Practices and trade-offs in the logistics of online retail

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1 Background

Selling through the internet has become more important for retailers. Nowadays, retailers have to adapt their organization to fulfill customers' expectations by delivering goods and services through multiple channels. Selling through multiple channels started more than a century ago (Fernie & Sparks, 2004). ''Multichannel retailing is the set of activities involved in selling merchandise or services to consumers through more than one channel'' (Levy, 2009). Catalogues, Telsell commercials, (Tupperware)-parties with friends and family, or door-to-door selling are well-known examples of non-store sales techniques. These *low-tech* forms of selling have accounted for around 5% of all retail sales in the UK and the USA for many years; however, this was expected to change when the *high-tech* would be developed (Fernie & Sparks, 2004). In the 1990s and early 2000s, the concerns of internet security and initial difficulties in navigating websites distracted customers from online shopping. Traditional retailers slowly introduced and improved the online sales channel, and its concerns by the customers. Traditional retailers were afraid of cannibalization effects in the traditional chain, and the conservative attitude of those retailers led to a slow development of e-retail (Fernie, Sparks, & McKinnon, 2010). In contrast, usage of the internet has increased significantly in the twenty-first century, that led to increasing online sales.

Online retail expands fast nowadays, because many new retailers have entered the market and started to invest in electronic grocery shopping systems (Daghar, 1998). Forrester research Inc. (2014) expects, that the US online retail accounts for 8% ($263 billion) of total retail market in 2013, will expand to 11% ($414 billion) of the total retail market in 2018. The European market expects an expansion from €112 billion in 2012 to €191 billion by 2017 (Indvik, 2013). E-retail has been expanding in other important economies such as China, India and South America as well (Research, 2014).

Multichannel retail is more complex and challenging than traditional retail, because they have more to manage. Multichannel retailers manage a large number of different products throughout the supply chain. They are responsible for the whole logistic process of packing, selling and delivering of all products to their end users through multiple channels (Zhang *et al.,* 2010).

Besides multichannel retailers, several online retailers have entered the e-market. These pure players in the online shopping market are retailers that do not have an up-front store presence and sell products only via the internet (Boyer, 2001). Most of these pure players have survived by takeovers or partnering with traditional retailers. For example, Amazon and Ahold both took over the two large US online grocers Webvan and Peopod respectively (Kämäräinen & Punakivi, 2002) Pure players do not have an up-front store location, brand names and a large customer base compared to the multichannel retailers (Geunes *et al.,* 2005).

Although online retail has been a rapidly growing market for the last couple of years, it has serious difficulties in being profitable and operationally efficient. *The last mile*, the distribution from the warehouse to the consumers' home, and order picking have been a real challenge for online retailers (Kämäräinen & Punakivi, 2002). Both order picking and home delivery are two new operations for online retailers. E-retailers developed various types of order picking and online distribution models. Most online retailers pick orders whether from a store or from a distribution center. The three types of online distribution are: pick-up from a store, pick-up from distribution center or home delivery (Kämäräinen & Punakivi, 2002). Some retailers chose to outsource to a third party while others prefer to do it themselves (Geunes *et al.,* 2005). Retailers have the choice whether to implement an automated

fulfillment system or to use personnel for order picking and home fulfillment. Product returns are also a complex practice of the online supply chain.

1.1 Related literature

Although many retailers are struggling with the choices in the logistics of the online channel, little literature is available about these trade-offs. The logistics of the online retail have been established during the last two decades. Much research focuses on the consumer behavior of online shopping, while the logistical characteristics and the problems of online retail have had little attention. Collectively, these studies outline the critical role for efficient order picking and home delivery: Fernie and Sparks (2004), Agatz *et al.* (2008), Geunes *et al.* (2005), and Metters and Walton (2007). Kämäräinen and Punakivi (2002) and Yrjölä (2001) mainly describe the cost structures of online fulfillment. R. B. M. de Koster (2002) focuses on the efficiencies of order picking at warehouses and in-stores. The logistics of the online channel is still dynamic and emerging, which is seen in the changing literature over the years. For example, Tesco nowadays invests much more in warehouse order picking while in-store order picking was the initial online fulfillment type. A large and growing body of literature has investigated the logistics of home delivery. Only literature by Colla and Lapoule (2012); Mahar, Salzarulo, and Daniel Wright (2012) focus on the efficiency of the pick-up points. Ofek, Katona, and Sarvary (2011) highlight that product returns are another main cost driver in online fulfillment.

The trade-offs in the logistics of online retail is not widely described, resulting in a need for better information about best decisions within this field. Therefore, the aim of this paper is to review the current practices and trade-offs in logistics in online retail by focusing on both home delivery and pick-up points. More specifically, the trade-offs are subdivided into three tradeoffs. These trade-offs seeks to find out the right balance between *investments and operational cost, scalability and cost*, and *service level and cost*.

The research question is:

- What are the current practices and trade-offs in logistics in online retail, by focusing on both home delivery and pick-up points?

The structure of the thesis, including the sub-questions, is as follows:

- What kind of logistic concepts are used in the retail supply chain?
- What are the logistic characteristics of the online channel?
- What conclusions can be drawn from the tradeoffs regarding the logistic characteristics?

The first part will expose various current concepts in retail exchanges. It emphasizes and explains the use of efficient consumer response in the retail industry. Secondly, the characteristics of the new practices in supply chain management will be discussed. Home delivery and pick-up points entail new practices within the field of order picking and delivery options. The addition of new channels to the retail structure has led to adaptations to the current retail structure. The last part focuses on the trade-offs that retailers are facing. This chapter points out the right balances between *investments and operational cost, scalability and cost*, and *service level and cost*.

2 What kind of logistic concepts are used in the retail supply chain?

Supply chain management in the retail industry has been through an enormous change during the last decades. In the meanwhile, the economy has become more globalized which has led to that goods and services have to be shipped over greater distances than before (Sparks & Wagner, 2003). The retail activity changed from a small 'local economy' to a global economy. Retailers always seek to improve their management practices in order to enhance service and reduce cost. Some retailers are more collaborative with their partners rather than only transactionally focused (Dawson & Shaw, 1990). In general, however, the purpose of every retailer is to improve customer service and to reduce cost. A couple of new concepts have developed in the retail industry in order to meet those expectations (Sparks & Wagner, 2003). Examples of those concepts are *quick response* (QR), *efficient consumer response*, and *collaborative planning, forecasting and replenishment* (CPFR) (Sparks & Wagner, 2003).

These concepts are all based on the *just in time* (JIT) principle, which intends that suppliers produce and deliver precisely the necessary units in the necessary quantities at the necessary time, with the objective that products produced by the supplier conform to performance specifications every time (Hayes, 1981). Kurt Salmon Associates (KSA) recognized various failures in the fashion supply chain in 1985 (Fernie, 1994). This textile and apparel industries initiative was called quick response, which attempted to reduce the amount of inventory in the supply chain (Harris, Swatman, & Kurnia, 1999). The grocery industry recognized the supply chain inefficiencies and proposed a similar stock replenishment system, called ECR (Fiorito *et al.,* 1995). Figure 1 displays the physical flow of goods, data and money, and how ECR improves the data exchange between the supplier and the retailer. CPFR is based on a combination of the above concepts, but mainly arose from ECR (Fliedner, 2003). CPFR coordinates the various activities such as production and supply planning, demand, forecasting, and inventory replenishment between supply chain partners (Fliedner, 2003). The CPFR concept is applicable to any industry, however it is focused on food, apparel and general products (Fliedner, 2003). Briefly, ECR and QR focus on the collaboration between partners for reordering and replenishment proposes, while CPFR consist of more complex activities such as planning forecasting and replenishment (Wang, 2008). In this paper efficient consumer response will have the main focus.

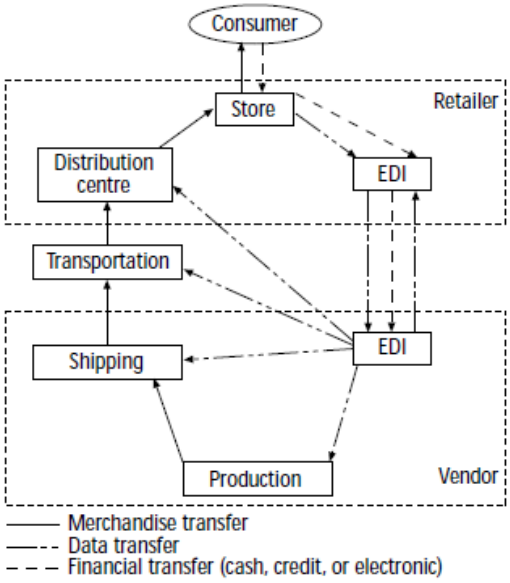

Figure 1; ECR improvements (Fiorito, May, & Straughn, 1995).

2.1 Efficient consumer response

Efficient consumer response is a grocery industry supply chain management strategy endeavor at eliminating inefficiencies, and non-value added cost within the supply, and therefore fulfill a better service to consumers (Sherah Kurnia, Swatman, & Schauder, 1998). ECR tries to recreate the grocery supply chain from a push system, whereby manufactures push their products into stores, towards a pull system, whereby products are pulled from the manufactures to the end consumers (Associates & Council, 1993). The main problem was that in most transactions the manufacturers would like to sell as

many products for the highest price, while the retailers want to buy as little products for the lowest price (Sherah Kurnia *et al.,* 1998). ECR is the step in the right direction to solve this conflict. The main proposition of ECR is to produce a responsive, consumer-driven system in where distributors and suppliers work together in order to maximize consumer satisfaction and minimize cost (Associates & Council, 1993). ECR uses electronic commerce, or more specific electronic data interchange (EDI), to improve both the relationships between companies and the communication between them (Sherah Kurnia *et al.,* 1998).

2.1.1 Strategies of ECR

ECR attempts to make the supply chain more efficient by eliminating the inefficiencies in the area of store assortment, product development/introduction, product replenishment, and promotion (Sherah Kurnia & Johnston, 2003). These four strategies are mainly supported by category management (CM) and continuous replenishment program (CRP) (Sherah Kurnia & Johnston, 2003).

The goal of the efficient store assortment initiative is to optimize the productivity of inventory and shelf management in the store (Harris *et al.,* 1999). Optimal allocation of the goods in a supermarket maximizes consumer satisfaction by delivering the best products and service while every square meter of the store is used efficiently (Harris *et al.,* 1999). Efficient store assortment is applicable to pick-up locations by the optimization of the inventory capability of the pick-up goods. Especially when the time window of the customers' pick-up is large, the retailer will have much inventory and therefore efficient store assortment should be adapted to the pick-up design. To optimize the productivity of inventory, category management is needed (Sherah Kurnia *et al.,* 1998).

The efficient product introduction initiative aims to maximize the effect of new product development and introduction activities in order to reduce cost and failure rates during the introduction of new products (Sherah Kurnia *et al.,* 1998). This will be achieved by the involvement of producers, retailers and consumers in an early stage of the new product development process (Harris *et al.,* 1999). A cross-functional team will improve the quality of the product too. This initiative is also supported by category management (Sherah Kurnia *et al.,* 1998).

The objective of the efficient promotion initiative is to maximize the total system efficiency of trade and consumer promotions (Sherah Kurnia *et al.,* 1998). This could be reached by better promotion strategies such as *pay for performance forward commit* and *every day low price policy* (Harris *et al.,* 1999; Sherah Kurnia *et al.,* 1998). Pay for performance means that retailers are rewarded on the principle of how many products they sell to customers instead of how many they buy from the manufacturer (Harris *et al.,* 1999). Forward commit implies that retailers spread the actual shipment of one order over several deliveries, thus enjoying the benefits of lower price due to quantity discounts and lower cost due to lower inventory (Harris *et al.,* 1999). The everyday low price policy decreases the variations in the demand, thus this will minimize the bullwhip effect throughout the supply chain. Although distributors prefer a consistent flow of goods throughout the supply chain, tactical promotions are still really important in many retailers marketing strategies. A research by Hoch and Pomerantz (2002) shows that price sensitivity and promotional responsiveness is large in the grocery sector due to *staple* purchases. Therefore, reliable forecast is essential to reduce the insecurity of the promotional actions. This efficient promotion initiative aims to decrease non-value-added processes by the reevaluation of promotions, and therefore this initiative is supported by category management too (Sherah Kurnia *et al.,* 1998).

Efficient product replenishment aims to optimize time and cost in the replenishment system by the provision of the right product to the right place at the right time in the right quantity and in the most efficient way possible (Sherah Kurnia *et al.,* 1998). It tries to find the right balance of inventory and the service level to the customer. Efficient product replenishment is an essential part within ECR, because it consists of more than half of the total savings in ECR (Harris *et al.,* 1999). In order to decrease inefficiencies, a continuous replenishment program (CRP) approach is needed (Sherah Kurnia *et al.,* 1998).

2.1.2 Activities

2.1.2.1 Category management (CM)

The four strategies in ECR, described above, are supported by category management, continuous replenishment program and various other activities and technologies. Category management is defined by information advantage (1996) as ''an interactive business process whereby retailers and manufacturers work together in mutual cooperation to manage categories as strategic business units within each store''. A category is a group of products that can be substituted by consumers e.g. frozen foods, dairy products and alcoholic beverages. Category management facilitates identification and implementation of an optimal product mix, thus making it easier to replenish each store with the products the customer wants to purchase (Harris *et al.,* 1999). Category management is supported by electronic data interchange (EDI), barcodes and scanners (Sherah Kurnia *et al.,* 1998).

2.1.2.2 Continuous replenishment program (CRP)

Continuous replenishment program is defined as ''the practice of partnering among distribution channel members that changes the traditional replenishment process from distributor-generated purchase order to one based on actual or forecast consumer demand '' (Thayer, 1995). CPR transfer the responsibility from retailers to suppliers which is also known as *vendor managed inventory* (VMI) (Sherah Kurnia *et al.,* 1998). Orders are sent electronically and are made more frequently in smaller quantities (Sherah Kurnia *et al.,* 1998). This will lead to smaller cost in distributers' and retailers' inventory, but could increase the cost of transportation if the distributers ship smaller truck loads more often (Garry, 1994). The continuous replenishment program will be a challenging program for the multichannel retailers, since they have to manage multiple channels.

2.1.2.3 (Integrated) Electronic data interchange (EDI)

EDI is a communication application that allows structured information to be shared with multiple organizations in the supply chain resulting in reductions in transaction cost, and it makes it possible for the organization to implement new business strategies (Emmelhainz, 1989). EDI exchanges invoices, purchase orders and advanced shipping notice (ASN) – a message that interchanges the arrival of pallets at their final point (Sherah Kurnia *et al.,* 1998). ECR and CPFR highly increase the total volume of information transmitted on daily basis (Doukidis & Pramatari, 2007). EDI has been one of the key enabling technologies facilitating the continuous replenishment program. EDI is expensive and complicated compared to newer technologies, and limiting in the type of information to be shared between partners (Doukidis & Pramatari, 2007). Therefore, the retail sector is increasingly focusing on newer types of electronic information exchanges. Those newer technologies make it possible for both the supplier and buyer to have access to many suppliers and buyers. It makes fast communication possible and facilitates the progress in planning, deployment of transport fleets, warehouse management and procurement procedures (Doukidis & Pramatari, 2007). These technologies are

important for multichannel retailers, since they have more channels to manage. The assortment width that multichannel retailers have is larger compared to traditional retailers, and thus they have more information to share with more partners.

2.1.2.4 Computer-aided ordering (CAO)

''Computer aided ordering is a retail based system that automatically generates order for replenishment when the inventory level drops below a pre-determined reorder level''(ECR-Central, 1997). The goal of CAO is to fulfil store replenishment automatically based on historical point of sale (PoS) data, delivery data and sales forecast (Harris *et al.,* 1999). The re-order is based on the actual inventory amount and the ideal inventory amount (Harris *et al.,* 1999).

2.1.2.5 Cross-docking

The aim of cross docking is to smoothen the flow of products from the distributor to the retail store by reducing storage and handling of products throughout the complete supply chain (Garry, 1994). This involves the share out of complete pallets at the distribution center into small quantities for the retail outlet without even store it in the distribution center (Harris *et al.,* 1999). This requires enabling technologies such as EDI, barcoding, scanning or even RFID of pallets or single boxes, and a warehouse design which is completely adapted to cross docking (Harris *et al.,* 1999). It is essential to have a well-integrated EDI system, especially for the advanced shipping notice (ASN) – to inform the distributor that the ordered goods are arrived.

2.1.2.6 Activity based costing (ABC)

Activity based costing is a costing tool whereby the cost will be allocated on the activity on what really affects that cost (Sherah Kurnia *et al.,* 1998). Traditional costing methods are based on the principle of gross margin calculation that spread operating cost across all products based on unit purchase price regardless of the used value (Porter, 1985). ABC shows a better understanding of where the profits and costs are being made and tries to control these costs rather than simply cut budgets (Harris *et al.,* 1999). Activity based costing can therefore be seen as part of ECR, because it could increase the profitability of the supply chain by reducing the cost that do not add value to the products (Harris *et al.,* 1999).

2.2 ERC implementation

Despite the many benefits of ECR, the adaptation and implementation to ECR has been slow rather than fast (Associates & Council, 1993). Many retailers are struggling, because the existing adoption model inadequately handle the complexity of the exchange systems (Damsgaard, 1998; SJRB Kurnia & Johnston, 2000). Differences in cost, benefits and risks are experienced as important drivers for the type of adoption (SJRB Kurnia & Johnston, 2000). A survey by Kurnia and Johnston (2003) revealed the reasons for failure in ECR implementation.

The main observations are that there is a lack of understanding of ECR; both parties have different interests; both parties lack in cooperation and trust; the retailers lead the ERC implementation; the retailers are more powerful; and the retailers experience more benefits than the manufactures (Sherah Kurnia & Johnston, 2003). In order to improve the ECR initiative, both companies must be willing to work collaboratively by changing company culture, tradition and business practice. Both companies have to change their partnership from a win/lose relationship to a win/win relationship (Sherah Kurnia & Johnston, 2003). The supply and demand relationship must be transformed from a traditional organizational structure to a multi-functional team structure (Fernie & Sparks, 2004). Figure 2

demonstrates the traditional and the multifunctional relationship. In the traditional structure only the buyer and the sales manager (key account manager) are involved in development and buying decisions. The various departments of two companies work together with the multi-functional structure. During the implementation of a joint exchange plan, it is essential to have a close working relationship in which both parties should invest time and money in order to develop joint plans and better forecasts (Fernie, 1997). This results to a better understanding of each other's needs, leading to better efficiency through collaboration.

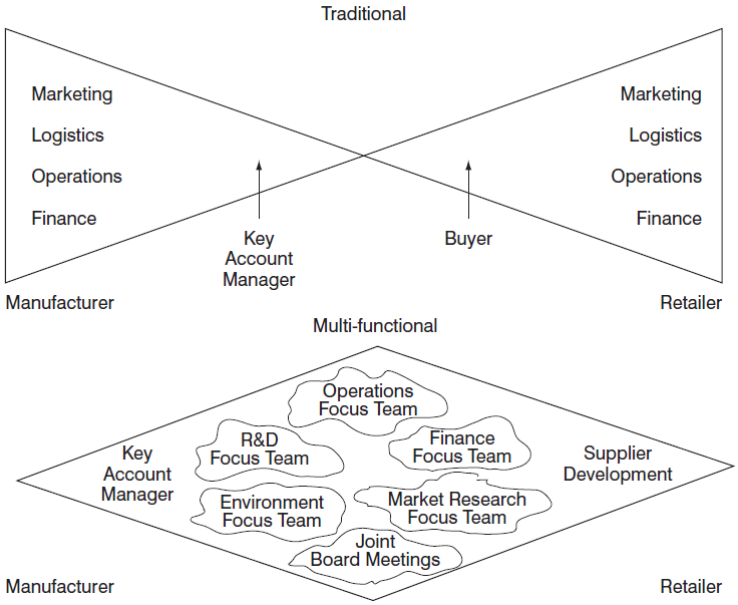

Figure 2: The change of relationships between manufacturer and retailer (Fernie, 1997).

Summarizing, several logistics concepts have been developed in the retail industry. These concepts are based on the eliminating the inefficiencies throughout the chain, which results in cost reductions. Efficient consumer response focuses on four inefficiencies, namely store assortment, product development, product replenishment, and promotion. ECR is supported by category management and continuous replenishment program. It also use an electronic data interchange that communicate that exchange invoices, purchase orders and many other relevant information from the retailer to the supplier and vice versa. Interaction between supply chain partners is essential to solve inefficiencies and to optimize the supply chain in order to provide the best quality for the lowest cost to the customer.

3 What are the logistic characteristics of the online channel?

E-commerce channels are relatively new and challenging for retailers. They have established their e-commerce channel, and are seeking for improvements nowadays. Retailers came with many different forms of operating, each with their own pros and cons. The literature of the current practices and the accompanying characteristics has been increasingly discussed the last decade. This part reviews the various types of retailers involved in e-commerce, and the various characteristics within the field of order picking, and order delivery. The possibilities and development of insourcing or outsourcing within e-retail will be argued. Lastly, the effect on the traditional channel will be discussed. The figure below (3) illustrates the new online channel in which the customer has the possibilities to use attended and unattended delivery (direct delivery and delivery box system respectively) or to use the pick-up points.

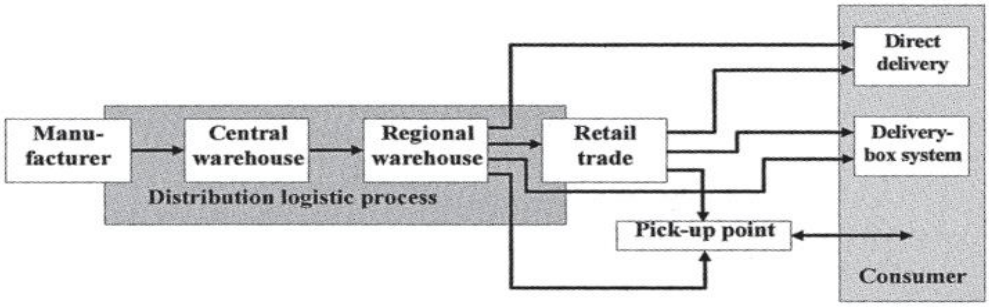

Figure 3: Basic structure of the online retail supply chain (Fleischmann, Klose, Daduna, & Lenz, 2005).

3.1 Type of e-retailer

As briefly discussed in the introduction, the three types of retailers have a different the supply chain design and structure. In the traditional system the flow of goods are going through the distribution centers to the retail outlets. Traditionally, customers themselves order the products that they want and transport them to their homes. A large group of customers still prefers this manner of buying their products from a retail store. Especially with groceries, because customers would like to see, smell, taste or squeeze the fruits and vegetables (Geunes *et al.,* 2005). Sometimes customers would like to have personal information about certain products, particularly from expensive and credence goods (such as laptops, cars, and medication). At the moment, it is increasingly common to buy these types of products via the online channel from pure online players and multichannel retailers.

Pure online players within the e-commerce are retailers that do not have an up-front store presence and sell products only via the internet (Boyer, 2001). Geunes *et al.* (2005) discuss four reasons why these pure e-retailers/grocers have several advantages over the traditional retail model and the multichannel retailers. First of all, pure online players do not have the high cost associated with property. Secondly, the sole presence and ownership of the online channel makes it much easier to manage inventory, resulting in lower inventory costs, and increased inventory rates. Thirdly, pure online players collect detailed information about customers' shopping behavior, because the shopping behavior is easier to collect in the online channel. The fourth benefit that Geunes *et al.* (2005) describe is that pure players profit form more impulse selling in the growing online market. The online retail channel has the advantage that its product assortment is very wide-ranging compared to the small assortment in the traditional chain due to high cost of inventory of the local store (Metters & Walton, 2007).

Disadvantages of pure-players are that they do not have up front locations, brand names, and a large customers base (Geunes *et al.,* 2005). These drawbacks have been overcome by large pure players such as Amazon and Zalando, world's largest e-retailer and Europe's largest online apparel retailer respectively (Mac, 2014). Amazon and Zalando highly promoted their companies to develop their goodwill and brand names. Some pure players copied the Amazon's strategy of investing much capital, but ended up bankrupt due to the high investments cost. Many current events indicate that survival is almost impossible for e-grocers without a physical presence (Geunes *et al.,* 2005). Various partnerships between traditional retailers exist within the pure online player industry. Partnerships between the traditional retailers and pure players creates a strong collaboration that minimize the weaknesses of both types of models (Geunes *et al.,* 2005). Therefore, many pure players found ways of collaborating with traditional retailers.

Traditional retailers have been slow in adapting to a multichannel strategy. The observed success of pure players and other multichannel retailers changed the mind of many traditional retailers (Geunes *et al.,* 2005). Multichannel retailers are retailers involved in selling their goods to consumers through more than one channel (Levy, 2009). For example a retailer with a combination of catalogue and online selling is a multichannel retailer. The combination of the traditional channel and the online channel is the primary focus of our study within multichannel retailers.

In many cases, the multichannel retailers use their existing distribution network for online order fulfillment as much as possible (Vanelslander *et al.,* 2013). Multichannel retailers gain benefits from the purchasing power of economies of scale due to the presence in both the offline and online market. Advantages of these retailers are that they already have locations, well-known brand names, and a large customer base (Geunes *et al.,* 2005). The multichannel retailers offer their customers the opportunities to choose between different channels. An additional advantage is that customers are able to return a product via a physical store or by mail (Metters & Walton, 2007).

3.1.1 Assortment

Each retailer has its own assortment based strategy, involving various activities and cost. For example, a huge assortment width led to a large warehouse, resulting in more investment cost, and complexity in warehouse management. Complexity also increases when many different store systems are used, since each storage system needs its own material handling systems, storage and retrieval strategies (R. B. M. de Koster, 2002). Operational complexity refers to the internal organizational complexity of the warehouse and distribution operations (R. B. M. de Koster, 2002). R. B. M. de Koster (2002) expresses that there is a relationship between organizational complexity and the:

1. The assortment width
2. The number of orders
3. The assortment type or product characteristics

Firstly, the assortment width increases the organizational complexity. The assortment width is the number of different individual products offered to the customer by the retailer (R. B. M. de Koster, 2002). An assortment width of 100.000 products is simply more complicated to manage compared to an assortment width of 10.000 products. The number of orders per week is the second factor of organizational complexity. A retailer would prefer few orders with a large quantity rather than many orders with a small quantity. The third cause of complexity is the type of product. This issue in the e-retail supply chain is somewhat more complicated, thus need some more extensive clarification. The

different types of products will first be enlightened. The three types of goods described by Holton (1958) are:

- Convenience goods; such as food, water, medicines
- Shopping goods (also known as occasional goods) such as clothing and shoes
- Specialized goods (high quality, long lasting goods) such as furniture or electronic devices

The greatest challenges of home delivery distribution are with companies that provide convenience goods. Convenience goods are the most complex in terms of storage and distribution, due to the quality requirements. The variations in temperature and protection requirements differ highly within this type of good. When the assortment contains more complex products, such as frozen, fresh or vulnerable products (fruit, crisps and vegetables), it becomes more difficult to transport these types of products over long distances without quality losses (R. B. M. de Koster, 2002). For example, Tesco pick 250.000 orders each week which consist of 60 to 80 items across three temperature regimes from a total range of 10.000-25.000 products within 12-24 hours every day within one to two hour time-slots (Fernie *et al.,* 2010). This causes huge complexities in distribution and order picking. Online shopping for non-grocery products, like shopping goods and specialized goods, are less complex in term of quality requirements of the product. Many of those non-grocery retailers have practiced small order fulfillment due to the experience in catalogue mail orders (Fernie *et al.,* 2010).

Retailers selling luxury specialized goods and provide high level of personal services may choose to stay away from the online channel. These retailers are concerned about the negative impact on their brand image and the insecurities of online channel (Zhang *et al.,* 2010). Tiffany's, a jeweler offers relatively inexpensive jewelry items on their website, but sells their expensive items only via the store channel (Zhang *et al.,* 2010). Tiffany's chose to use its website solely for customer information of expensive items. The customer must come to the store to buy the product. Tiffany's provides these customers personal assistance at the store, resulting in a satisfactory shopping experience (Zhang *et al.,* 2010). Other products that are commonly not sold and delivered via the online channel are expensive products such as cars.

3.2 Order picking

One of the major logistical difficulties of the e-retailer is the activity of order picking. Order picking is ''the process of clustering and scheduling the customer orders, assigning stock on locations to order lines, releasing orders to the floor picking the articles from stage locations and the disposal of the picked articles''(R. de Koster et al., 2007). From an e-retailer standpoint, order picking, home delivery, and the pick-up service are three new operations compared to traditional retailers. The online retailer is involved with the most expensive and complex parts of the supply chain, namely order picking of small orders, packing the products for distribution and for home delivery (R. B. M. de Koster, 2002). Many authors describe the different manners of order picking (Agatz, Fleischmann, & van Nunen, 2008; Colla & Lapoule, 2012; R. de Koster et al., 2007; R. B. M. de Koster, 2002; Geunes et al., 2005; Kämäräinen & Punakivi, 2002). In general, the two order picking places for the fulfilment of online orders are from the local stores and the (internet only) warehouses.

3.2.1 In-store

The shift of traditional retailers entering the online channel is increasingly popular. Many traditional retailers are seeking ways to enter the market as quickly as possible. They want become a dominant

market player by enjoying the advantages of being a large e-retailer. Some retailers pick orders for their online shoppers from their own store, for example the grocers Tesco and Safeway. Several studies have argued that store base order picking is more common in the early stages of the entry to the online market, because it represents a low risk strategy, and allows retailers to extend their market with relatively low investments (Fernie & Sparks, 2004)

Tesco's fulfilment strategy uses its own network of the nearly 700 stores in the United Kingdom (Geunes *et al.,* 2005). Tesco has special employees picking the items for the online grocery shoppers from the selves of local supermarkets. After the order has been picked, the groceries will be sent by a dedicated teams of drivers who deliver their products to the final customers (Geunes *et al.,* 2005). Tesco uses for the assembly of the online orders trolleys with screen guides and instructions that instruct them where to pick the items on the list (Sandoval, 2002). Tesco is able to implement the online grocery model faster with this order picking strategy than for example its rival Sainsbury who builds dedicated online distribution centers. This model facilitates the quick geographical expansion of Tesco. In-store picking allows retailers to improve their utilization of their existing operations, assets and resources too (Fernie & Sparks, 2004). Retail property can be used for more channels and staff could be shared for both the online and traditional channel (Fernie & Sparks, 2004).

Tesco's in-store picking model is very labor-intensive, resulting on higher order picking costs (Geunes *et al.,* 2005). The online shopper is in this case disadvantaged by not having the ability to get detailed information about product availability. Although a certain product might be available on the moment of purchase online, products could be sold out in the local store when the orders are picked (Fernie & Sparks, 2004). In this situation, online shoppers have to trust retailers on making suitable substitutions when stock outs occur. The customers can refuse the substitution when the products are delivered at the customers' door. The van driver takes the product back to the warehouse when the customer refuse the product, and the retailer will refund the cost of the product. The substitution rates of store fulfilment are significantly higher than for warehouse fulfilment. For example, Ocado, the only UK e-grocer that use solely an internet only order picking center has substitution rates of less than 5 per cent while grocers with store fulfilment achieve substitution rates of at least 10 per cent (Fernie & Sparks, 2004; McClellan, 2003).

Furthermore, when stores are very busy, such as in the weekends, the online orders are much higher, resulting in a less effective order picking and conflicts about stock outs and "*who may have the last product?*" (Geunes *et al.,* 2005). Order pickers could disturb ordinary customers while picking the online orders. This problem can be mitigated by order picking from less busy stores rather than the nearest stores (Geunes *et al.,* 2005). This situation is also different when stores have an adjacent inventory area. In this situation order picking could take place in the storage area instead of the store itself (R. B. M. de Koster, 2002). However, most retailers do not have such inventory areas adjacent outlets, due to the high cost or rent of store property. The implementation of quick response, ECR and CPFR practices limits the amount of inventory throughout the supply chain and thus in the stores as well (Fernie & Sparks, 2004). These new practices impede the retailer of the fulfilment of online orders. Not having enough inventory results in stock-outs for the local store. Retailers have to make substitutions for their online shoppers and the traditional shopper is hindered by the fact that the products are not available anymore. New replenishment systems that combine the online and offline shopping market into one replenishment system will solve this problem.

Order picking from a local store is not favored by de Koster (2002) as he describes that order picking is simply not a process where the supermarket has been designed for. The supermarket is designed to increase customers shopping time by storing popular fast moving products, such as bread, milk, meat, vegetables relatively far from each other, and by having aisles with a minimum possibility of making short cuts (R. B. M. de Koster, 2002). The store is relatively spacious compared to the distribution centers. In general, the products are stored in the shelves by product margin instead of unit turnover too (R. B. M. de Koster, 2002). The products with a high product margin on eye height and vice versa.

In conclusion, order picking from a store minimize investments, improves the utilization of existing assets and therefore makes this a method for rapid method with geographical extension for grocers. The efficiency of in-store picking is less effective, because the store is not made for online distribution.

3.2.2 Internet only warehouse

Another type of order fulfilment is from a special dedicated online warehouse, also known as a dotcom warehouse or internet only warehouse. An online distribution center is designed for picking many small customers' orders, which consequently goes directly into the different packaging types, and will be shipped to the customers. The amount investments of a warehouse with the accompanying automatization/ system investments are huge compared to in-store order picking. A special designed distribution center for internet customers is thus only an appropriate type of warehousing within a geographical location with adequate customers base. Appropriate information systems compatible for small internet orders are essential to streamline the process (R. de Koster *et al.,* 2007). Fast travel times from product to product can be achieved by using appropriate systems, such as carousels (Webvan), sorters, (Wehkamp) and case-flow racks (Albert Heijn)(R. B. M. de Koster, 2002).

It is obvious that pure online players use an internet warehouse, because they do not have stores or store warehouses. Multichannel retailers do have store warehouses, though, most of these retailers will not use these for their online customers. Order picking for online internet orders is not an efficient method within store distribution centers. These warehouses are typically designed for store fulfilment and consist of pallet racks, with long travel distances per order (R. B. M. de Koster, 2002). The orders of internet shoppers are small, and commonly contain many different individual products. Store distribution centers have information system, such as EDI, that are designed for store fulfilment, which are not yet compatible with internet orders (R. B. M. de Koster, 2002).

Amazon uses different warehouses per category of products. The warehouses are subdivided into replenishment, customer return, specialty items, grocery items, small-, large-, and non-sortable fulfilment warehouses (Formaspace, retrieved at oktober 20th). Each warehouse has its own category that is mostly based on transportation requirements. This involves a huge investment for Amazon, but reduces the handling cost of an online order.

Fast implementation of order picking via internet-only warehouses was not successful for all grocers. Somerfield and Asda both set up internet only distribution centers, and both closed some of them down within a couple of years (Fernie & Sparks, 2004). Nowadays they fulfil orders via in-store and internet only warehouses. Vulnerable products such as groceries require fast delivery due to the high expectations of quality on groceries. Therefore, these internet only distribution centers cannot be far away from final customers. The short shelf life of some products is another critical point. Traditionally, when over stocking occurs in a shop, consumer demand can be stimulated in a short time by price

reductions (Fernie & Sparks, 2004). This is achievable with in-store picking, but limited with dedicated warehouse fulfilment.

Retailers often combine the dedicated online distribution fulfilment in regions with a high density of demand, and in-store fulfilment for regions with low density of demand. A combination between both types of order picking brings several advantages, especially for the grocery industry. The in-store order picking has several advantages for the short term geographical extension, but for the longer term could this be too inefficient, rather than having a warehouse with shelf and aisles designed for the fastest picking and packing time. Therefore, when the online market is developed and the number of customers is adequate, an appropriate next step is to move to a more cost efficient type of order fulfilment warehouse (Geunes *et al.,* 2005). Once volumes have reached an adequate level in a specific geographical region, it is justified to invest in internet only distribution centers (Fernie & Sparks, 2004). Table 1 summaries and compares in-store and warehouse order picking.

Tabel 1: Overview of pros and cons of the in-store and warehouse fulfilment.

Fulfilment type	In-store	Warehouse
Picking type	Manual	Manual or automated
Distribution network	Decentralized	Centralized
Investment cost	Low/medium investments needed	High investments needed, especially when automated
Personnel cost	High	Medium or low if automated
Assortment width	Limited to store capacity: Small, medium	Limited to warehouse capacity: Large
Geographical expansion	Fast	Slow
Out of stocks	More than 10% (Fernie & Sparks, 2004)	Less than 5% (Fernie & Sparks, 2004)
Other drawbacks	Out-of-stocks are more likely Disturb other customers during picking	Longer delivery distances
Best suitable for	Low customers density regions when fast expansion is preferred (especially within the grocery industry)	High customers density regions

3.2.3 Automatization

Retailers implemented various types of automatization whereby some are completely automated while others partly (R. B. M. de Koster, 2002). For example, Webvan only picks from online distribution centers, resulting in a high speed of picking by investing heavily on automation. The main advantages of automation are the reduced labor requirement and cost savings (Kämäräinen & Punakivi, 2002).

De Koster (2007) distinguishes the different types of order picking systems differentiated by automation and human deployment (figure 4). The *picker-to-parts* method, where the picker walks or drives along the aisles to the pick items is the most common (R. de Koster *et al.,* 2007). The *parts-to-picker* system consist of automatic storage and retrieval systems, using aisle cranes that retrieve one or more unit loads and bring them to a pick position (R. de Koster *et al.,* 2007). The responsibilities of the order picker are to get the right quantity for the order. With the *put systems* the order picker retrieve the products first and then put them on a dedicated location or on a carrier, which is usually a bin (R. de Koster *et al.,* 2007). Instead of picking items when they are passed, a single unit is allocated. The put systems are mainly used in case a large number of customers' order lines have to be picked in a short time window (R. de Koster *et al.,* 2007). Automated and robots picking is only used in special cases, for example with

small and delicate items (R. de Koster *et al.,* 2007). For example, Albert Heijn invests in an automatic supermarket distribution center for non-perishables (Ahold, 2014). Tesco, the UK grocer who (used to) pick mostly in-store has already six internet only warehouses that have completely integrated fulfilment systems (Vanderlande, retrieved October 2014). The automatization development is going fast which results in more opportunities for the internet only warehouses in the future.

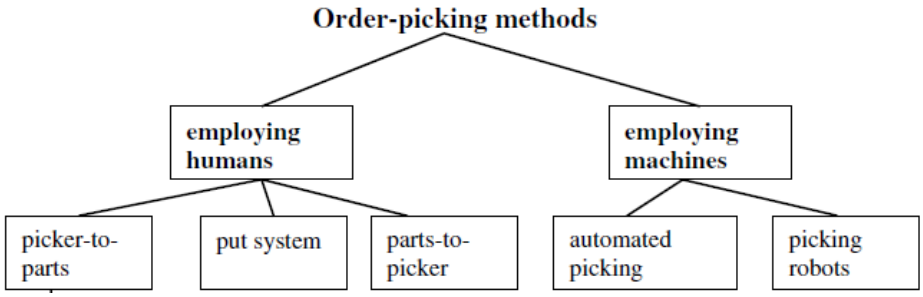

Figure 4: Overview of the different order picking methods (R. de Koster, Le-Duc, & Roodbergen, 2007).

3.3 Delivery options

Retailers must strike on an acceptable and profitable balance between customer convenience, distribution cost and security with the delivery option to the customers' home (Fernie & Sparks, 2004). There are two forms of delivery, namely home delivery and delivery via a pick-up point whereby the customer must pick-up their product at an agreed location. The practices within those two types are different among retailers and will be carefully (figure 5).

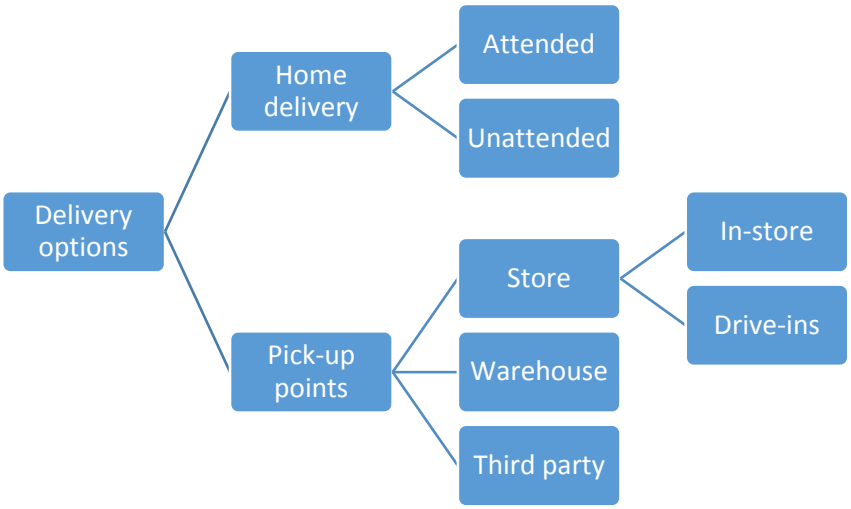

Figure 5: Overview of the various delivery options

3.3.1 Home delivery

Home delivery has already been practiced for many years by farmers who delivered fresh milk or vegetables to the customers. In the meanwhile, retailers established stores in where customers could choose between a wide variety of products. Home delivery of these small grocers have mostly disappeared because of the corner grocery store and the huge supermarkets or megastores that rapidly established (Geunes *et al.,* 2005). Nowadays, many groceries are developing methods to bring their

wide variety of products to the customers' homes. Shipments are delivered directly to the customers at an agreed location with this form of delivery (Fleischmann *et al.,* 2005). The most common type of home delivery within online grocery shopping is attended delivery, but unattended delivery offers many advantages too. Unattended delivery (mailbox delivery) is more common with non-grocery online shopping.

3.3.1.1 Attended delivery

Attended delivery, is as the name suggests, express delivery whereby the customers must be at home during the agreed upon time window to accept the delivery. Customers of online groceries, which offer attended home delivery, can normally choose for a specific time window when they want to receive their order (Geunes *et al.,* 2005). For e-grocers, who have their own delivery network, an important service is to align and meet these promised delivery time windows (Geunes *et al.,* 2005). This requires a system that dynamically assigns delivery time windows to customers when new orders arrive, and therefore van routes are adjusted constantly (Geunes *et al.,* 2005). The demand for certain popular time windows, the length of a time windows, travel uncertainties and other external factors complicates the task of an accurate delivery time (Geunes *et al.,* 2005). The aim is to minimize cost while maximize the van utilization. Most e-grocers offer home delivery when customers order their products at least one day before the scheduled delivery day (Geunes *et al.,* 2005). Some retailers are so flexible that they compete with the *same day delivery* when you order before 9 o'clock in the morning, such as safeway.com, AmazonFresh.com and Fairprice.

In order to maximize the utilization of the courier service, Albert Heijn proposes higher delivery prices during the peak hours, and when the time window is shorter. For example, the charge for a delivery to Wageningen ordered on Friday October 3th is €12.95 for delivery on Monday morning from 8.00-10.00, while it is €7.95 between 16.00-18.00. One will get the lowest price during bottom hours with a large time frame which is in this example on Monday from 19.00 till 21.00 for €6.95 (ah.nl). Albert Heijn requires a minimum sales value of €70 for home delivery to compensate the high cost of home delivery. With these price differences Albert Heijn tries to fulfil customers' orders within the agreed time window, while maximizing the van utilization and minimize unnecessary costs. To meet the high expectations of on-time delivery while keeping delivery cost low, these retailers need to use advanced techniques and information systems.

3.3.1.2 Unattended delivery

Unattended delivery is very common for e-retailers that sell products that fit into the mailbox such as books, music, movies and games. Those non-grocery retailers often deliver their products via a third logistics partner. The shopping goods that not fit into the mailbox will be delivered attended another time or are delivered to their neighbor. Unattended delivery is a delivery whereby the customer is independent of delivery timetables (Kämäräinen & Punakivi, 2002). The difference between attended delivery and unattended delivery is that retailers with unattended delivery do not let the customer choose for a specific time window. Most grocery retailers offer attended delivery with accompanying time window and cost. Unattended grocery delivery is complex because grocery products have certain shipping requirements, such as cooling.

According to Punakivi (2003) unattended delivery is the most cost efficient home delivery model, because it enables the optimal routing and scheduling of delivery vans. It is estimated that up to a third of delivery cost will be eliminated due to the time constraints savings (Punakivi, 2003). The reason for

this reduction is that delivery vehicles with attended delivery are driving back and forth, because of the promised delivery time windows. The two e-grocers Netgrocer and Peapod are offering unattended delivery, in where Netgrocers delivers only their non-perishables via FedEX. Peapod put the groceries packed with coolers in special secure location, and pick the coolers up with the next delivery (Geunes *et al.,* 2005). The example of Peopod is very low cost, increasing customers satisfaction due to the convenience of delivering unattended groceries (Geunes *et al.,* 2005).

This secure location is also known as reception or delivery box (Fernie & Sparks, 2004). A reception box is equipped with a refrigerator and freezer unit enabling compartments for frozen and chilled foods (Punakivi, 2003). A delivery box is a secured box that can be left on the customer's doorstep (Punakivi, 2003). The difference between these boxes is that a reception box is installed on a fixed location and a delivery box is portable. The home delivery box solves the problem when nobody is home to receive a certain order. It is an ideal solution for people who work during the day, and thus are not home during the delivery. The process of the reception box is simple: the courier follows the instructions of the reception box, and activates a lock, thereby preventing theft (Punakivi & Tanskanen, 2002). Although this method has several advantages, especially in cost and convenience, some shortcomings are concerned according to Geunes (2005). Firstly, apartment renters and owners cannot use this service, unless a receptionist will take the packages. Secondly, customers have to give up a part of their garden/garage or storage place. Thirdly, installation and other cost of delivery boxes are quite expensive for customers.

The reception box looks like an appropriate solution to delivery failures. In the UK 60% of the small package deliveries fail, because customers are not at home when a package is delivered (Kämäräinen & Punakivi, 2002). Unattended delivery appears to be a very appropriate solution, however, the reality is that the implementation is expensive and unlikely for both the e-retailers and the customers. The shared reception boxes are sometimes offered by companies (i.e. collection and delivery points, CDPs), improving the delivery efficiency (Kämäräinen & Punakivi, 2002). The cost that are involved range from zero up to around €3.50 per transaction for the final customers (Kämäräinen & Punakivi, 2002).

3.3.2 Outsourcing the last mile

The last mile delivery, the delivery form the retailers to the customers' home, is completed by the retailers' van delivery or by an outsourced parcel delivery. The cost of the last mile delivery by an owned van is in general very high due to the low amount of customers in a specific region. A wide variety in time windows and options for different times are common in this high customer service market, resulting in an even lower density per time window of a specific region. Therefore, the cost of attended transportation is very high in low customers density regions (Vanelslander *et al.,* 2013). The growth in e-commerce improves the cost effectiveness of van delivery, especially when the customers density has potential to grow and thus makes it less costly (Boyer, Prud'homme, & Chung, 2009).

Instead of having a dedicated fleet of vans, retailers could partner with parcel carriers. Parcel carriers use its already existing network to deliver the goods to the final destination for the last mile delivery (Vanelslander *et al.,* 2013). Examples of parcel distributors are DHL, UPS, Post NL etc.. Parcel distributors are more cost efficient within lower density areas compared to private distribution methods, resulting in a popular way of distribution within the online market (Vanelslander *et al.,* 2013). Disadvantage of parcel carriers is that they do not led the customers choose for a specific time window, and thus are limiting with attended delivery options (Vanelslander *et al.,* 2013). Most grocery e-retailers prefer to deliver their groceries by themselves due to the high transportation requirements of grocery products.

3.3.3 Pick-up Points

With so many different existing stores, outlets, and supermarkets, many multichannel retailers have developed a strategy where they combine both the online shopping experience and the convenience of spending less time in the physical store. Shipments are delivered to an agreed store, a so called pick-up point with this form of delivery (Kämäräinen & Punakivi, 2002). Customers get the best of both worlds by avoiding shipping charges and having the ease of saving time during online shopping (Colla & Lapoule, 2012).

A big advantage is that customers do not have to wait at home to accept the delivery. The goods are delivered only half the way with a pick up point, and the customer has to pick them up within a certain pick-up time window which is agreed upon between both parties (Punakivi & Tanskanen, 2002). The time window with non-grocery shopping is commonly multiple days, though many e-grocers have smaller time windows for pick-up points similar as with home delivery. For example, the pick-up points of Albert Heijn have a time window of one hour, and the extra cost for the pick-up service varies from €0.95 to €2.95, depending on the order size, and order pick-up time (AH.nl). Disadvantages of pick-up points is the extra drive to the shop, for which time and the related cost is paid by the customer themself (Fleischmann *et al.,* 2005). The distance from the customer to the pick-up point is a very convincing factor for the customer (Fleischmann *et al.,* 2005). A customer might prefer home delivery to a pick-up point due to the distance, or vice versa due to the high home delivery shipping costs. Many different retailers have created various forms of pick-up points. The three most common are the pick-up in-store, pick-up at a distribution center and a third party pick-up.

3.3.3.1 Store pick-up & warehouse pick-up

In-store pick-up is the most common of the three different forms of pick-up. Store pick-up can be subdivided into in-store pick-up, and drive-ins. The in-store pick-up model obligates the customer to get out of their car and to get their order at the cashier desk in the store. With the drive-in method customers have to drive to a special nearby parking lot and have to pick-up their order at a special section of a store, commonly with a dedicated entrance (Colla & Lapoule, 2012). Some drive-ins offer the service that retailer' personnel brings the order to the customers car which is comparable to the drive through model of McDonalds. Many companies (e.g. Best Buy, Sears, Albert Heijn) have those dedicated drive-ins within their existing stores only for their online customers (Colla & Lapoule, 2012). Pick-up customers have to be treated differently than ordinary customers, because this is another service process compared to offline customers who go to the store, pick their products and purchase them at the checkout (Colla & Lapoule, 2012). Online customers only drive to the store to get their order. These customers save a large part of the time needed compared to the offline shoppers, because the drive in outlet is closer to the customers and all the time one had to spend during picking in store.

Two fulfilment methods used by pick-up e-retailers are *site-to-store* and *immediate in-store pick-up* (Mahar *et al.,* 2012). The *site-to store* practice does not offer the customer an immediate in store pick-up, but sends the product form the distribution center to a local store for pick-up (Mahar *et al.,* 2012). The retailer enjoys the usage of the already existing supply network resulting in free or cheap shipment for the customer. This delivery lead time could take much longer than home delivery depending on the retailer, with sometimes 1 up to 10 days delivery days (Mahar *et al.,* 2012). On the other hand, the *immediate in-store pick-up* method uses the stores own stock (from the shelves or adjacent stock) to fulfil customers' orders (Mahar *et al.,* 2012). An advantage is that the products that have been purchased are available in sometimes less than half an hour depending on the retailer. This option offers shipping

savings, product availability and more customers satisfaction contrasted to the *site-to-store* practice (Mahar *et al.,* 2012).

Some retailers offer the option for customers to pick-up their order at the distribution center. For example, Best Buy offers warehouse pick-up for items, such as TVs, refrigerators and other major appliances. This option is less common than store pick-up.

3.3.3.2 Third party pick-up locations

Many online pure players and other retailers offer third party pick-ups these days. Examples are; Bol.com pick-up point at the Albert Heijn, Etos or Kiala stores; Tele2 pick-up points at the Dixons stores; and Peapod pick-up points at Stop&Shop. Collaborating with a third party is a perfect way to combine the best of both stores. The synergy between the two businesses is especially valuable in areas where land is expensive and the density of customers is high. Third party logistics decreases cost by delivery fulfilment of shared assets and location (Geunes *et al.,* 2005). Both companies can profit from their partners brand names and goodwill.

Geunes *et al.* (2005) expect that if the pick-up practice increases, the future expansion of third party pick-ups will enlarge. A perfect combination of third party pick-ups is with personalized locks (reception boxes) in parking lots, gas stations or public transport stations. This combination results in cost reductions for both companies, making it attractive for retailers to work together.

In conclusion, home delivery is a very convenient option for customers, but quickly becomes costly and difficult when shipping large or perishable items cool and safe to the customers. Other options that exist, such as pick-up points, appear to be a more cost effective, but less convenient choice.

3.4 Product returns

Product returns are especially a problem in the online retail, as the products have to travel the expensive and complicated last mile again, but then backwards (Vanelslander *et al.,* 2013). The problem with online shopping is that customers prefer to ''touch and feel'' the product to determine how well it fits their tastes and needs (Ofek *et al.,* 2011). It is hard to asses a product only from a small photograph on the internet, or to buy a product in where the decision making is solely based on the small or complicated described amount of information. In categories such as fashion apparel, jewelry, sporting goods artwork etc., many relevant attributes for decision making are difficult to communicate electronically (Ofek *et al.,* 2011).

It is great for consumers that most large online retailers offer free or cheap product returns. Products returns are not cheap for the retailer instead. Product returns do include substantial cost on retailers due to all the handling costs (Ofek *et al.,* 2011). Besides these handling cost, the retailer need to refurbish (could include ironing, cleaning, washing etc.) and restock (Ofek *et al.,* 2011). If the product is not suitable for online sales, the retailer has to sell the product to a third party for a salvage value, or destroy the product in extreme cases (Ofek *et al.,* 2011). The value of the product sold to a third party, is estimated at only 10%-20% of the original product value (Ofek *et al.,* 2011). According to Economist (2013) the cost of handling are between $6 and $18, and this is without the loss of product value. A recent study shows that while the product returns for traditional channel is estimated at 8.7% of the total retail sales, the rates for catalogue and e-commerce retailers are significantly higher, ranging from 18%-35% depending on the category and the customers' return cost (Ofek *et al.,* 2011). Some multichannel retailers offer customers to both pick-up, and return the products at the store. This policy

enhances customer convenience, and also provides the retailer the opportunity to cross-sell and up-sell during the visit (Zhang *et al.,* 2010).

Although accessible product returns increases the shopping volumes to multichannel retailers, it is still a complex and expensive part of the supply chain in where the best practices are still far behind (Zhang *et al.,* 2010). The prevention of product returns and improvements in the reverse supply chain have to decrease the operational cost.

3.5 The effect on the traditional channel

The importance of the online channel for retailers is growing rapidly. Traditional retailers have faced or are still facing the hard choice whether to implement a new channel or to stick with their old business model (Schoenbachler & Gordon, 2002). In the beginning, retailers that had much success with a specific channel are likely to be skeptical with a newer channel (Zhang *et al.,* 2010). Many traditional retailers are entering the online market, since they noticed the increased importance of the multichannel where products are offered through more than one channel. Some multichannel retailers assumed that 'more is better' and that the existence in the online channel means a growth in the customers base and the following profits (Schoenbachler & Gordon, 2002). While other retailers believe that the retail model is perfectly suited for the implementation of the extra online channel. In this part the effect of the introduction of the online channel on the traditional channel will be discussed.

3.5.1 Cannibalization effects

According to Forbes (2013) is the current physical retail in crises, because consumers are spending less time, and money in the physical stores. Consumers find researching and shopping on the web more convenient than in store shopping nowadays (Walker, 2013). This shifting in sales from one channel into another channel is called cannibalization (Zhang *et al.,* 2010). Research is not very elaborate of the effect of cannibalization within multichannel retailers. Many firms are afraid of cannibalization effects, and differences in prices and margins across channels (Zhang *et al.,* 2010). Findings by Dholakia *et al.* (2010) suggests that when a retailer adds a channel, customers add these channels for shopping instead of replacing their existing channels.

Colla and Lapoule (2012) did research among the French groceries. The increase of cannibalization due to the implementation of the drive-ins is between 10% and 30% according to the interviewed managers. The multichannel retailers only experienced cannibalization and conflicts in the development of multiple channels for a short period. The implementation of alternative channels, whether online or offline, creates long competitive advantage as the online channel results in an increased customer base and improved customer loyalty (Boehm, 2008).

Avery et al., (2012) studied the effect of opening of a physical store on the existing online channel. They found out that the retail store had an immediate short-term cannibalization effect of both the catalogue and online channels. The cannibalization effect was much stronger in the catalogue channel than in the online channel, due to the store's assortment and information availabilities in the stores compared to the catalogue channel (Avery *et al.,* 2012). In the longer term both channels profit from the presence in the physical retail sector, with sales increasing over time (Avery *et al.,* 2012). Although the existing customers did not buy as regularly via the online channel immediately after the store opening, many came back to the internet channel after some time (Avery *et al.,* 2012). The addition of the new channel also attracted new customers, which came back over time .

Many retailers have not launched their online channel with the same care and effort as with the traditional channel. Many e-commerce sites learned that the neglected online divisions were not long lasting. Outages, slow performance, content errors, and broken transactions were terrible for customer satisfaction (Schoenbachler & Gordon, 2002). Retailers improve the online channel by synergizing the multiple channels. The benefits of a multichannel strategy can take some time to develop (Zhang *et al.,* 2010).

Walker (2013) describes that the integration of various channels in the retail, known as *Omni channel retailing*, is a reason to survive the retail crisis. Retailers must look at their system landscape, operational approach and performance metrics and enable a strong synergy between the channel or even erode the notion of the channel (Erik Brynjolfsson, 2013).

Summarizing, the development of e-commerce is a growing and successful market. However, not all e-retailers became successful. Many retailers observed the success of pure players, entered the market and became multichannel retailers. After a shaky start many retailers have developed effective logistical systems (Fernie & Sparks, 2004). Many pure players started partnerships with traditional retailers to survive. E-retail has still presented many cost effective related challenges. Especially, challenges within order picking and home delivery appear to be major obstacles. Many different forms in order picking, home delivery and pick-up points have been established. In-store order picking seems to be the best solution in regions with few customers. Unattended home delivery is the most cost-efficient type of home delivery, but appears to be an unrealistic and too optimistic option for retailers. Some retailers have chosen to use parcel distributors while other use their own fleet. Product returns are one of the main cost drivers within the industry of taste and feel products. The addition of an extra channel has solely negative short term effects. Figure 6 summaries briefly the subjects that are discussed in this chapter.

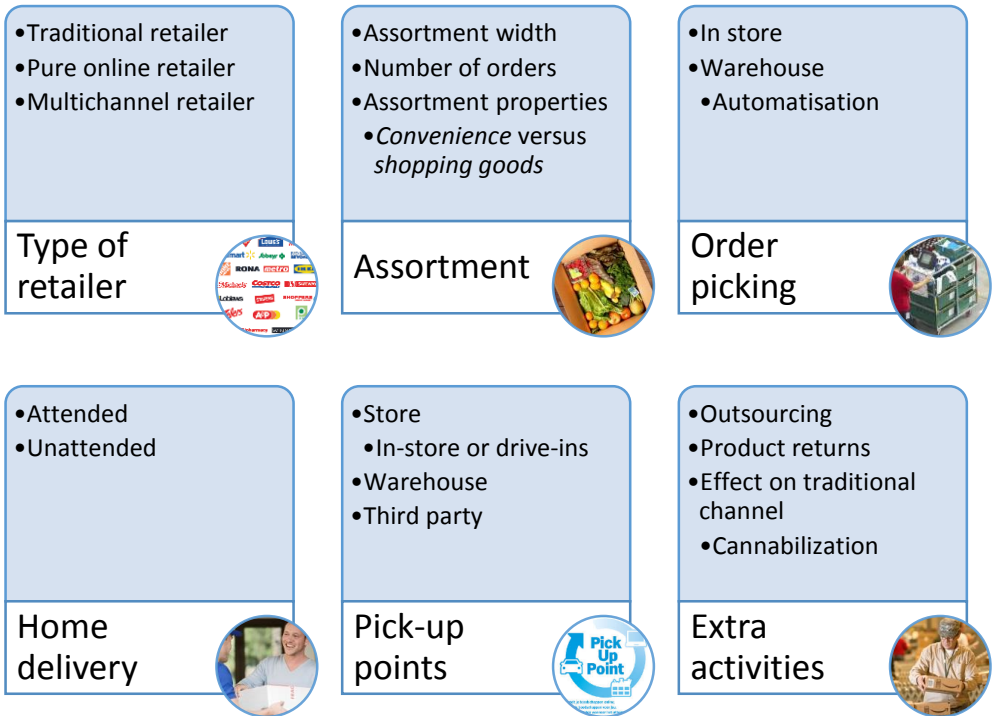

Figure 6: Overview of several characteristics of the logistics in online retail industry.

4 What conclusions can be drawn from the tradeoffs regarding the logistic characteristics?

The possibilities of the various forms of order fulfilment are very broad. Retailers are seeking for improvements of their online channel by reducing costs and improving efficiencies. The variety of options impedes the fast implementation of the best method. In this chapter various trade-offs will be discussed with the usage of the model from Vanelslander *et al.* (2013).

4.1 Framework

Vanelslander *et al.* (2013) seeks to find out the distribution of logistics cost throughout the supply chain from order picking to the customers' doorstep. They made a framework in where the inputs are the primary determinants that influence the logistics cost faced by the retailer. These inputs are listed according to the amount of control of the retailers. These inputs led to outputs, such as cost, investments and service quality. This framework is useful for solving the trade-off in investments, scalability and service level. One question that needs to be asked is whether the inputs and outputs are appointed correctly. Although Vanelslander *et al.* (2013) use the terms input and output, I rather prefer to express *inputs* as *condition* and *outputs* as *trade-offs* (figure 7). Most inputs are hard to change by the retailer, and therefore could be better described as conditions. These conditions cause an atmosphere in which the retailers have to make trade-offs. The choices are based on the conditions where the amount of control is at an adequate level, such as the delivery option, picking methods, and return policy. The conditions that are hard to change are not involved in the trade-offs. The trade-offs are subdivided into three categories: investment versus operational cost, scalability versus cost, and service level versus cost.

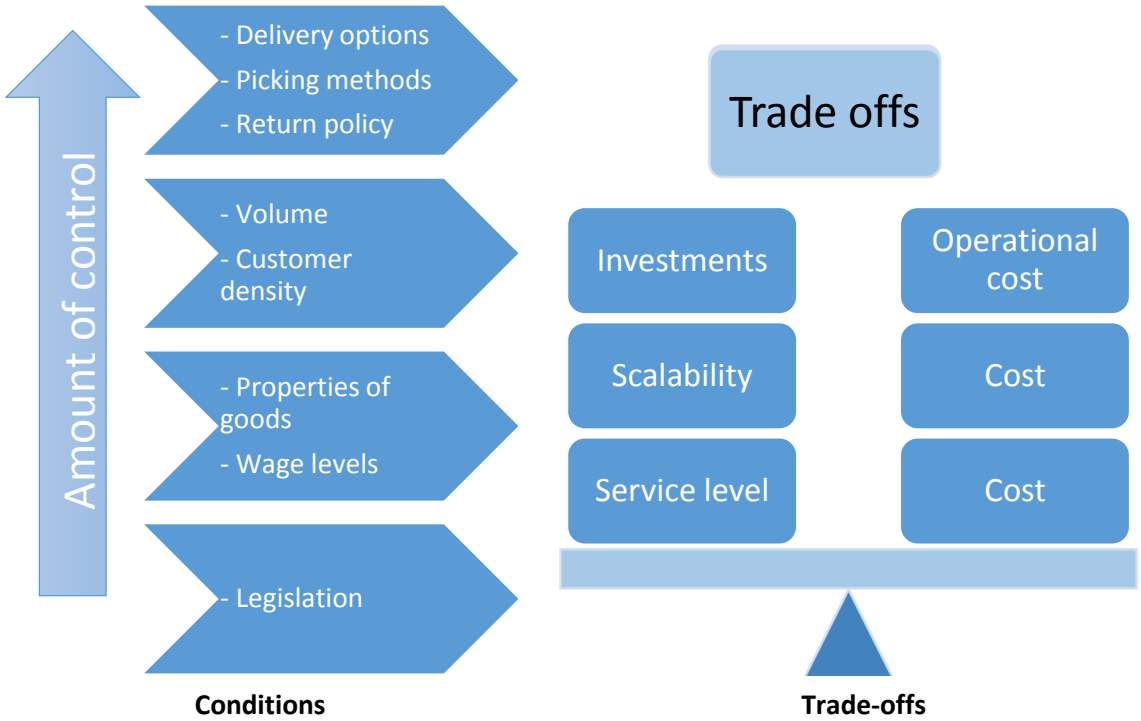

Figure 7: The situation for online retailers: how the conditions influence the various trade-offs. Adapted from (Vanelslander, Deketele, & Van Hove, 2013).

4.2 Conditions

In this part, the conditions will be briefly discussed in order from the lowest amount of control to the highest amount of control from the retailers' point of view.

The retailer has no amount of control with legislation. Legislation includes the laws that are used by countries or cities to regulate the freight traffic (weight) within urban areas that makes the last-mile delivery commonly more difficult and expensive (Vanelslander *et al.,* 2013). Retailers have to follow the law and governmental legislation and sometimes this can have a tremendous impact on the retailers' practices.

The retailer has partial control over the properties of the goods sold and the wage level. Some goods involve a bigger challenge than others due to their specific properties (Kornum, Vangkilde, Kornum, & Bjerre, 2005). Although, this problem is already discussed in the second chapter, properties of goods have a significant impact for the requirements of transportation. Some products need cooling, resulting in investments for the retailer in a temperature-controlled warehouse and cooled transportation. Vehicles have to be temperature controlled, implying that the retailers need to take the last mile delivery by themself or find a way of keeping the items cooled or frozen long enough to be shipped by a parcel distributor (Vanelslander *et al.,* 2013). The amount of control is based on the type and selection of products offered online. For example Amazon UK does not offer frozen or vulnerable items, because of the complexities with the transportation of those goods (Vanelslander *et al.,* 2013). The second feature over which an online retailer has limed control is the wage level. For some low-skilled workers, which are typically involved with non-automatic order picking or transportation, the wage level is very close to the minimum wage of that particular country (Vanelslander *et al.,* 2013). Although online retailers have control over their wage level, they have limited control over the minimum wage level.

The next two conditions, where retailers have a decent amount of control over are volume and customer density. Although these factors might be pre-determined, the increase of volume and customer density can be increased by certain marketing efforts (Vanelslander *et al.,* 2013). For example, some retailers target customers with marketing campaigns in a specific area in order to increase the customer density in that area (Vanelslander *et al.,* 2013). Volume is an important cost driver for order picking whereas customer density is especially critical for the cost of the last mile delivery (Vanelslander *et al.,* 2013). Both volume and customer density are important drivers for the choice of order picking. If the sales volume and customer density is at an adequate level it is wise to distribute from an internet only warehouse. If not, store fulfilment or a combination might be suitable.

The most important conditions whereby retailers have a large amount of control are picking options in the warehouse and the delivery options for the last-mile delivery (Vanelslander *et al.,* 2013). The three types of order picking for online orders are from a local store, an internet only warehouse or a combination of both. The types of order fulfilment that are common under e-fulfilment are home delivery or pick-up points. The last important condition is the retailers' return policy. Product returns are an extra problem with online retailing, as the goods sold have to travel over the last mile again, but the other way around (Vanelslander *et al.,* 2013). The online return policy impact the shoppers' perceived service level. Online shopping lack the experience of seeing, smelling, tasting, feeling a product. This missing experience may lead to more returns resulting in significant cost.

Regarding these conditions, many choices are available for retailers. These can be subdivided into three priorities, namely investments, scalability and service level. In return of the investments, retailers have

to pay (operational) costs. These investments mostly relates to the pros and cons of the order picking methods. The scalability reflects the flexibility within the delivery options. The service level exposes the relation between the customers' service level and cost.

4.3 Investments versus operational cost

The investments of warehouses are high, but small investment for in-store picking results in long-term operational costs, such as personnel costs and fuel costs. Warehouse investments may lead to a more cost effective operation for the longer term. Cost-effectiveness can be reached by choosing flexible options for receiving the goods at the customer and by improving home delivery and picking efficiency (Kämäräinen & Punakivi, 2002). The options that are the most flexible might differ from the type of retail and its product assortment. In this first trade off the focus is on order picking.

Order picking is the first cost driver in the e-commerce business (Kämäräinen & Punakivi, 2002). Store-based order picking was the first operational model introduced in the e-retail industry, but many internet only warehouses have established in the retail industry the past two decades. (Kämäräinen & Punakivi, 2002). Figure 2 provides a table overview of the characteristics which is described in the third chapter.

Table 2: Overview of pros and cons of the in-store and warehouse fulfilment.

Fulfilment type	In-store	Warehouse
Picking type	Manual	Manual or automated
Distribution network	Decentralized	Centralized
Investment cost	Low/medium investments needed	High investments needed, especially when automated
Personnel cost	High	Medium or low if automated
Assortment width	Limited to store capacity: Small, medium	Limited to warehouse capacity: Large
Geographical expansion	Fast	Slow
Out of stocks	More than 10% (Fernie & Sparks, 2004)	Less than 5% (Fernie & Sparks, 2004)
Other drawbacks	Out-of-stocks are more likely Disturb other customers during picking	Longer delivery distances
Best suitable for	Low customers density regions when fast expansion is preferred (especially within the grocery industry)	High customers density regions

From a cost-efficiency perspective, in-store picking is not efficient, due to the fact that the store is not designed for picking but for sales (Kämäräinen & Punakivi, 2002). Yrjölä (2001) describes an in-store picking model in where the supermarkets are redesigned, resulting in more efficiency for order picking while customers can still use the traditional store. In-store picking is a low risk solution towards the insecure internet shopping market. While the initial investments of internet only warehouses are relatively high. The operational costs and the cost of labor are the most decisive factors in the cost structure of a local distribution center (Yrjölä, 2001). He made a cost structure figure of a local (internet only) grocery distribution center as a function of the sales volume (Figure 8). Yrjölä research shows both the currency Finnish mark and Euros in his figure. The lower curve is an optimistic estimate where the cost are estimated at the low point of view (Yrjölä, 2001). The upper curve is the pessimistic scenario, where cost is set at maximum reasonable level (Yrjölä, 2001). This graphic illustrates that the costs of the

warehouses are very high in percentage of the total turnover when the turnover is less than €2 million. If the turnover is higher than 2 million, picking in a local distribution center is more efficient than from an ordinary supermarket (Yrjölä, 2001).

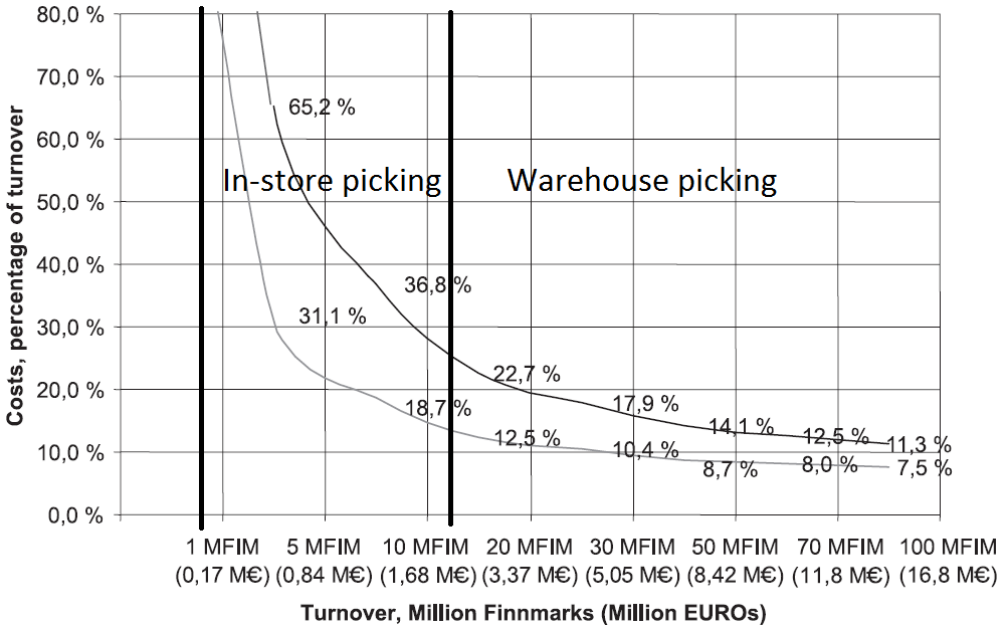

Figure 8: Cost function of the local distribution center as function of the sales volume. Adapted from (Yrjölä, 2001).

These findings correspond with the findings of Durand (2004). According to him, volume and customer density of a retailer are deciding factors that determine the appropriate type of order picking. In-store picking must transform into warehouse picking when the customers density of online demand in a specific region is large enough. This tipping point will be achieved when 20% of the total grocery sales are sold online (Durand, 2004). These results are only based on the Finnish supermarkets by the study of Yrjölä (2011) and are therefore not representative for all retailers. Every retailer has a different situation (other competitors, customers, etc.). Several factors have impact on the cost-structure, and thus different outcomes occurs in terms of turnover values.

The best choice depends largely on the current and future situation of the retailer. Many retailers first prefer in-store fulfilment, but the presence of physical stores is of course a requirement. For pure online players, an in-store picking model is solely suitable when partnering with traditional retailers. In-store fulfilment might have low initial investments, but that does not imply that it is always profitable. Retailers must have an adequate customer base to make in-store picking profitable. Nowadays more retailers start with warehouse fulfilment, because in-store picking causes many problems between channels and disturb ordinary customers. For retailers who have a large customer base in a specific area, an (automated) warehouse is the best solution offering competitive advantages in the longer term.

4.4 Scalability versus cost

The next trade-off is about choices within scalability. Scalability refers to flexibility of the supply chain set-up to handle changing volumes (Vanelslander *et al.,* 2013). The part of the online fulfilment that is about organizational complexity and flexibility, are the choices regarding to the assortment complexity and delivery options. The assortment width, orders per week and the assortment characteristics

influences the organizational complexity. The larger the assortment width and the orders per week the larger the complexity of the organization. For the assortment characteristics displays table 3 an overview of the characteristics of the logistics of the grocery and non-grocery fulfilment.

Table 3: Some differences between grocery and non-grocery fulfilment. Adapted from (R. B. M. de Koster, 2002).

Characteristic	Grocery fulfilment	Non-grocery fulfilment
Product quality	Depends on transport and packaging decision. Quality checks are recommended.	Objectively established.
Product returns	If product quality is below expectation, it may lead to customer reject or no return sales.	Less returns normally, but many returns with touch-and-feel products such as apparel.
Packaging materials returns	Used packing crates, packaging materials with deposing fees must return.	Hardly occurs.
Pick-up window	In advance agreed upon time window. Often short time window.	Common time window is a week.
Home delivery lead-time	Fast delivery needed (often one day).	Long delivery time is no problem.
Home delivery window	In advance agreed upon time window differs from half an hour up to 6 hours.	Commonly no agreed upon time window.
Ease of home delivery	Customers generally must be at home. Many products have to be stored or cooled immediately.	Customers do not have to be at home.
Order size	Usually large orders. Some grocers require a sale minimum.	Small.
Storage, handling and transportation conditions	Assortment includes frozen and fresh products (each with its own optimal temperature conditions). Some products reduce the shelf life or quality of the other products (Kiwis and bananas). Most products are perishable and require keeping date management.	No special conditions required.

The difference in characterizes between grocery and non-grocery fulfilment makes it complex and expensive to combine the distribution of grocery fulfilment and non-grocery fulfilment. Non-grocery delivery is easier to outsource than grocery fulfilment. Many retailers chose to use parcel carriers, which combines several deliveries. This makes the last mile delivery less expensive in areas where the customer density is low, and the cost of private delivery is expensive. In the non-grocery industry, retailers promote with free delivery or even free product returns. The shipping expenses are charged as a part of the product price, but the non-grocery retailers profit from the low cost of parcel carriers compared to the high cost of private distribution. The challenge for non-groceries is to make the delivery time as short as possible without having extra operational cost. Retailers and parcel carriers must collaborate more to make this possible.

Grocery fulfilment can hardly be outsourced, since most parcel carriers do not have cooled vans or deliver within a pre-arranged time window. The cost of last mile home delivery will be in the most cases charged to the consumer in the grocery chain. The margins on groceries are relatively small, and the competition is relatively high, making the grocery retailers fragile too.

The cost of home delivery, consisting of time and travelling cost, is a big cost driver in the e-grocery business. The average of kilometers per route depends greatly on the amount of customers (customer density) and the distance between the retailer and the consumer (Vanelslander *et al.,* 2013). An

important factor to determine the delivery cost is sales per square km, which can be related to the delivery density (Vanelslander *et al.,* 2013). At a certain point the increase of sales per square kilometers did not decrease the delivery costs any further. This point, where the decrease of distance has very little effect on the cost, is when the distance becomes lower than 500 meter (Yrjölä, 2001). Figure 9 illustrates that the distance of the delivery have a very important impact on the cost of the last mile and its share in the total logistics cost (Vanelslander *et al.,* 2013). Minimizing the delivery route is of major importance to reduce the total logistics cost of home delivery by van (Vanelslander *et al.,* 2013).

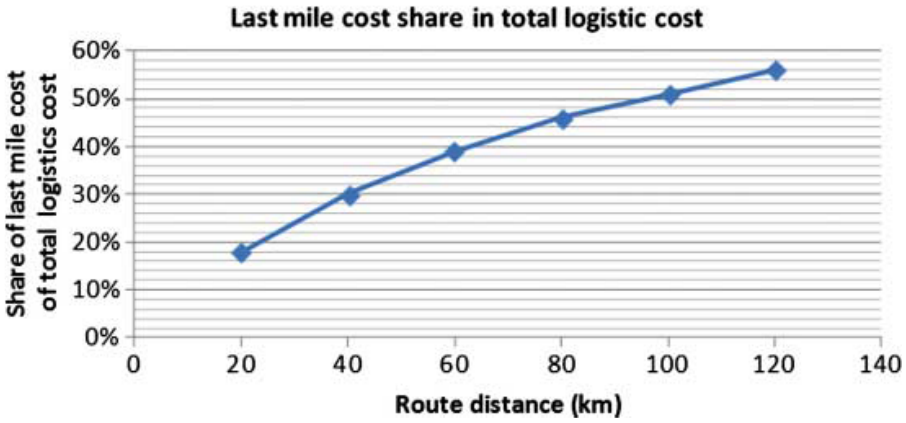

Figure 9: The cost of the last mile of the total logistic cost. (Vanelslander et al., 2013).

Grocers who fulfil their orders with attended delivery offer the customer to choose for a specific time, and time window of half an hour up to five hours. According to Punakivi and Saranen (2001) the attended delivery with a one hour time window is 60% more expensive than an unattended home delivery. The driver is driving back and forth with attended home delivery, causing big inefficiencies in driving the most optimal route. Unattended delivery does not cover time and place constraints, and thus the vehicle is driving the most cost-efficient route. The reception boxes that are mainly used with unattended delivery are relatively expensive, and have to be implemented to the whole neighborhood to increase the efficiency which is an impossible task for retailers.

The Dutch grocers Hoogvliet and Jumbo solely have pick-up points. Home delivery is too expensive for them, seeing it as the next step for their online fulfilment (Garstenveld, 2014). Their online customer base is yet too small to implement attended home delivery, but is suitable for pick-up points. Pick-up points offer the convenience of online shopping, and uses the already existing stores for its fulfilment resulting in lower investment costs. Both grocers chose for warehouse distribution instead of in-store order picking. According to the director of Hoogvliet is the in-store picking method faster and cheaper to implement, but it disrupts the traditional shopper. Moreover, it interrupts the existing systems and inventory in the traditional chain, causing extra costs and displeased customers (Kuipers, 2014). Therefore these grocers prefer internet-only warehouses.

4.5 Service level versus cost

The customer service level must be involved when improving the supply chain. The switching cost for online customers, the cost incurred when a customer changes from one supplier to another, is relatively low for internet shopping. This is due to the easiness of comparing retailers on the internet (InvestorWords, 2014). *Comparison websites* such as beslist.nl, vergelijk.nl or Google shopping make it convenient for customers to get all the relevant information about a specific product from many e-

retailers. The customers are pulling the products through the supply chain, especially when the marketplace is the internet that has the widest variety of products available. Logistics have a significant impact on the way of how customers perceive the online channel, and is an essential factor in customer attraction, satisfaction and retention (Vanelslander *et al.,* 2013).

Retailers try to increase their competitive advantage by improving customer service, and the physical distribution service quality (PDSQ) is an important criterion according toYuan and Grant (2006). Fulfilment is seen as a key component in affecting post purchase satisfaction (Yuan & Grant, 2006). The PDSQ describes the fulfilment in the online shopping literature. Yuan and Grant (2006) describe four dimensions that influence the online PDSQ. The four dimensions are timeliness, availability, condition, and return.

Timeliness is the time elapsed between placing the order online and receiving the order at the door (Mentzer, Gomes, & Krapfel, 1989). It about how many choices the consumer has over the delivery date and time window; how quickly the consumer receives the order, and of the retailer's performance matching its promised conditions (Yuan & Grant, 2006). More delivery options, smaller time window and faster delivery results in much more expenses in logistics. More and more e-retailers have fast(er) delivery options, and charge the cost to the customers. For example, Amazon delivers free two day shipping of millions of items to its prime members, who are paying $50-$100 extra a year depending on the type of prime member (amazon.com/prime). Amazon also offers fast delivery to other customers, which is more expensive after a few orders.

Availability refers to the inventory capability, whether the retailer already has the inventory source to fulfil consumers order instantly (Mentzer *et al.,* 1989). It is about whether the products are in stock at the point of the online order, or if not, when the products are available (Yuan & Grant, 2006). In extreme cases what kind of product substitutions are made when stock-outs occur. This is especially relevant for e-grocers where stocks are low and stock-outs do appear. Customers would go away if products that are not available at the first retailer are available at another online retailer. Costumers also enjoy a sort of control or information about the delivery. Therefore, track and trace would be an appropriate way to inform customers about their product's delivery, making the customer more eager to know when to expect the product (Yuan & Grant, 2006).

Condition is about the quality of the order (Yuan & Grant, 2006). Everybody expects that ordered products work and are not damaged. Quality requirements are very important regarding the online grocery fulfilment. The packaging, storage, handling, transportation conditions can improve the quality that is delivered to the customer (Yuan & Grant, 2006).

Returns are seen as an important service requirement particularly with online shopping. Return logistics refers to the process that products are returned from the point of consumption to the retailer of supplier for possible repair, resale etc. (Tarn, Razi, Wen, & Perez, 2003). It is about how the retailer deals with the products returns; how many channels the customer can return their product, and how complicated or expensive it is to return these products (Yuan & Grant, 2006).

Although these dimensions are hard to express in hard facts or numbers, the findings of this research should provide retailers a better understanding of the implications of their operations on their customers. The retailers' question whether to invest heavily on fast delivery or to save money is still complex to answer. Xing *et al.* (2010) performed a survey about PDSQ in Edinburgh, Scotland. One of

questions was about the customers' reasons for buying online. The respondents primary reasons for choosing an online retailer are the price, brand attraction and availability (Xing *et al.,* 2010). About 34% of the respondents considered the price as the main reason to choose the retailers, followed by choice of brand attraction (23%) and convenience (8%). A full list of the respondents' reasons for choosing a particular retailer can be found in figure 10. This implies that the price of online products, and thus the cost of transportation is a main driver by the customer's choice. Therefore it is better to lead a particular choice by the customer instead of changing it to all customers.

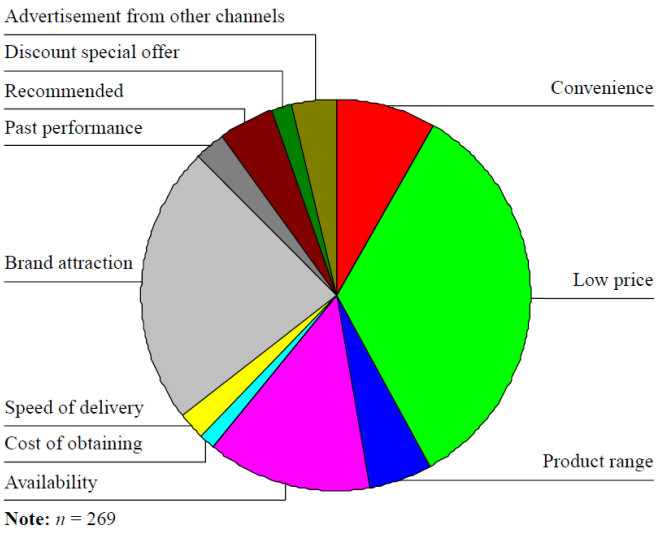

Figure 10: Respondents' reasons to choose a particular online retailer (Xing, Grant, McKinnon, & Fernie, 2010).

Summarizing, this chapter has discussed three tradeoffs based on a framework Vanelslander et al., (2013). Several conditions, such as volume and the properties of the goods, influence the possibilities for the online retailers. The three trade-offs revealed that there are various implementations strategies which depends on the type of retailer. What conclusion can be drawn from this chapter is that the customer density is essential when justifying the right type of order picking. Parcel carriers are more cost-efficient when sales volumes are low compared to a private delivery fleet. The type of retailer and assortment requirements is determinative factor for choosing the appropriate type of delivery. Customers service is essential when developing an online channel. Online shoppers can easily change from retailer, because comparing retailers online is very easy and the customers' switching costs are relatively low. Many websites compare the retailers' prices, customers' satisfaction and other qualifications, making the online retail industry highly transparent.

5 Conclusion & discussion

The internet has become part of our daily life, and online shopping is becoming increasingly popular. The distribution of online orders has caused big changes in the supply chain. Bulky and homogenous delivery of goods is now replaced by smaller and more frequent orders for home delivery or pick-up points. In this paper, the current practices and trade-offs in logistics in the online retail have been investigated. The key issues in home delivery and the pick-up points from a perspective of both multichannel retailers and pure players are addressed. In this section the main observations and conclusions will be summarized.

Table 4 highlights the main issues in both home delivery and pick-up points for pure online players and multichannel retailers that is discussed in chapter 3 and 4. Many general supply chain issues, that are described in the table, are also relevant for the online channel. The last mile delivery, the pick-up points and order picking of individual (small) orders are three new practices within the retail industry. The management of these practices give rise to planning and strategy trade-offs. Companies need to choose an appropriate service level with an accompanying price while managing the resources and information systems, to support this service.

Table 4: Practices and issues in the online fulfilment.

	Pure players (Home delivery)	Multichannel retailers (home delivery and pick up points)
Delivery service design	Last mile service, delivery time windows, delivery lead time, return options, parcel delivery	Both home delivery and pick up points service, delivery time windows, lead time, return options, parcel delivery
Pricing	Fees, return fees, minimum sales volume	Fees, return fees, minimum sales volume, same price in both channels
Order picking	Inventory and order pick location, degree of automatization, organizational complexity (assortment)	Inventory and order pick location, shared facilities, shared planning, degree of automatization, organizational complexity (assortment)
Inventory	Level of safety stock	Level of safety stock, conflicts between inventory between channels

The lessons that can be drawn from this study is that different fulfillment options are possible. The best fulfillment options depend largely on the type of retailer, and the factors that determine the complexity within an organization such as assortment width, number of orders and assortment type. Online pure players fulfil orders from warehouses, while traditional retailers have to choose between internet warehouses or in-store fulfillment. Retailers with a large number of orders are better off with internet only warehouses. Nowadays, retailers with a small number of online customers (such as Hoogvliet and Jumbo) tend to prefer an internet only warehouse to avoid channel conflicts and disruptions of ordinary customers during shopping. The literature findings suggests that only if a retailer has or expects an adequate number of online shoppers, an internet only warehouse is the most suitable. If not, a retailer must consider whether to withdraw from the online market or to compete with big online competitors by implementing a store-based fulfilment.

The second area of worth noting is that grocery and non-grocery distribution are two complete different practices (see table 3, chapter 4). Non-grocery home delivery is carried out by parcels carriers, which are relatively low-cost compared to private distribution. Grocers have their own trucks or vans due to the high shipping requirements of grocery products. Online grocery shoppers have to be at home on an

agreed time during the time of delivery. Vans are driving back and forth with attended delivery resulting in high cost for grocery home deliveries. Attended delivery is more expensive and less convenient for both the customer and the online retailer compared to unattended delivery. The reception boxes, which make unattended grocery shopping possible, are hardly installed at the customers' home. Therefore, pick-up points are becoming more popular for traditional grocers that want to enter the online market. Pick-up points offer the online shopping convenience, and is not involved with the expensive last mile by using its existing assets.

Another topic which is important within the online channel is customer service. The customers' switching cost of online purchases are very low, and thus online shoppers are relatively unloyal compared to traditional shoppers. The main customers driver when choosing a particular online retailer is the cost of a product, followed by product availability, and brand attraction. Investments made by the retailer should not lead to higher prices, because the price sensitive customers may buy from a cheaper retailer. The customer buying decision is largely based on price, and therefore expensive improvements, such as same day delivery, should be charged to that individual buyer itself rather than to all customers.

5.1 Discussion

Literature about the cost of online fulfilment is relatively small. Solely Yrjola (2001), Kämäräinen and Punakivi (2002) and Vanelslander et al. (2013) discuss about the cost structure of the online retailers. Relevant statements about the cost of distribution and the cost of order picking of both store and internet only warehouse fulfilment are solely discussed by these few authors. To date a very small number of authors describe both the multichannel and pure online player's cost structure. This is in contrast with the large amount of information about the problems within the logistics of online retail. To validate my cost related findings more scientific articles must be consulted. Especially in the fourth section of this thesis more literature is needed to make strong conclusions that justify the cost structure of the logistics of the online retailer.

Given that the online industry is still emerging, another area in which more literature is needed is within the field of order picking. The developments of order picking are more about automatization techniques at warehouses which results in changes within the literature over the time. For example, Yrjölä (2001) and Kämäräinen and Punakivi (2002) both favor the in-store picking model for small retailers during the beginning of the 2000s. While the in-store picking model is criticized by de Koster (2007) due to the inefficient order picking design of a retail store. Recent developments of retailers with a small number of internet customers reveal that internet only warehouses are more common rather than the in-store picking model. The newer practices, especially the automatization techniques at the internet only warehouses, are not broadly described within academic articles. Insight into the current automatization techniques is essential for improving the warehouse design and accompanying information systems.

Concluding, literature about best practices within the online retail is still needed due to the high cost of the inefficient practices of order picking, home delivery and products returns. Both small and large online retailers have problems with the implementations of the best practices. I believe there are significant opportunities for challenging academic contribution in the field of online fulfilment. More literature, especially in the cost-effectiveness, will be valuable in order to reduce the significance cost of distribution and order picking in the online channel, while fulfilling the expectations of the internet shoppers.

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