill packaging is made with less material than parent packaging. Parent packaging can be refilled by: - pouring product inside parent packaging; - placing container inside of parent packaging; - diluting concentrated product in water inside parent packaging.	Makeup, dental floss, tooth and mouth wash tabs, deodorant, perfume, cosmetics, cleaning products, hair care products, flavoured water
Returnable Packaging	**Container, bottle, cup, plate, bowl,...** Customers return empty packaging which will be cleaned and refilled for future use by the retailer/producer (can be combined with a deposit system to provide a financial incentive).	Beer, soft drinks, mineral water, perishables, detergent, soap, cosmetics, hair care products. Reusable cups, containers, plates. (for events, cafes, restaurants)
Transit Packaging	**Boxes, containers, soft packages** Customers receive the product in reusable packaging which is returned by door delivery/pick up, or through the post office. **Crates, pallets, wrappers** Customer reuses packaging multiple times before being returned to the producer or disposed of.	Reusable packaging for transport or shipping of perishables or non-perishables. B2C: for moving home or office location or e-commerce delivery of apparel, furniture or perishables. B2B transport from producer-warehouse-store.

Fig. 7: Classification of reusable packaging (Coelho et. al., 2020, p.2)

[149] European Parliament (1994), p. 9.

[150] Cf. Deutscher Bundestag (2018), p. 8.

[151] Cf. Umweltbundesamt (2015), p. 6., Deckert (2016), p. 3, 9.

RSP for B2C is classified as boxes, containers, or soft packages, while crates, pallets or wrappers are rather used for B2B shipments.[152] Reusable packaging solutions usually require strong materials and initially higher investment costs for the production as they must efficiently protect goods for a higher number of trips than one-way packaging.[153]

Experts stated that it proves to be difficult to develop an "ecological" reusable packaging as it must protect goods for many trips. This could not yet be achieved using natural and biodegradable fibers such as hemp or cotton for the manufacturing of the packaging. So far, there is no considerable alternative than the use of plastics for reusable packaging solutions. Plastics are more durable and flexible in terms of use.[154]

The company DHL illustrated the principle of "closed-loop packaging". The customer places his or her order and either he chooses the order to be delivered in a reusable shipping bag or gets one automatically. After having received the order, the packaging is returned via a drop-off point (a store for example) or via the postal system (a mailbox). Afterwards it is transported to a distribution center where it is cleansed and prepared for a new shipment.[155]

Fig. 8: Closed-loop packaging in e-commerce (DHL, 2019, p.30)

Reusable packaging is usually not regarded as a product such as DSP but as a service that is provided to the customer as various duties such as return transports and reprocessing arise with its usage.[156]

[152] Cf. Coelho et. al. (2020), p. 3.

[153] Cf. Palsson (2018), p. 87.

[154] Cf. Expert A (2020), s. Appendix 2, l.89 ff.

[155] Cf. DHL (2019), p. 30.

[156] Cf. Coelho (2020), p. 2.

Existing systems (from fashion as well as other industries) can be classified into four different types. Each one of them offers a different scope of services provided.

1. Full-service system: A reusable packaging pool operator offers the packaging as well as the return logistics of the packaging and the preparation of them, meaning cleaning, repairing, and sorting. The pool operator is responsible for the quality of the pool and handles all administrative issues concerning the reusable packaging.
2. Circulation fee system: A pool service provider is again able to take over return logistics, sorting, cleaning, repair, stockpiling, and administration and receives a fee for each circulation of the packaging. The difference to the full-service system is that the listed services depend on the agreement. In a full-service system all services are included automatically.
3. Rental system: The lessor remains the basic owner of the reusable packaging. The packaging is rented for a fixed period that is paid for.
4. The lowest level of services provided is offered by a purchasing system. The RSP is sold by a packaging producer without other services being linked to it. The buyer must decide whether to pass the responsibility for the logistics and the administration to a service provider or to handle them by himself.[157]

An exception is the retailer-owned deposit system. It is developed and used by one retailer, who is responsible for the system and does not provide it to be used by others.[158]

3.2.1 Market Analysis of Existing Solutions

The analysis of the expert interviews showed that most online or fashion retailers who are interested in reusable packaging solutions do look for external service providers as the development of reusable packaging and the reverse logistics behind reusable packaging solutions are not part of their core competencies.[159]

[157] Cf. Rödig et. al. (2020), p. 4.

[158] Cf. Rödig et al. (2020), p. 3.

[159] Cf. Expert A (2020), s. Appendix 2, l. 277 ff.

Research on existing RSP solutions showed that worldwide around ten different RSP systems for B2C online trade are currently in use. Most of them are full service or circulation fee systems.[160]

Five out of the ten RSP systems are available in Germany. Three of them are used to ship food ("Gemüsekiste", "Frische Post" and "DHL Food Delivery"). One was developed to exclusively ship products of the retailer who developed the system (the "Memobox" owned by the "Memo AG") and one is suitable for the shipment of clothes.[161]

Only two companies developed reusable packaging for the shipment of fashion articles: the American company "Returnity" and the Finnish startup "RePack". Returnity offers a purchasing system and tailors the packaging to the specific needs of an online retailer. Other services are not included within the business model of Returnity. Currently their packaging is not available on the German market. RePack is the only service provider for fashion products that has locations in Germany and other European countries. [162]

By the beginning of 2021, a French-German startup named "Living Packets" will launch another reusable packaging solution to be rented called "The Box" which shall revolutionize packaging in terms of digital tracking technology, but which is not available until now.[163]

Therefore, it can be stated that the range of existing RSP systems for the German B2C e-commerce is very limited.

3.2.2 RePack

The company that could be determined for the shipment of fashion products in Germany was "RePack", a startup which was founded in 2011 in Finland. Their idea to develop a reusable packaging solution which derived from the principle of the bottle deposit system which is well-established in Finland and Germany. Their flexible packaging is made from recycled polypropylene, the fasteners are made from nylon and the seams are out of polyester. RePack offers three different sizes of their shipping

[160] Cf. Rödig et. al. (2020), p. 5.

[161] Cf. Rödig et. al. (2020), p. 5 f.

[162] Cf. Rödig et. al. (2020), p. 5 f.

[163] Cf. online: LivingPackets (2020).

bags. The packaging offers protection against water, but it is not corrosion stable. Therefore, it is not suitable for fragile elements. It can be used for clothes, shoes and accessories that are not at risk of breakage in case of impact.[164]

RePack offers the online retailer the packaging, reverse logistics and an incentive system to encourage customers to return the packaging. [165]

Customers of RePack can choose between a full-service system or a circulation fee system. If all services offered (return logistics, implementation of the incentive system and the RSP) are used, it is a full-service system. Some retailers also ship their products in an RSP by RePack without providing an incentive to the customers which corresponds to a circulation fee system. The incentive system is included within the price that RePack charges per packaging. The company itself is responsible to decide whether to provide an incentive or not and is in charge to cover the costs for the incentives. Retailers not using the incentive system offered by RePack do not benefit from a lower price per packaging.[166]

RePack receives a fee per trip that each packaging takes. To obtain the full system 2,75€ to 3,50€ are charged from the retailer (depending on the size of the packaging) for each trip of the RSP. Product returns do not count as a full trip as they are shipped back to the online retailer.[167]

The customer can either choose within the checkout to get his or her order shipped in an RSP from RePack, but there are also retailers that ship all their articles in their shipping bags. Currently the service provider cooperates with around 50 online retailers in Europe and the USA.[168]

Different to the one-way packaging the bags of RePack need to be stored as articles within the system of an online shop and each of them possesses a unique ID.[169] During the packing process, the picker usually decides on the RePack size to be used, afterwards the packaging is closed by adhesive tape. The ID must be scanned and is then linked to the email address of the end user and transmitted to RePack. It is

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[164] Cf. Rödig et. al. (2020), p.8, online: RePack (2020).

[165] Cf. Expert D (2020), s. Appendix 4 l. 158.

[166] Cf. Expert D (2020), s. Appendix 4, l. 114 ff.

[167] Cf. Rödig et. al. (2020), p.4,8, Expert D (2020), s. Appendix 4, 114 ff., l. 166.

[168] Cf. online: RePack (2020).

[169] Cf. Expert H (2020), s. Appendix 6, l. 68.

registered within the system of RePack and able to be tracked. The shipping label provided by DHL, Hermes or other parcel delivery services is stuck onto the adhesive tape.[170]

The customer who receives the RePack packaging is in charge to return the packaging via a mailbox. If the ordered goods are kept, the packaging is folded in a specific way, a return label must be stuck on it and it can be thrown into a mailbox. The return label of RePack includes an international post code. Therefore, the system can be applied for all orders within Europe. The post code can be used to ship the packaging back from all countries in Europe to the preparation and distribution hubs in Tallin, the capital of Estonia. There, the bags get prepared for the next shipment.[171]

Customers can handle the returns like it is known from traditional online shopping with single-use packaging. Packaging and products to be returned can be handed over to various collection points, as for example a store, a DHL shop, or a post office. From there, are sent back to the online retailer to be processed. The packaging is then directly cleaned and checked at the facilities of the retailer. RePack instructs retailers on the cleaning process and provides detergents for the cleaning.[172]

The costs for sending back the packaging are included within the price that is charged per trip. Whether to charge an additional deposit fee for the packaging to encourage the return by the customer depends on the retailer. The return logistics for the packaging are carried out by contractual partners of RePack. A fulfilment partner of RePack is responsible for the cleaning and the quality control of the bags.[173]

The company offers retailers a proprietary software system to allow tracking and incentivizing for returned bags. The integration of the software of RePack usually takes place in the front- and backend of the online shops. The frontend integration is necessary to inform the customer about the reusable packaging or to eventually offer him a choice within the checkout process. The backend integration is necessary to allow the tracking of the packaging and usually takes place with the merchandise management systems and the shipping service providers. The integration can be either

[170] Cf. Rödig et. al. (2020), p. 8.

[171] Cf. Expert A (2020), s. Appendix 2, l. 54 ff.

[172] Cf. Expert D (2020), s. Appendix 4, l. 84., online: RePack (n.d.).

[173] Cf. Rödig et. al. (2020), p. 8.

carried out by the retailer or by an IT service provider. RePack itself does not carry out the software implementation.[174]

RePack in cooperation with an online retailer offers some typical elements of a reverse logistics system. Their system involves a retailer, a company which is responsible for the return shipment (“Eesti”, the national post and logistics company of Estland), a private service provider for the checking and cleaning of the bags (Ogoship), and the customer who is in charge to return the packaging and usually has to pay for the packaging.[175]

Most important aspects that can be summarized from this chapter:

1. In a circular economy reduction and reuse are regarded as most efficient measures to reduce the need for fresh raw materials.
2. Reverse logistics are a decisive element of circular business models.
3. The customer is the most important element within a reverse logistics system.
4. Reusable shipping packaging complies with the idea of a circular economy.
5. It is legally prescribed that RSP solutions must be supported by sufficient reverse logistics and appropriate incentive systems to encourage customers to return RSP.
6. So far, only very few RSP systems are available on the German market, only one service provider could be identified for the product category of fashion products: the Finnish service provider RePack.
7. The software of RePack must be installed in front- and backend of an online retailer to allow tracking and incentivizing of the RSPs.

[174] Cf. Expert D (2020), s. Appendix 4, l.216 ff., l. 233.

[175] Cf. Rödig et. al. (2020), p. 8.

4 Opportunities of Reusable Shipping Packaging

In this context, future potential is defined as a range of untapped or unused possibilities reusable shipping packaging may offer.[176]

Several opportunities could be formulated from literature research and expert interviews: a reduction in CO^2 emissions and waste, the possibility to especially target environmentally conscious customers and the opportunity for a company to set itself apart from others. Finally, RSP could help to generate more profit by the usage of incentive systems.

4.1 Ecological Advantageousness

Online retailers who want to use or test reusable packaging are especially hoping to reduce packaging waste and CO^2 emissions.[177] The ecological advantageousness of reusable packaging has been discussed controversially in existing literature. What can be concluded from the analysis of the expert interviews is that most experts evaluated the ecological potential of reusable packaging as high or very high. Some stated that in the long term they regard RSP as the most reasonable solution for the reduction of packaging waste.[178] Under which conditions RSP can be ecologically beneficial will be pointed out in the following.

4.1.1 Reduction in CO^2 Emissions

A reduction of CO^2 emissions largely depends on two decisive elements: Trip and return rate of the amount of RSP circulating. The packaging needs to take a certain number of trips to spread its environmental impact over its number of uses. To achieve a high trip rate a high amount of packaging must successfully be returned to service provider or online retailer. The higher the rate of returned RSPs, the more of them can be reused. Usually, the rate should be around 90%. Therefore, the percentage of rejects (the rate of packaging, which was not returned successfully or was damaged during the reprocessing) must be kept as low as possible.[179]

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[176] Cf. online: Wortbedeutung.info (n.d.).

[177] Cf. Expert H (2020), s. Appendix 6, l. 49.

[178] Cf. Expert A (2020), s. Appendix 2, l. 71 ff., Expert B (2020), s. Appendix 3, l. 58 f., Expert H (2020), s. Appendix 6, l. 90 f.

[179] Cf. Expert A (2020), s. Appendix 2, l. 72 ff., Expert G (2020), s. Appendix 5, l. 32 f.

Furthermore, it is important which kind of packaging is replaced by the RSP. Generally, lightweight plastic packaging has a lower carbon footprint than boxes made from cardboard, as producing cardboard is a very material intensive process. Therefore, a higher number of trips is necessary when replacing a lightweight one-way plastic packaging by a more durable and reusable one.[180]

It has been dealt with the comparison of disposable and reusable packaging for some time now. The diagram shown below compared the carbon footprints of a disposable LDPE shipping bag and an RSP.

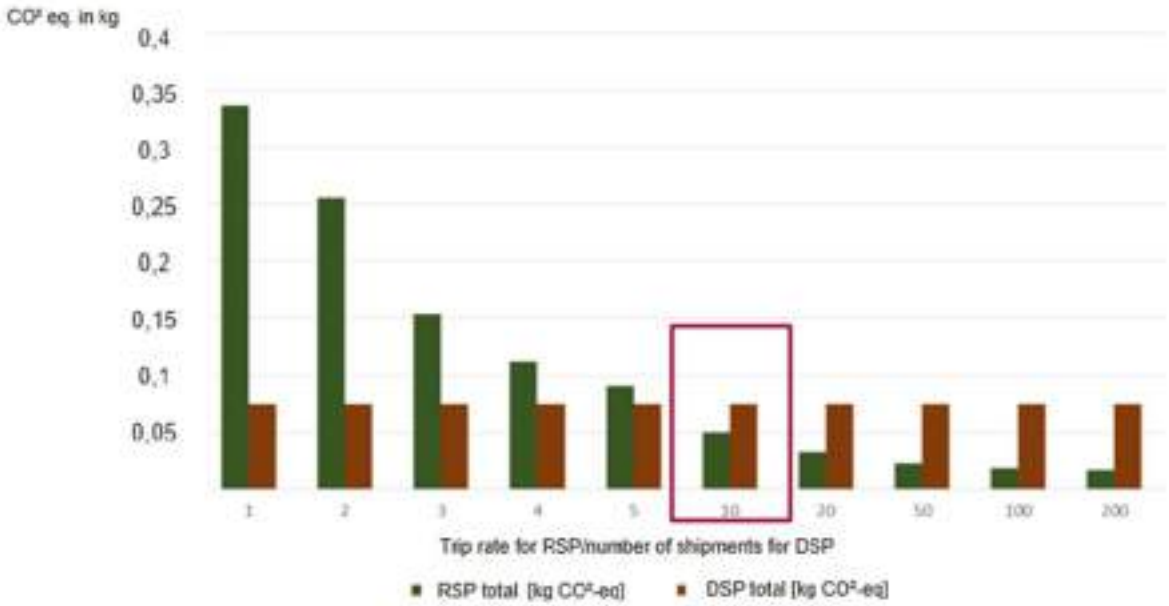

Fig. 9: CO^2 equivalents of an RSP compared to an LDPE shipping bag according to the number of trips of an RSP (Oekopol, 2020, p.9, translated from German by Naomi Ternes)

The data from the LDPE bag derived from packaging which is commonly used by online retailers. For the reusable packaging it was assumed that it has the same properties (for example material and weight) as a shipping bag offered by RePack. The emissions of the RSP become lower if the number of trips is rising. Around ten trips are needed for the RSP to become lower in emissions than the ones produced by one LDPE bag.[181]

[180] Cf. Expert A (2020), s. Appendix 2, l. 72 ff., Expert G (2020), s. Appendix 5, l. 33.

[181] Cf. Expert A (2020), s. Appendix 4, l. 17 ff.

In order to unify different forms of greenhouse gas emissions caused (for example during production or usage) and to create a carbon footprint, different types of greenhouse gas emissions measured have been converted into CO^2 equivalents displayed in kilograms (as shown in the figure above).[182] To determine the carbon footprint, the emissions caused during the entire lifetime of both shipping bags were determined, from raw material sourcing to waste treatment. Emissions for raw material procurement and production of the packaging were considered as well as transports with different transport means for distribution or return shipment of the RSP. CO^2 equivalents for water and electricity needed to clean and check the reusable bag after each usage have been considered as well. For the waste treatment for DSP and RSP it was assumed that 40% of the material would end up in incineration and that 60% were recycled.[183]

Experts stated that even recycling or the usage of recycled material is not decisive for the ecological advantageousness if the environmental impact of the packaging is spread over a sufficient number of trips. But it supports reducing the number of trips that are needed to achieve a comparably lower impact than a DSP.[184]

It could be argued that for the reusable packaging more transports are needed which cause an increase in CO^2 emissions as it must be returned to a distribution center and from there back to the online retailer to be used again. For the single-use packaging additional transports are only needed in case of product returns. But even when including the additional transport ways for the reusable packaging it becomes beneficial latest after ten trips. [185]

If an RSP is replaced by a commonly used cardboard box it is assumed that even a lower number of trips (around five to seven) is needed for the RSP to become more environmentally beneficial as for the production process of cardboard much more emissions are caused than for the production of lightweight polyethylene.[186] Producing one cardboard box produces in average already 230g of CO^2, while the production of an RSP currently causes 200g of CO^2. After ten trips the CO^2 emissions amount to

[182] Cf. online: Paschotta (2020).

[183] Cf. Expert A (2020), s. Appendix 7, l.26 ff.

[184] Cf. Expert A (2020), s. Appendix 2, l. 108 ff.

[185] Cf. Expert A (2020), s. Appendix 2, l. 233 f.

[186] Cf. Expert A (2020), s. Appendix 2, l.75 ff.

2300g for the cardboard box, but only to 533g for the RSP, if emissions from transport and cleaning have been added.[187]

4.1.2 Waste Reduction

RSP reduces the need for new packaging materials for each shipment. Service provider RePack assumes that one of their bags turns into waste after 20 uses. While the amount of waste produced by a RSP always stays the same, the waste from the one-way packaging adds up for each use. Using 20 one-way shipping bags that weigh 75 grams produces 1,5 kilograms of plastic waste while the waste from RePack remains 118g.

Comparing the RePack bag with cardboard packaging even shows more significant savings in waste. Assuming one cardboard box weighs 150 grams, the waste for 20 boxes adds up to 3 kilograms. Using a reusable packaging could in this case save 96% of the produced waste from one-way packaging.[188]

Especially for online retailers with high return rates the savings in packaging material would be significant.

	RePack	Disposable plastic (LDPE)			Cardboard		
Uses	waste kg	waste kg	Saving abs. kg	Saving rel. %	waste kg	Saving abs. kg	Saving rel. %
1	0,118	0,08	0,04	57%	0,15	-0,03	-25%
2	0,118	0,15	-0,03	-21%	0,30	-0,18	-60%
3	0,118	0,23	-0,11	-48%	0,45	-0,33	-74%
4	0,118	0,30	-0,18	-61%	0,60	-0,48	-80%
5	0,118	0,38	-0,26	-69%	0,75	-0,63	-84%
6	0,118	0,45	-0,33	-74%	0,90	-0,78	-87%
7	0,118	0,53	-0,41	-78%	1,05	-0,93	-89%
8	0,118	0,60	-0,48	-80%	1,20	-1,08	-90%
9	0,118	0,68	-0,56	-83%	1,35	-1,23	-91%
10	0,118	0,75	-0,63	-84%	1,50	-1,38	-92%
11	0,118	0,83	-0,71	-86%	1,65	-1,53	-93%
12	0,118	0,90	-0,78	-87%	1,80	-1,68	-93%
13	0,118	0,98	-0,86	-88%	1,95	-1,83	-94%
14	0,118	1,05	-0,93	-89%	2,10	-1,98	-94%
15	0,118	1,13	-1,01	-90%	2,25	-2,13	-95%
16	0,118	1,20	-1,08	-90%	2,40	-2,28	-95%
17	0,118	1,28	-1,16	-91%	2,55	-2,43	-95%
18	0,118	1,35	-1,23	-91%	2,70	-2,58	-96%
19	0,118	1,43	-1,31	-92%	2,85	-2,73	-96%
20	0,118	1,50	-1,38	-92%	3,00	-2,88	-96%

Fig. 10: Waste reduction through RSP after 20 uses (online: RePack, 2020)

Annotation: It is assumed that the waste per packaging for disposable plastic illustrated in the figure amounts to 0,075 kg and not 0,75kg as it is noted above and that the weight of one RePack bag amounts to 118g and not 110g.

[187] Cf. online: WDR (2020).

[188] Cf. online: RePack (2020).

The online retailer Tchibo indicated that 25% of all their shipments were suitable for the shipment in RSP. This would correspond to the waste of at least two million DSPs to be saved per year.[189]

Even if a package can no longer be used for shipping, there are still possibilities to reuse it, as the material might not be irreparably damaged and is comparably robust. RePack for example uses their old and used packaging to design upcycled products or prototypes for new packaging solutions. In this way the company ensures that RSPs which are no longer used for shipping do not end up as waste but might still be sold as products. This prolongs their lifecycle again and avoids disposal.

The Finnish fashion brand “AALTO” for example uses old RePack packaging to create phone cases, bags, and pouches.[190]

Fig. 11: Upcycled RSP (online: Pinterest n.d., Selfridges, n.d.)

[189] Cf. online: WDR (2020).

[190] Cf. online: RePack (2020).

4.2 Informed and Environmentally Conscious Consumers

4.2.1 Informed Consumers

More and more people experience a clean environment as an important element of a high standard of living and as beneficial for the individual well-being. Generally, the willingness in Germany to engage in more sustainable alternatives has been growing during the last years and an increasing openness towards sustainable consumption could have been observed.[191] Customers become aware of the amounts of packaging waste that online-shopping creates. Studies show that they are especially dissatisfied if the number of ordered products differs greatly from the size of the packaging used. For example, if a big carton is used to ship two small T-Shirts.[192]

A Bitkom study published in 2020 indicated that 86% of the questioned online shoppers older than 16 would be willing to use reusable packaging and 52% would be willing to pay an additional price for environmentally friendly packaging. The accurateness of this data must be regarded critically as often, a gap between attitude and behavior towards sustainability can be observed on consumer's side.[193] However, the percentage of those who demand sustainable packaging is growing. Thus, in a study by PwC, conducted in 2018, 63% expect an environmentally friendly transport, which corresponds to an increase in 2% compared to a similar study conducted by PwC in 2017.[194]

Babader et. al. investigated the social behavior of consumers towards reusable packaging. They concluded that reuse behavior largely depends on communication and knowledge. Awareness about the environmental impact and the consequences of improperly disposed packaging waste increase the willingness to reuse products. Those being informed about the benefits of reuse and on how to reuse correctly are more motivated and have less problems with handling the reusable product. Also, customers informing others can increase the number of people that are actively using reusable packaging options.[195] Consumers who know that their actions contribute to something important and are worthwhile will much more likely participate voluntarily

[191] Cf. PwC (2011), p. V., BMUB (2016), p. 6.

[192] Cf. DHL (2019), p. 9.

[193] Cf. BMUB (2016), p. 8, Bitkom (2020), p. 26.

[194] Cf. PwC (2018), p.10, Expert B (2020), s. Appendix 3, l. 216 f.

[195] Cf. Babader et. al. (2016), p. 5, 12.

and with pleasure. Studies proved that these kinds of actions can lead to an intrinsic feeling of reward.[196]

Customers also have very clear expectations which information should be provided to encourage participation in sustainable actions, for example detailed information on carbon footprints and social aspects (such as working conditions for the production), clear statements about the costs and shops where the product can be obtained. Paraphrasing should be avoided. The information should be very up-to date, possible conflicts of objectives should be addressed as well as resulting recommendations for action.[197]

First pilot projects of German online retailers that tested the acceptance towards RSP confirmed this assumption. Within one of the first pilot projects customers had difficulties to understand what to do with the RSP. Communication needed to be adapted.[198] Within the next pilot projects the online retailers included detailed information on how to handle the RSP. The RSP were distributed randomly and without informing the customers beforehand. They were also shipped without any additional costs for the customer. The order contained detailed information on the benefits of RSP and on how it must be used by the customer. The retailer Otto for example achieved a return rate of 74% and Tchibo 81%. Both rates could have been regarded as quite high as they were one of the first attempts of larger online retailers in Germany to introduce an RSP to customers.[199]

4.2.2 Environmentally Conscious Consumers

Furthermore, questioned experts assume that an acceptance and correct handling of reusable packaging largely depends on the degree interest towards sustainable consumption. It could be noticed that companies collaborating with RePack achieved very high return rates and could successfully establish reusable packaging in shops that owned a very environmentally conscious consumer base. Experts regard it therefore as beneficial if a choice between DSP and RSP is provided within the checkout. Like this, the customer can actively decide whether to choose the RSP or

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[196] Cf. Barr (2007), p. 466.

[197] Cf. Umweltbundesamt (2014), p. 44.

[198] Cf. Expert C (2020), s. Appendix 3, l. 36 ff.

[199] Cf. Tchibo (2020), p. 10, Otto (2020), p. 3.

not. Experiments showed, that if the customer already knows the principle of RSP, he will rather send it back. [200]

According to its own statements, the German eco fashion shop Avocadostore serves customers who are very conscious and critical towards sustainable products. Unlike Otto and Tchibo the Avocadostore was willing to demand a fee from the customers in case they opted for RSP. In cooperation with RePack the retailer offered the option within the checkout process while testing RSP for a month.

Within the first two weeks 40% of the customers who ordered a product within the shop chose the RSP for the shipment and paid an additional fee of 3,95€ to receive the packaging.[201] A high level of acceptance towards the additional costs for the customer could have been observed. As expected, the retailer received a lot of feedback concerning the alternative packaging solution.[202]

Sociodemographically, those who are most interested in supporting a sustainable lifestyle and consumption in Germany are especially women at age 30 or older, with a high degree of education and a relatively high income (higher than 3000€ net per month).[203]

Another term coined by American media agencies that shall describe consumers that are interested in sustainable consumption is the one of the “LOHAS” (Lifestyle of Health and Sustainability). On the one hand it describes a way of living and on the other hand the group of people living according to these principles. LOHAS are especially interested in taking over responsibility for the environment, social issues, and health.[204]

LOHAS cannot clearly be defined demographically, their age ranges from 25 to 70 years old, but a higher percentage of women can be assigned to this target group. They mainly order their products online, directly from the producer or buy from stores that offer a rather high-priced product segment. Analyzing the average of existing studies about LOHAS, they make up about 20% of the German population.[205] This

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[200] Cf. Expert A (2020), s. Appendix 2, l. 143 ff., 168 ff., Expert D (2020), s. Appendix 4, l. 195 f.

[201] Cf. Expert H (2020), s. Appendix 6, l. 20 ff., online: WDR (2020).

[202] Cf. Avocadostore (2020), p. 3.

[203] Cf. Umweltbundesamt (2014); p. 45.

[204] Cf. Umweltbundesamt (2014), p. 43.

[205] Cf. Weissinger (2020), p. 44.

target group is said to have a significant impact on a change in value pattern among the German population.[206]

For shops knowing that they are serving an environmentally conscious customer group (as for example the LOHAS) it is more likely to receive acceptance and feedback than for those who are serving a large and heterogenous group of customers.[207] Therefore, it is beneficial to know the targeted customer group and to explore whether at least an interest for different packaging solutions is existing or not.

[206] Cf. Wenzel et. al. (2007), p. 6.

[207] Cf. Expert A (2020), s. Appendix 2, l. 147 f.

4.3 Company

According to Regattieri et. al. one of the most important functions companies today should focus on when entering the market as an online retailer is the usage of reusable packaging solutions.[208] Questioned online retailers that are currently testing reusable packaging are especially hoping to reduce CO^2 emissions and packaging waste. Furthermore, they would appreciate a better image, increased customer loyalty and higher numbers of orders.[209] Even though many online retailers do have existing logistics systems for their packaging processes the willingness to integrate or to try to integrate reusable packaging solutions is increasing.[210]

4.3.1 Differentiation and Pioneer Role

A certain association with a brand helps characterizing its image and the packaging is the first impression a customer receives from an online retailer. Since RSPs have so far only been established in niches, they could help brands setting themselves apart from other brands, which is becoming more and more decisive in the ever-increasing competition of online retailers.[211] At the same time sustainability within fashion is playing an increasingly important role. Business models focusing on waste reduction are currently enjoying great popularity, but they are still very rare. Thus 71% of German citizens indicated to approve the concept of shops that reduce or do not use any packaging for their products. However, not many retailers offer reusable packaging solutions for fashion products to serve this demand.[212]

Pioneers within the area of RSP could also encourage other brands to focus on reuse. As it is a concept which is not used by many retailers in Germany it can be regarded as special and innovatory. Those who specialize on the optimization and use of RSPs could use their knowledge to guide online retailers that want to implement RSP. Most retailers reject the development of own reusable packaging on their own but at least investments of the company could flow into the research on new and optimized reusable packaging solutions as so far only one solution is available.[213] Customers

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[208] Cf. Regattieri et. al. (2018), p. 90.

[209] Cf. Expert H (2020), s. Appendix 6, l. 48 f., Expert G (2020), s. Appendix 5, l. 38 ff.

[210] Cf. Rödig et. al. (2020), p. 13.

[211] Cf. Expert A (2020), s. Appendix 2, l.127 ff.

[212] Cf. online: Frohn (2019).

[213] Cf. Expert A (2020), s. Appendix 2, l. 277 ff.

could recognize these companies as innovatory, unique, and sustainably oriented. Examples from other industries show the advantages of focusing on packaging reuse. The English cosmetics company "Lush" is one of the most successful cosmetic brands worldwide. Lush recycles its packaging which is returned by customers with the help of their own recycling facilities and is constantly optimizing its reprocessing and packaging reduction processes. This makes them experts in their field and makes up their unique selling proposition.[214]

Hurdles and ways to improve currently used RSP solutions could be analyzed and transmitted to other retailers. The German eco fashion online shop Avocadostore also wants to become a pioneer of reusable packaging and pass on its knowledge to other sustainably oriented shops.[215]

4.3.2 Increased Customer Loyalty and Higher Order Volumes

In case of RePack, an incentive system is used to motivate the customer to return the RSP and to increase the return rate.[216] Every time a customer successfully returns a packaging, he or she is incentivized with a voucher for the next purchase in one of the participating shops.[217]

This may result in a higher loyalty towards a brand or a group of brands offering these services. Additionally, the buyer may feel satisfied as he did something beneficial for the environment and is rewarded for doing so.[218]

As mentioned before, German customers are relatively price sensitive. Coupon and loyalty programs are therefore very popular. Especially younger customers are valuing discount campaigns and coupons.[219] 22% of the participants of a representative study are explicitly choosing online shops that offer discounts or coupon codes on a regular basis.[220] In another survey 47% stated that they are using coupons on a regular basis

[214] Cf. online: TU Delft (n.d.).

[215] Cf. online: Preuss (2020).

[216] Cf. Expert G (2020), s. Appendix 5, l. 33 f.

[217] Cf. online: RePack (2020).

[218] Cf. Coelho et. al. (2020), p. 8.

[219] Cf. Bitkom (2020), p. 11.

[220] Cf. online: Unternehmer (2019).

and perceive it as a good idea. 60% prefer to receive their vouchers per mail. RePack as well is distributing their vouchers per mail. [221]

Distributing vouchers for packaging returns is already more widespread and successful in other sectors. Again, especially in cosmetics. The German company Junglück for example, produces natural cosmetics in glass bottles and offers every customer 10% vouchers for the next purchase if at least 10 bottles are returned.[222]

What could be observed as well is that if a choice between the DSP and the RSP is offered, and the RSP is offered for a fee, but becomes “free of charge” at a certain order volume, for example 150€, consumers increase the order volume, to receive an RSP for free.[223] The Scandinavian retailer Scandinavianoutdoor introduced RePack in 2016. The customer could choose between DSP and RSP for an additional price of 3,50€. 2017 an offer was developed where all orders above 99€ were shipped in an RSP without an additional price to be paid by the customer. More customers started choosing the RSP option and the average order volumes increased by 30%. At the same time, the amount of used single-use bags was reduced significantly. It is more probable that customers keep a higher number of articles, than originally intended, which would result in a higher profit per order.[224]

Important findings from chapter 4:

1. RSP can be regarded as environmentally beneficial provided that a defined return and trip rate is achieved within an RSP pool.
2. Analyzing the reduction of waste by using RSP showed that especially the reductions of cardboard waste are remarkable.
3. Detailed information and awareness on how to use reusable shipping packaging is important for successful usage.
4. A higher acceptance towards RSP can be expected from very environmentally conscious consumers as for example the LOHAS.

[221] Cf. Statista (2018), p. 2.

[222] Cf. online: Junglück (2020).

[223] Cf. online: TU Delft (n.d.).

[224] Cf. online: RePack (n.d.).

5. An increasing interest in alternative packaging solutions is existing but currently not many businesses offering these solutions are available on the German market.
6. RSP can be used to differentiate from other retailers and to develop expertise in a relatively unexplored field.
7. Proposing incentives or offering the RSP “for free” from a certain order volume upwards can help motivating the customers to use RSP.

5 Barriers of Reusable Shipping Packaging

Despite various opportunities, reusable shipping packaging could not successfully establish itself on the German e-commerce market yet. Reasons that hinder an establishment have been analyzed and will be presented in the following.

5.1 Logistics and IT

The increase within the logistic complexity and the IT structure of an online have been mentioned as a hurdle by all questioned experts. Changes within the check-out and the order processing must take place and returns must be treated differently than those that have been packed with single-use packaging.

5.1.1 Changes within the Order Processing Process

A switch from disposable to reusable packaging causes changes within the existing supply chain due to the introduction of reverse logistic activities.[225]

Traditionally an order consists of two central elements, the customer, and the ordered articles. Changing to an RSP means that a third element is added to the order process. As this packaging shall be used again it can be regarded as an additional article that is added to the order and which must be treated separately.[226]

Fig. 12: Changing order elements when switching from DSP to RSP (Naomi Ternes, 2020, own depiction)

[225] Cf. Coelho et. al. (2020), p. 2.

[226] Cf. Expert H (2020), s. Appendix 6, l. 68 ff.

For single-use packaging, the tracking data is usually generated automatically by the parcel delivery service. It becomes redundant as soon as the customer receives his/her packaging. But in addition to the shipping label to track the articles within the shipment, the data for the reusable packaging must be stored somewhere to allow the tracking of the return shipment. In most cases a separate packing station is necessary for reusable shipping packaging, as its identification number (a barcode or a QR code for example) must be scanned separately during the packaging process. In the case of RePack also the incentive can only be sent to the customer if the packaging is tracked. This scanning and separate tracking process means an additional effort for the online retailer.[227]

In case of RePack, the IDs of the bags must be scanned during the picking process and additionally stored in the program that is provided by RePack. But especially the packaging process every second counts that is needed to prepare an order. Retailers prefer not to switch between different programs during the picking process.[228]

Also, aspects that concern the characteristics of the packaging must be considered. Most online retailers are using different sizes of cardboard boxes due to their stability and transport properties. It is important that the RSP does not slip off the conveyor belts and that it also achieves the running characteristics of other conventionally used packaging. If the packaging cannot sufficiently fulfill the most important packaging functions such as the transport, storage, and handling functions compared to a DSP, retailers will not be willing to use them. So again it must fulfill requirements of stakeholders, needs to be designed ecologically and for reuse while remaining attractive for the consumer. This proves to be a challenge. RePack's existing solution could not achieve the running characteristics of single-use cardboard packaging so far.[229]

As the supply chain of online retailers might be very fragmented, and individual work steps are carried out by different service providers it does not solely depend on the willingness of the company to introduce a reusable solution, but also on the approval

[227] Cf. Expert H (2020), s. Appendix 6, l. 68 ff., Expert D (2020), s. Appendix 4 l. 168 ff.

[228] Cf. online: Schumacher (2020), Expert D (2020), s. Appendix 4, l. 170 ff.

[229] Cf. Expert G (2020), s. Appendix 5, l. 72 ff., 101 ff.

of the service providers and whether the packaging can be adapted to their processes.[230]

5.1.2 Returned Products

In the case of RePack product returns are directly sent back to the online retailer to avoid additional transport ways to Estonia. The RSPs must be cleaned and checked at the facilities of the online retailer. Questioned online retailers indicated that a considerable effort is required to set up facilities for the repreparation. Assuming an online retailer shipped all his clothes in an RSP, and the return rate were around 50%, about half of the packaging of all orders would have to be prepared for reshipment at the facilities of the online retailer. This would require a lot more time and labor than the processing of returns using DSPs. Small- or mediums sized online retailers might not have the space or the facilities to clean and check the RSPs.[231] Again, third parties are often responsible for the return and resale of returns, which would make it even more difficult to introduce RSP.[232]

5.1.3 Choice or No Choice for the Customer

As analyzed before, it is regarded as beneficial to provide a choice for the customer. So, he or she can actively decide whether the product shall be shipped in an RSP or not and the probability that the packaging will be sent back correctly becomes higher.[233]

But providing a choice means adding an additional step within the checkout process. Another box must be ticked until the purchase is completed. Many retailers are afraid that the slight increase in complexity could lower the rate of people who successfully finish their purchase online.[234]

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[230] Cf. Expert B (2020), s. Appendix 3, l. 77 ff.

[231] Cf. Expert H (2020), s. Appendix 5, l. 64 ff.

[232] Cf. online: Spohn (2018).

[233] Cf. Expert A (2020), s. Appendix 2, l. 165 ff.

[234] Cf. Expert D (2020), s. Appendix 4, l. 178 ff.

Fig. 13: Checkout process of the bag brand "O My Bag" offering RSP by RePack (online: O My Bag, 2020)

Some online retailers stated that it is difficult to integrate various packaging systems at the same time as especially larger retailers use highly automated processes for the picking process of their orders. Often, all their processes are adapted to a specific packaging used for shipping. If a warehouse was planned for the use of single-use packaging, it may not meet requirements of RSP.[235]

Moreover, a higher number of packaging can lower the efficiency during the picking process if it is not automated. The fewer the packaging options that are available the less time is needed to choose a suitable one which results in higher efficiency and lower costs for labor.[236]

Furthermore, it proves to be a challenge to integrate RSP into the existing IT structure of a company. One of the questioned retailers for example indicated that the kind of the packaging needed is determined after the customer placed the order. After the number of parts and volume of the shipment have been determined, their system proposes a suitable packaging. If the retailer wanted to offer a choice between RSP and DSP for the customer, the volume would have to be determined already during and not after the ordering process. An algorithm or filtering process within the checkout

[235] Cf. Expert A (2020), s. Appendix 2, l. 177 ff., Expert G (2020), s. Appendix 5, l.146 ff.

[236] Cf. online: Rbb (2020), Rödig et. al. (2020), p. 11., Expert G (2020), s. Appendix 5, l. 56 ff.

would be required to verify whether a reusable packaging is suitable or not. So far, no software system exists that is able to distinguish between RSP and DSP.[237]

Depending on the number of product categories a retailer offers it can be a complex task to adapt the systems used for the order processing. This would require much time and costly investments at least for larger sized online retailers.[238]

Offering a choice to the customer would only become reasonable if a significant percentage of customers would actually choose this option. Otherwise, adjustments within the logistic structure of a company such as separate pick stations and cleaning lines for the RSPs would not become worthwhile.[239]

[237] Cf. Expert G (2020), s. Appendix 5, l. 41 ff.

[238] Cf. Expert D (2020), s. Appendix 4, l. 184 ff., Expert G (2020), s. Appendix 5, l. 41 ff.

[239] Cf. Expert A (2020), s. Appendix 2, l. 174 ff.

5.2 Customer Acceptance

There is very limited knowledge towards the acceptance of reusable packaging, as Germany online retailers have only recently started to explore the interest of customers towards RSP in e-commerce.

What is known so far is that customers that are not actively interested in sustainability or alternative packaging solutions will probably have more issues with returning the packaging in the right way. Online retailers serving a large and heterogenous group of customers are worried that not all of them will understand the principle of RSP and will not be willing to return it. This point should not be neglected as the overall environmental benefit depends on the return and trip rate of the RSPs.[240]

Usually, three mails are sent to the customer after he or she placed his or her order: an order confirmation, a shipping confirmation, and an information about the delivery date (and time) of his order. Often, customers do not carefully read these e-mails and additional information about the reusable packaging do not reach the customer. It proved to be labor-intensive to prepare an uninformed customer sufficiently for the new form of packaging.[241]

Nowadays a very important aspect for gaining a customer's loyalty is clarity and simplicity within the entire ordering, delivery and after sales process.[242] Reuse behavior is also much related to convenience. If the mailbox is for example too far away from the customer's home, the return will be perceived as more difficult and will more likely not participate.[243] Many customers regard product returns as an inconvenience and for them it would be a relief if returns would be collected at their home. Within a PwC study even 64% of the respondents indicated that they would pay a surcharge for it.[244]

What online retailers want to avoid by any means is to upset the customer as the risk to lose him would be highest then. Therefore, existing, or alternatively considered

[240] Cf. Expert C (2020), s. Appendix 4, l.36 ff., Expert G (2020), s. Appendix 5, l. 84 f.

[241] Cf. Expert A (2020), s. Appendix 2, l.290 ff.

[242] Cf. Frei et. al. (2018), p. 169.

[243] Cf. Barr (2007), p. 466.

[244] Cf. PwC (2018), p. 11.

channels for return should be reconsidered wisely to ensure that the highest possible number of customers will be willing to return the RSP without feeling bothered.[245]

[245] Cf. Expert G (2020), s. Appendix 5, l. 78 f.

5.3 Costs

Designing the costs of a reusable system in a way that becomes economically viable is a key challenge for online retailers as it is associated with additional cost compared to the one-way packaging. RePack itself regards the costs as the biggest challenge for an increasing number of users of their system.[246]

So far, only very little is known about the costs related to a reusable packaging system for e-commerce products.[247] They are much dependent on the size of the retailer and the extent to which RSP is implemented within the company. The central question that online retailers ask themselves is up to which level they can be regarded as a worthwhile investment and are compensated by the opportunities of reusable packaging, as for example a reduced environmental impact, a better image, and an increasing number of orders.[248]

5.3.1 Change in Costs

The purchasing price for the reusable packaging is usually already significantly higher as it must be more robust compared to one-way packaging and must survive a high number of trips.[249]

Another decisive difference between one-way and reusable shipping packaging are the additional incurred costs for cleaning, checking, repairing and the return transport and management of the packaging.[250] These costs can be summarized as cost of return which are nearly non-existent for one-way packaging.[251]

Only comparing the costs to obtain one-way and reusable packaging shows a significant difference as the costs of return need to be added for the RSP to be able to use it. RePack offers its packaging linked to its return system including the logistics, the cleaning and checking. 2,75€ to 3,50€ are charged (depending on the size of the packaging) for each full trip the packaging takes. The return shipment represents a major component of the costs (around 1,60€). The rest of the costs comprise

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[246] Cf. Rödig et. al. (2020), p.10, Expert A (2020), s. Appendix 2, l. 112.

[247] Cf. Expert A (2020), s. Appendix 2, l. 139 f.

[248] Cf. Expert G (2020), s. Appendix 5, l. 15 ff.

[249] Cf. Palsson (2018), p. 87, Expert A (2020), s. Appendix 2, l. 114 ff.

[250] Cf. Expert H (2020), s. Appendix 6, l. 64 f.

[251] Cf. Expert G (2020), s. Appendix 5, l. 21 ff.

production, inspection, and cleaning operations.[252] Storage and handling costs would have to be added on top. It has been estimated that the additional costs roughly amount to 2,50€.[253]

But the total costs to introduce RSP can be expected to be even higher as other cost factors that arise with the use of an RSP should be considered. In the case of RePack returned articles are sent back to the retailer and therefore must be cleaned at the retailer's place. Investments for example for cleaning stations, personnel and maintenance would be required. An IT service provider might be necessary to be able to offer a choice within the checkout process and to store the IDs of the bags within the used inventory systems of a company. Depending on the size of the online shop, the IT service provider, and the scope of the IT structure the costs for an implementation can vary significantly. For the customers, who successfully return RePack the costs for the incentives of the returned bags would need to be considered which usually amount to 10% or 10€ per returned RePack.[254] The added value of the coupons is not yet conclusively clarified, it can only be stated that discount codes are quite popular in Germany. Studies on the redemption of discount codes as an incentive for returning reusable packaging are not yet available.[255]

5.3.2 The Customer as a Cost Bearer

There are several options to handle the higher price for the reusable packaging. The costs can be covered directly by charging a defined price for the packaging and communicating this to the consumer within the checkout process. This would require an option to select the packaging for the consumers. Retailers offering the packaging within their checkout process usually charge the same or a slightly higher price for the packaging as RePack does.[256]

Online retailers could decide to cover the cost for the packaging by themselves, but especially larger retailers are often not willing to do so. Parts or the full costs can also be handed over to the customer by including the costs elsewhere for example by

[252] Cf. Expert G (2020), s. Appendix 5, l. 20 ff.

[253] Cf. Rödig et. al. (2020), p. 8.

[254] Cf. Expert D (2020), s. Appendix 4, l. 166.

[255] Cf. Avocadostore (2020), p. 4.

[256] Cf. online: RePack (2020).

charging a slightly higher product price. Then, the higher price for the packaging would not directly be associated with the customer as a shipping fee and the products could still be “shipped for free”. But again, especially larger retailers are afraid of charging higher product prices as the competition in e-commerce is intense and the customer can compare the prices online and pick the less expensive offer.[257]

Generally, the willingness of German customers to pay an additional price for the shipping is significantly lower as in other European countries. It becomes higher if the delivery time becomes shorter or if the service level is increasing.[258]

Another study performed by Pricewaterhouse Coopers analyzed for which services customers are willing to pay and how much. A fast delivery, flexibility within the delivery process and an environmentally friendly transport have been defined to be the most important factors to satisfy the customer. The highest amount of money would be paid for a fast delivery (between 3,75 and 5,19€). In average 2,40€ would be paid to choose a delivery time window. 63% consider an environmentally friendly transport as very important. Only every third would pay in average 2,34€ for this kind of service, which is still below the amount that is usually charged for an RSP offered by RePack. The willingness to pay decreases with the age of the participants and women would in average pay a comparably higher amount than men.[259]

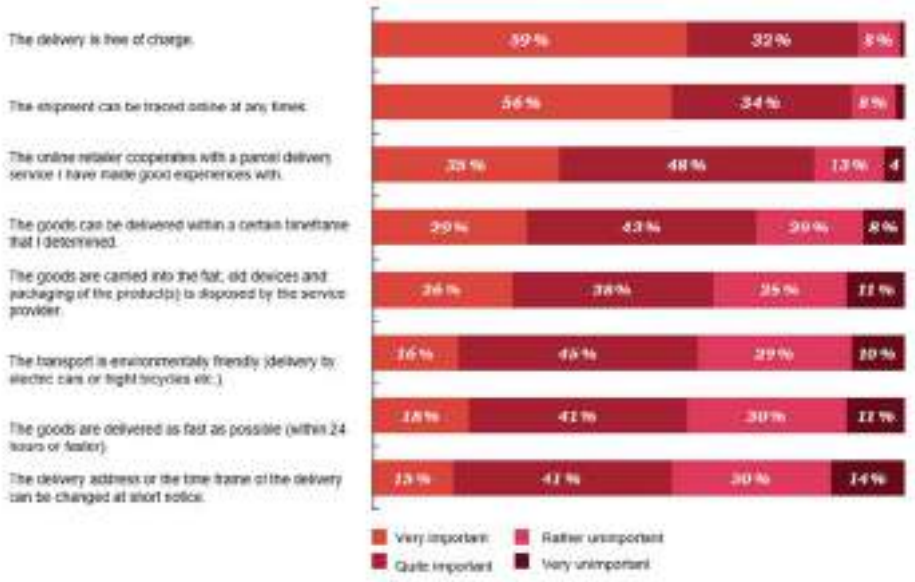

Fig. 14: Most important criteria when choosing an online shop (PwC, 2017, p.9, translated from German by Naomi Ternes)

[257] Cf. Expert D (2020), s. Appendix 4, l. 114 ff., online: Spiegel (2019).

[258] Cf. OC & C Strategy Consultants (2017), p. 9.

[259] Cf. PwC (2018), p. 11 f.

On the other hand, 91% of respondents indicated within a PwC study of the year 2017, that among the most important criteria for an e-commerce delivery, free shipping was important or very important.[260] It can be observed that the establishment of “shipping free” options in Germany mainly introduced by big online retailers strongly influence the attitude towards shipping fees. It is quickly recognized as a standard for smaller retailers if larger ones ship their orders for free.[261] And especially larger retailers who mainly compete on low prices are afraid of losing one decisive competitive advantage by charging higher prices for the product or the packaging.[262]

Another study of a German market research institute and a digital agency out of the year found out that most customers reject steps within the checkout process that take too long for them, or which increase the price to pay. This can also be regarded as a reason for the high drop-out rates within the check-out process.[263]

No clear statement can yet be made about the customers' general willingness to pay for RSP. Also research performed by experts proposes that first a solution should be pursued where the customer does not have any direct additional cost compared to the disposable packaging.[264]

[260] Cf. PwC (2017), p. 9.

[261] Cf. OC&C Strategy Consultants (2017), p. 9.

[262] Cf. online: Spiegel (2019), Expert A (2020), s. Appendix 2, l. 184.

[263] Cf. online: E-Tailment (2019).

[264] Cf. Rödig et. al. (2020), p. 13.

5.4 Legal Aspects

Several experts stated that so far, the establishment of RSP for B2C e-commerce, has not been supported or funded sufficiently by the German government. The new regulations of the packaging law focus on the increase of recycling rates and the obligation of packaging manufacturers to license their packaging. Regulations or support on the introduction of RSP for B2C e-commerce are not addressed explicitly. It is focused on returnable packaging in the context of beverage packaging. Experts already see a lack in control authorities for the achievement of the legally prescribed recycling rates and are convinced that not enough pressure is put on companies to do research on alternative and reusable packaging solutions.[265]

Lacking political pressure and its consequences can be observed when looking at the German deposit system for reusable beverages. According to the new packaging law 70% of the offered beverages that must be licensed shall be offered in a reusable packaging until the end of 2021. No concrete sanctions are provided in case of a non-achievement of the rate. So far, most German supermarkets missed this quota by far. Organic supermarkets reached an average of 56%. Netto and Rewe reached 31% and Edeka 21%. This indicates that discounters do not invest much effort in changing from one-way to reusable beverages as long they are not threatened by concrete sanctions.[266] Also for RSP it could be assumed that retailers whose primary interests do not lay within sustainable issues will not be willing to accept increases in logistic complexity and higher costs unless there is decisive pressure set by the German government.

[265] Cf. Expert B (2020), s. Appendix 3, l. 59 ff., Expert C (2020), s. Appendix 4, l. 256 ff.

[266] Cf. online: VZBV (2019).

The most important findings on barriers of RSP in fashion e-commerce:

1. The use of RSP makes the fulfilment process more complex.
2. Furthermore, it is challenging to adapt the design of the RSP to the different packaging requirements of various online retailers.
3. The cleaning and inspection of packaging from returns represents another additional effort for the online retailer.
4. It is recommended to offer customers a choice between reusable and disposable packaging, but a choice is difficult to reconcile with a company's IT structure and packing processes.
5. Online retailers are afraid that providing a choice between RSP and DSP could lead to a higher rate of purchase abandonment.
6. Not much is known about the acceptance of a broader mass towards RSP.
7. Most retailers are unwilling to accept the additional costs of RSP, which either retailer or customer must bear.
8. “Shipping free orders” are often regarded as a standard and the willingness to pay for environmentally friendly transports is rather low among German customers.
9. An obligatory increase in the share of RSP for the B2C e-commerce is not prescribed by the German law.

6 Possible Measures

Analyzing the barriers has shown that so far not much is known about reuse behavior and acceptance on customer side and that retailers are often not willing to pay the additional costs per packaging and change their existing logistics structures to introduce an RSP solution. Aims that must be achieved to encourage an establishment of RSP are among others:

1. A significant reduction of the cost of return per packaging.
2. Return rates must increase to at least 90% for the RSP to become more environmentally beneficial than the DSP.
3. The suitability of the packaging must be tested in existing logistic structures.

Therefore, research on measures has been performed which focus on improving these aspects.

6.1 Deposit Systems and Alternative Channels for Return

Regarding studies towards additional services that are desired by German online shoppers the most comfortable solution for the customer to return the packaging would probably be the pick-up by a parcel delivery service. DHL for example offers the service of picking up returns. Currently this service is offered for 2,92€ per shipment and is therefore even more expensive than RePack's currently used return solution via the postal system.[267]

According to experts the costs for the return shipment per packaging would have to drop far below 1€, to make RSPs more competitive compared to disposable packaging. Interested retailers and RePack itself are already analyzing alternative channels for the return. A common solution for all interested online retailers and an introduction on a wider scale could reduce the cost of the system and is therefore pursued. If RSPs were bundled and the return would not be paid individually for each packaging, the costs per packaging could be lowered. RSP would become more competitive in the long term.[268]

Most questioned retailers and experts share the opinion that the introduction of a deposit system is indispensable to ensure a high return rate and a cost reduction in

[267] Cf. online: DHL (2020).

[268] Cf. Expert D (2020), s. Appendix 4, l. 209 ff.

the long term. In case of a deposit an additional fee is paid by the customer, but it is reimbursed by the online retailer if the RSP is returned. The deposit must not be too low as the consumer might keep the RSP to use it for himself. The retailer would have to decide whether the deposit amount must be paid in addition to shipping costs, or whether the shipping costs are already included within the product price and only the deposit amount is listed directly.[269]

An example for a successfully installed deposit system is the German PET bottle deposit system for disposable bottles which is legally prescribed since 2003. Distributors of one-way beverage packaging are obliged to charge a statutory deposit from the consumer. The system shall primarily ensure recycling and proper disposal of the bottles, not the reduction of waste or emissions. However, it achieves very high return rates due to the comparably high amount of 0,25€ that is reimbursed for each PET-bottle.[270] In Germany the return rate of PET-bottles is 98,5%.[271]

Various options for the return of the packaging and the installation of a deposit system are currently considered as for example supermarkets, kiosk, or tobacco shops. As it is central that the return is as convenient as possible for the customer, shops that are visited to buy goods for daily needs are considered more suitable as for example stationary shops of the online retailers.[272]

An analysis of existing deposit systems for reusable and disposable beverage packaging by PwC confirms that packaging consumer-unfriendly return options can have a negative impact on return rates and make it more difficult to ensure a transparency of the system. Furthermore, uniform return conditions favor a successful introduction. Supermarkets that were only willing to take back the bottles they sold exclusively which was not well accepted by customers.[273]

The costs to initially set up a return and deposit system would be very high. Millions of euros would have to be invested to set up reverse vending machines, to ensure their maintenance, and to employ personnel to take care of them. An interface between

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[269] Cf. Expert D (2020), s. Appendix 4, l.118 ff., Expert G (2020), s. Appendix 5, l. 32 f. Expert H (2020), s. Appendix 6, l. 44 ff.

[270] Cf. online: DPG (n.d.).

[271] Cf. PwC (2011), p.V.

[272] Cf. Expert H (2020), s. Appendix 6, l. 44 ff., Expert D (2020) s. Appendix 4, l. 251 ff.

[273] Cf. PwC (2011), p.V.

retailer and the location of the take back would have to be installed to register the collected RSPs. Claims and liabilities between the online retailers and the collecting institutions would arise. An additional administrative effort would be required to coordinate the tracking and the individual repayment of the deposit. In existing deposit systems for bottles, the system costs for the collection systems, for example, handling, reverse vending machines, are largely borne by beverage manufacturers and retailers.[274] An allocation of the system responsible persons and of the different responsibilities would have to take place.[275]

So far, it has been proved to be difficult to find suitable locations for the return of RSP. For a pilot project the retailer Tchibo was asked if a part of the sales area could be used to install a station to return an RSP. This was rejected by the retailer as sales space proves to be very important for many stationary businesses. Remaining space in supermarkets and small, owner-operated kiosks and shops is often very limited. It is needed for advertisement and shelf presentation.[276] Therefore it remains questionable which shops of daily use would be willing to collect RSPs at their locations that have not been put into circulation by themselves and would provide a part of their sales area. Also, large online retailers consider the establishment of a deposit system for packaging in online trade to be very difficult and costly.[277]

A monetary incentive would have to be created for the drop-off points. It also might not be sufficient to offer for example one chain of supermarkets for the return, but the return would have to take place in various supermarkets (Aldi, Lidl, Rewe, and Edeka for example) to ensure that the preferences of all customers have been considered.[278] It must also be considered that online shopping is a less calculable process than the return of empty bottles. If only a fraction of online retailers would offer this option a comprehensive deposit system would not pay off.

As with the management and recycling of packaging waste, centralized collection points within Germany would have to be installed. This would make the return transports more efficient and environmentally friendly. Long transport distances to

[274] Cf. PwC (2011), p. VI, Expert D (2020), Appendix 4, l.265 ff.

[275] Cf. PwC (2011), p. XXXIII.

[276] Cf. Expert C (2020), s. Appendix 4, l. 259 ff.

[277] Cf. Expert G (2020), s. Appendix 5, l. 34 ff.

[278] Cf. Expert D (2020), s. Appendix 4, l. 255 ff.

Estonia (as in the case of RePack) to prepare used packaging for new shipments could be avoided. The service provider RePack itself indicated that he would be willing to install further collection points if the demand for reusable packaging in Germany would be growing.[279] Cleaning, which is currently carried out manually in Estonia, would have to be automated to clean a large number of packages efficiently. Cleaning lines would have to be installed.[280]

[279] Cf. online: WDR (2020).

[280] Cf. Expert F (2020), s. Appendix 4, l. 148 ff.

6.2 Standardization

Standardization refers to the unification of products, in this context packaging, to one or a few variants.[281] The use of standardized e-commerce packaging is currently very limited among German online retailers. This could be explained by the heterogeneity among the offered products and the requirements a packaging for e-commerce products needs to fulfill depending on the product to be shipped.[282]

As the packaging requirements for clothes are comparably low, retailers selling mainly fashion products could consider developing a packaging tailored to their needs and share a uniform packaging for the shipment. This would also correspond to the experts' thesis that a reusable system can only establish itself on a wider scale. Therefore, the cooperation of German retailers would be needed to design a suitable packaging.[283]

A uniform packaging would facilitate the return of the RSP to the individual retailers, as all could share the same pool of packaging. In case of a deposit system less time and labor would be needed to sort and return various kinds of packaging.[284]

As pointed out before complexity within the picking process should be avoided wherever possible. A standardized RSP for example for a high number of retailers could reduce the error rate within the picking process and the process reliability would increase. If the packaging has a label, it is easier to identify and the return could be issued quicker. The packaging would also gain in recognition value with the customer and increase the transparency of a reusable system. Economies of scale and shared costs for packaging could also reduce the cost per package.[285]

Since processes in a fulfillment warehouse are often tailored to a specific type of packaging (mainly cardboard boxes), it would have to be a packaging that is compatible with these processes, for example one that runs on the installed conveyor belts. Close cooperation with fulfillment partners and parcel delivery services would therefore also be required, as these are mainly responsible for packing and

[281] Cf. online: Wirtschaftslexikon24 (2020).

[282] Cf. BIEK (2019), p. 49.

[283] Cf. Expert D (2020), s. Appendix 4, l. 249 ff.

[284] Cf. Coelho et al. (2020), p. 2.

[285] Cf. online: Transpak (2013).

transporting the parcels. Since the company RePack is already internationally known, it could prove useful to optimize and standardize an already existing packaging.

6.3 Reusable Packaging for Returned Articles

Generally, returns in fashion are an important issue. They make online retailing less ecologically efficient due to additional transports, costly reprocessing steps of the returned products and new packaging that is required. However, they are inevitably part of fashion articles sold online and are often already included within the calculated budgets.[286]

For retailers with a higher average number of returns as for example Zalando, that accept high returns as part of their business model, the use of reusable packaging could be considered. At least in the case of RePack the costs per full trip could be (partly) amortized due to repeated use of the RSP without a costly reshipment to Estonia. So far, the packaging needs to be paid for full trips where the packaging ends up at the facilities of the service provider. The shipping costs for the return of the goods are incurred for each returned article, whether it is shipped in a DSP or RSP. There are considerations of retailers to use the reusable packaging first in case of returns and to test the acceptance in this way, to minimize packaging waste and to ensure that most packaging is sent back. This process could also be automated. For example, if a dress is ordered in three different sizes it is very probable that at least one of them will be returned. Algorithms could be used to say that reusable packaging is used at this point. Since the package will be returned with a very high probability with at least two pairs of pants.[287]

Within this scenario not the consumer but the company would decide which packaging to ship to the customer, no choice would be offered to the consumer. Precondition would be that the packaging could be integrated within the logistics of the company. An obstacle could be that uninformed customers could keep the packaging and return the product(s) in an alternative packaging.

Obviously, there is a conflict of objectives between the actual aim of many retailers to reduce returns and to preferably use reusable packaging in case of high return rates. However, it can be assumed that returns for clothing products are often higher than for other product categories, as it is in most cases it is preferred to try on the ordered articles before keeping them. Still, a lot of effort would have to be invested for the

[286] Cf. online: Spiegel (2019), Expert A (2020), s. Appendix 2, l. 242 ff.

[287] Cf. Expert A (2020), s. Appendix 2, l. 250 ff.

preparation of the packaging, but it could be regarded as a measure to test reusable packaging and to optimize cleaning and inspection processes. Knowledge for possible improvements could be gathered.

Another possibility to consider is the growing demand towards renting principles instead of ownership which can also be observed for fashion products offered online.[288] An increasing number of online retailers is offering customers to rent clothes for a certain period in exchange for a monthly fee. Since this concept of reuse tends to address a more sustainably oriented consumer group, it could prove useful to test RSPs within this business model. Also, within this scenario, the articles would in most cases be returned to the retailer to be reprocessed and rented again. Since these retailers are already selling reusable fashion, it might be possible that they already have a broader understanding of the logistics behind reusable packaging. Even larger retailers are discovering the potential of rental models. Tchibo, for example, rents clothes for mothers and babies and upcycles those items that cannot be worn anymore to rent them again. Offering these items in RSP could increase the return rate and would make the business model even more sustainable.[289]

Fig. 15: Principle of Tchibo Share Fashion (online: Tchibo, n.d., translated from German by Naomi Ternes)

[288] Cf. Coelho (2020), p. 8.

[289] Cf. online: Tchibo (n.d.).

Retailers like Tchibo that might fear to entirely switch to RSP, could try to integrate RSP exclusively for the clothes that are rented, as the customers using “Tchibo Share Fashion” may already have been more concerned with sustainability.

6.4 Political Engagement

6.4.1 Communication

Even if alternative channels for return would be used for the reshipment of RSPs, the customer would probably remain an important element responsible to the return the packaging in a supermarket, kiosk, or even to the parcel delivery service. He must decide whether to keep it or not. Therefore, spreading awareness about the importance and benefits of reuse is regarded as a central element to establish RSP solutions.

Babader et. al. assumed based on their studies that a higher level of information offered about packaging reuse would increase awareness and a change within their attitude which would promote behavioral adaptation and an increasing number of people practicing packaging reuse.[290] Knowledge can be regarded as an essential basis for sustainable behavior and consumption and should be imparted as early as possible. Especially as the younger generations account for a large proportion of the online purchasing power in Germany.[291]

Politics can actively support this process as they can promote and inform on initiatives and provide incentives. They can set a framework for sustainable consumption. Concrete measures would for example be advertisements in public places, informing about reusable packaging in public television stations or in newspapers and online magazines.[292]

6.4.2 Praxpack

A project dealing with the user-integrated development and testing of business models for reusable packaging solutions in online trade is “Praxpack”. It is supported by the German federal ministry of education and research and organized and coordinated by the institute of ecology and politics, Oekopol. Within the project it will be tested how RSP solutions can be made practicable and economically viable for retailers of different sizes. The aim of the project is to contribute to the establishment of reusable packaging solutions for different kinds of products in the B2C e-commerce, to reduce waste and CO^2 emissions. Three German retailers are involved in the project: Tchibo, Otto and the Avocadostore. Next to the participating online retailers, the company

[290] Cf. Babader et. al. (2016), p. 5.

[291] Cf. BMUB (2016), p.14 ff.

Cargoplast which develops packaging for various purposes is taking part and the society for packaging market research, which collects market data and information on current packaging practices in online trade.[293]

Various pilots, taking four weeks each, are planned during the project and are carried out in cooperation with RePack, as it is a subcontractor of the project and the only existing service provider for reusable shipping packaging in Germany so far.[294] By supporting big online retailers RePack also wants to leave its niche position within the German market.

For the various pilots, the online retailers mainly want to consider orders shipped within Germany. The transports are organized by the German parcel delivery service DHL. Tchibo wants to replace 7500 DSPs by reusable ones. Customers receiving the RSP shall be picked randomly.

The online retailer Avocadostore is a marketplace that offers especially sustainably sourced fashion products. Their goal is to establish reusable mailbags among their 4000 brands they are collaborating with and to become a role model for the usage of reusable shipping packaging. Around 2000 RSPs shall be put into circulation during the pilot projects. Customers ordering at the online shop of Avocadostore will receive the possibility to choose whether an RSP is used for the shipment or a disposable one. An additional fee of 3,95€ must be paid on top by those who choose the RSP. Both, Tchibo and Avocadostore want to conduct customer surveys in parallel to find out about acceptance and possible measures for improvement.[295]

The third participating retailer, Otto, is one of the largest online retailers in Germany with a wide range of different customers. One important aim for Otto is therefore to test the mass suitability of reusable packaging, but not to overburden their customers. Therefore, the RSPs are sent out randomly. Mainly clothes will be shipped in the RSPs during the pilots.[296] Sustainability experts, logistics, buying departments, marketing and market research departments of the participating retailers will mainly be involved. Again, the willingness of the German customers to return the packaging is central for

[293] Cf. Expert A (2020), s. Appendix 2, l. 1 ff.

[294] Cf. Expert A (2020), s. Appendix 2, l. 47 ff.

[295] Cf. online: Umweltdialog (2020).

[296] Cf. online: Preuss (2020).

the success of the project. If the customers do not actively participate, the project can be considered a failure.[297]

The duration of the project is three years. Afterwards, the potential of reusable packaging is evaluated from an economic and ecological point of view. Final step of the project is the creation of an online toolbox where findings of the project shall be collected. The toolbox should guide all interested retailers through the processes that the experts and other participants have analyzed during the project. Companies will be asked for example, which protection functions will be needed for their products, if branding is an important aspect for them and what cost they would be willing to pay. The primary target group are online retailers, but the information will also be published for other interested parties, such as customers or service providers. All results shall be made available by 2022.[298]

Making the results available for a wider public does also correspond to the approach of Babader et. al., that proposes that policymakers should constantly inform about the opportunities of reuse by providing information through various channels that are easily accessible such as websites and online articles.[299]

Based on the results politicians could decide whether legal regulations or guidelines to increase the use of reusable packaging in e-commerce should be introduced or not.

To take away from this chapter:

1. Uniform return conditions favor high return rates.
2. Deposit systems count as one of the most effective measures to ensure a high return rate.
3. Deposit systems require a lot of organizational effort and financial investment.
4. Standardization of RSP would allow several retailers to share the same pool of packaging, which could reduce the costs per packaging.
5. Standardized e-commerce packaging is currently not very common among online retailers.

[297] Cf. Expert A (2020), s. Appendix 2, l. 269 ff., 285 ff.

[298] Cf. Expert A (2020), s. Appendix 2, l. 300 ff.

[299] Cf. Babader (2016), p. 11.

6. Using RSP for product returns could increase the return rate and is relatively easy to automate.
7. Retailers would need to provide the facilities to clean, check and repair the packaging from product returns.
8. Political support in form of advertisements or via social media channels could support communicating the benefits of RSP to a broader audience.
9. A three year's project organized by the institute of ecology and politics currently does some user - integrated testing of RSP to find out about its mass suitability.

7 Results and Conclusion

Aim of this thesis was to explore the state of the art of RSP for fashion products and to find out which advantages and disadvantages RSP offers compared to conventionally used one-way packaging. The initially asked research questions will be answered to present the results of the conducted research.

RQ1: What are opportunities and barriers of reusable shipping packaging for fashion products in B2C e-commerce in Germany?

Opportunities have been investigated at first.

Environmental benefits: The comparison of DSP and RSP showed that the reusable alternative can be environmentally advantageous, provided that a defined number of cycles per packaging and a stable return rate of at least 90%. This opportunity is restricted by the fact that consumers are responsible for the return rate. So far, the highest rate achieved was 81%.

Reduction of waste: Only after a few trips of the RSP considerable amounts of waste can be saved. The material from the RSP that are offered by RePack for example, can be recycled or upcycled and sold as a new product in case of damage.

Environmentally conscious and informed consumers: Experts assume that companies which carefully prepare their customers for an alternative packaging solution and that those who target an especially environmentally conscious customers can support the acceptance towards RSP. This assumption could be confirmed by pilot projects that have been performed by the German retailers, Otto, Avocadostore and Tchibo.

Furthermore, first movers who develop intelligent ideas for RSP systems can use their knowledge to differentiate from other online retailers or to become pioneers in the field of RSP.

Minimum order volumes to receive “shipping free” orders prove to be a successful measure to motivate customers to increase the size of their basket. Offering an RSP from a certain order volume upwards can therefore be used to increase the order volume per customer.

Incentives and coupon codes are well-accepted by Germany customers. However, their added value in connection with return procedures of RSP has not yet been conclusively clarified.

Analyzing the barriers of RSP lead to following results:

The number of existing service providers offering an RSP system and the number of online retailers using an RSP system for the online business suggest that the barriers to successfully entering a broader market might be difficult to overcome. Only one service provider could be determined that offers its RSP system for online retailers on the German market.

RSP causes additional handling steps during the picking process, tracking and return management. As these processes should be designed as efficiently as possible many retailers are not willing to integrate RSP as an additional packaging solution.

Consumer Acceptance: So far, not much is known about the mass suitability of RSP and retailers are afraid to overburden the customer with the return of the RSP.

High additional costs due to the introduction of reverse logistics represent a main barrier for online retailers. The possibility to directly pass the costs on to the customer is not considered to be a suitable option for most retailers. In average Germans proved to be extremely price sensitive and critical towards additional shipping fees.

Providing a choice between RSP and DSP for the consumer causes difficulties during order processing and within the IT infrastructure of an online retailer. Furthermore, retailers fear that the rate of purchase abandonments could become higher if the customer must choose between two packaging options.

Legally, there is no prescription for the use of a certain amount of RSP for online retailers.

RQ2: By which measures can barriers be reduced or eliminated?

Alternative channels for return were mentioned as a possible measure, as the return via the postal system is too expensive and complicates bundling of the RSPs.

Deposit systems in convenient places have been determined as one of the most effective measures to achieve return rates higher than 90%. They allow a bundling of the RSPs and costly and individual return shipments could be avoided. But they require a commitment on a wider scale and from various parties such as politics, convenience stores and online retailers. Without a sufficient incentive provided, supermarkets or kiosks will probably not be willing to collect the packaging using part of their sales space. Demand and acceptance of a broader mass should again be verified and tested

beforehand before making investments for reverse vending machines, maintenance, and personnel to run and administrate a deposit system.

Standardized packaging would enable common collection points and pool sharing which could reduce costs and enhance process efficiency. So far, standardized packaging is very limited among online retailers. Further research on a uniform design suitable for a high number of retailers is needed to explore the full potential of standardized RSPs.

RSP for returned articles or renting principles could prove to be useful for testing RSP, especially as the return rates for fashion products are quite high in Germany. It represents an alternative to deposit systems and gives retailers more assurance that the packaging comes back. It must be verified beforehand, if available structures can be adapted to allow the reprocessing of the packaging. A pool of RSPs could be shared where the bags are prepared for reuse.

Knowledge and education are considered a basic prerequisite for more sustainable consumption. Therefore, educational measures provided by politics, online retailers and other involved parties would help to spread awareness about possible benefits of RSP.

The Praxpack project supported by the federal ministry for education and research currently evaluates the potential of RSP for the online business. The project could provide new important insights about the consumer acceptance and an evaluation of various alternatives for the return. Its results can help to communicate the importance, benefits, and challenges of RSP to a broader audience.

As existing knowledge currently is very limited and it is still unclear which channel of return will work out best, it might be too early to demand clear regulations from the government. But the results of the project could build a basis for some regulatory measures.

However, each interested retailer should define individual challenges for itself as supply chains may be built up very differently. According to experts a close look should be taken at customer base, logistics and IT, and costs to set up and run an RSP system to evaluate whether RSP represents a worthwhile investment compared to DSP. Experts recommend retailers to test RSP on a smaller scale and to expand the test step by step.

RQ3: What is the future potential of RSP for fashion products?

In existing literature, the main purpose for the usage and the testing of reusable packaging is its ecological advantageousness over disposable packaging. If no remarkable savings in emissions and waste can be achieved, reusable shipping packaging will most likely not be used due to previously analyzed barriers.[300]

At present, online retailers bear great risks on their side when introducing RSP, such as complex system adaptations, potential customer loss and high investments for the introduction of reverse logistic activities. If it cannot be ensured that 90% of the RSPs are returned in the long term, it would not be reasonable to take these risks.

It is therefore essential for online retailers to find out which return option is the most convenient for consumers and how to make RSP more attractive. The customer can be highlighted as the most central element for the success of the failure RSP solutions.[301] The first results concerning the return behavior of customers were quite promising. But as research about reuse behavior for e-commerce packaging is very limited, comprehensive findings are not yet available.

Commitment and cooperation of politics, retailers and other stakeholders can support the further development of intelligent return systems, consumer acceptance and the standardization of reusable shipping packaging. An introduction at large scale is needed to reduce the costs of a comprehensive return system in the long term.

From an environmental perspective the idea of RSP for fashion products in online trade can be considered as sensible and necessary, but its realization requires the engagement and the rethinking of an entire industry. It can therefore be stated that the establishment of reusable shipping packaging for fashion articles in Germany is still in its infancy. More research is needed for its further development. Only if RSP offers an advantage for each involved party it will establish itself on the German market within the future.

[300] Cf. Expert G (2020), s. Appendix 5, l. 150 ff.

[301] Cf. Zimmermann & Bliklen (2020), p. 182.

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Declaration

I herewith declare that I have completed the present thesis by myself and without the use of any aids other than those listed. All passages that were taken either directly or mutatis mutandis from published and non-published sources, have been marked as such. The thesis has never been submitted to a different examination authority in the same or a similar form.

Köln, 04.01.2021 [redacted]

(Location and date) *(Signature of the author)*

Abstract

Single-use e-commerce packaging from fashion products makes up a great percentage of the yearly disposed household waste in Germany. This bachelor thesis analyses barriers and opportunities of reusable shipping packaging as an alternative to reduce packaging waste from fashion sold online. Therefore, differences between disposable and reusable shipping packaging for clothes are pointed out at first. The existing market for reusable shipping packaging is described. Afterwards, opportunities and barriers are analysed and measures on how to reduce existing barriers are presented. Strengths and weaknesses of these measures were determined. A final evaluation of the results draws conclusions on the expected future development for reusable shipping packaging for fashion products in e-commerce.

Digital Appendix

Appendix 1 – Questionnaire Expert Interviews

Appendix 2 – Transcript 1: Interview Expert A

Appendix 3 – Transcript 2: Interview Expert B

Appendix 4 – Transcript 3: Workshop about reusable shipping packaging (Expert A, C, D, E, F and students A, B and Naomi Ternes)

Appendix 5 – Transcript 4: Interview Expert G

Appendix 6 – Transcript 5: Interview Expert H

Appendix 7 – Transcript 6: Additional questions Expert A

Appendix 8 – Transcript 7: Questions Expert E