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Requirements on e-commerce distribution and their implications for the use of heavy trucks

*Master's Thesis in the Master's Programme
Supply Chain Management*

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Gothenburg, Sweden 2019
Report No. E 2019:002

MASTER'S THESIS E 2019:002

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Master's Thesis E 2019:002

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Abstract

The European market is experiencing a digital revolution and e-commerce shopping is a rapidly increasing trend. E-commerce growth has accordingly led to increased logistical activities and also driven a need for new flexible solutions of delivery. Stakeholders in the e-commerce industry all have different requirements on the transportation and heavy truck manufacturers today have their focus on fulfilling the needs of the stakeholders conducting the transport which creates a gap in what is required and delivered. The aim of this thesis is to investigate how heavy truck manufacturers can adapt to the e-commerce transport operations requirements in the European market.

This qualitative study is based on secondary data and conducting interviews to triangulate the issue and create a broad picture over relevant stakeholders and their requirements and upcoming trends. Fifteen different interviews with eleven different organizations within the realm of e-commerce, such as e-tailers, carriers, heavy truck manufacturer and external stakeholders were conducted.

The thesis finds that the major trends in e-commerce are the growing *cross-border* market, the demand for *transparency* and tracking throughout the distribution chain, the growing issues with *last mile* and *reverse logistics* driven by retailers and customer behavior and requirements on a higher *service level* of deliveries. New, more effective modes of delivery have started to emerge with parcel lockers, click and collect and other more sustainable solutions. The thesis discusses a misconception by e-tailers of customer requirements where the focus is mainly on fast and convenient transport. Furthermore, it is discussed that transport is an important part of e-commerce and that transport services should be priced and transparent.

The thesis concludes that e-commerce business is growing so fast that it is still under development and the implications from customers behavior are hard to analyze. E-commerce drives new modes of transport and delivery which puts requirements on the heavy truck manufacturer to offer transport solutions with the possibility to communicate with and adapt to other modes of transport and delivery.

Keywords: e-commerce, transport, last mile, trucks, distribution, e-tailer

Acknowledgements

This thesis concludes the Master of Science programme Supply Chain Management at Chalmers University of Technology, Gothenburg, Sweden. It was written during the autumn semester of 2018 by Fredrik Hamnén and Martin Larsson in collaboration with Volvo Group Technology.

We would like to thank our supervisors at Volvo, Klas Nilsson & Anders Petersson, for making this thesis a possibility and for giving invaluable input along the road. We would like to dedicate a special thanks to our tutor, León Poblete and examiner, Per-Olof Arnäs at Chalmers for their immense dedication and interest in the thesis. We are also thankful to the European Commission for allowing us to use their research material. Lastly, we would like to thank all the participating interviewees for making this study possible, both at Volvo and externally.

January 21st, 2019
Fredrik Hamnén & Martin Larsson

Terminology

Actor - Stakeholder that take active part in the distribution of goods

API - Application Programming interface

e-tailer - owner and operator of the company selling e-commerce goods

Euro class - Emission based classification of trucks

Geo-fencing - Geographical steering method

Last mile - the last stretch of delivery to end-customer.

Long-haul - The long, hub to hub, stretch of a transport.

NPO - National Post Offices

OECD - Organization for Economic Co-operation and Development

Reverse logistics - The return flow connected to online sales

SEK - Swedish Kronor

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1. INTRODUCTION

The first chapter presents the background to the research subject in 1.1, followed by a problematization in 1.2 leading to a purpose and a set of research questions in 1.3. Thereafter, the delimitations are laid out in 1.4 and the outline of the report is presented in 1.5.

1.1 Background

E-commerce is growing rapidly in Europe, especially in the retail sector (Statista, 2018). One driver to digital change in behavior is that customers today are showing less resistance towards shopping online (Chang et al., 2013). Future scenarios for 2025, suggest that e-commerce will stand for between 22-33 percent of total sales in retail (Svensk Handel, 2018).

There are numerous types of stakeholders involved in e-commerce e.g. customers, e-tailers, authorities and carriers (Taniguchi et al., 2001). These all have different requirements on the transport operations (Anand & van Duin, 2016). The growth of e-commerce shopping has accordingly increased logistical activities amongst these actors and has driven a need for flexible solutions for delivery and returns (Svensk Handel, 2018). Fulfilling and exceeding customer needs is what differentiates the successful e-tailers from other players (Lee & Whang, 2001). Customers today require their products to be delivered fast and convenient and companies use delivery as a service differentiator towards their customers where customers can choose between delivery options such as pick-up or home delivery (Joerss et al., 2016). However, customers prefer that goods are delivered fast and to their doorstep which creates issues such as *last mile*, denoting the last part of the distribution to the end-customer. This has become a hot topic and a necessity for being successful as a logistical actor according to Joerss et al. (2016). In addition to these *last mile* issues, e-commerce actors today face the growing problem of *reverse logistics*, where customers can return their goods after purchasing online creating an additional flow (Mukhopadhyay & Setoputro, 2004).

Reduced lead time for transport and increased flexibility for customers have made it harder for the transport sector to match frequency and filling degree of trucks (Lumsden, 2007). Lumsden explains that to solve this issue there has been changes in what type of vehicles that are present in fleets. Still, many of these transports are covered by heavy trucks, which stand before future changes with new concepts such as digitalization and semi-autonomous connected vehicles that might become more and more relevant with the growth of e-commerce (Schiller et al., 2016).

1.2 Problematization

With the apparent, rapidly changing landscape of the retail business heavy truck manufacturers struggle to identify what role they are going to play in future delivery schemes. There exists previous literature on the requirements on city and urban logistics, but less specifically tied to e-commerce (Ducret, 2014; Taniguchi & Thompson, 2014). Since the deliveries to end-customers incurred by e-commerce differ notably from other types of city logistics, e-commerce transport requirements become interesting to isolate and study (Allen et al, 2018). E-commerce is continuously growing which in turn increases the demand for transport, where

many of the distances of transport are covered by heavy trucks (Svensk Handel, 2018). Anand & van Duin (2016) explain that stakeholders in e-commerce all have different requirements on the transport and Joerss et al. (2016) argue that customers today require their products to be delivered fast and convenient. The literature, such as van den Bossche et al. (2017), shows that there is clear focus on the requirements and demands of the end-customer in the distribution chains. From retailer's distribution point of view, the literature is mostly focusing on the relation between retailers and transport actors and the set-up, while studies on an aggregated level that includes all stakeholders are missing (Lumsden 2007). In order to close this gap, this paper studies what these transport operations requirements are and how they are translated to the heavy truck manufacturers offering.

1.3 Purpose and research questions

Based on this background, heavy truck manufacturers need to understand what the requirements are from their perspective of the distribution chain to fulfil the logistical demands of the booming e-commerce business. Thus, the aim of this thesis is to *investigate how heavy truck manufacturers can adapt to the e-commerce transport operations requirements in the European market.*

Two research questions (RQs) are used in order to fulfil the aim, where RQ2 is dependent on the answer in RQ1.

RQ1. What requirements on e-commerce transport operations exist amongst stakeholders on the European market?

RQ2. How can heavy truck manufacturers adapt to the requirements of the European e-commerce market?

1.4 Delimitations

The report focuses solely on road transport and no other modes of traffic or intermodal solutions will be studied. The basis for this thesis is investigating the product group of heavy trucks in the European market and the relation to other road vehicles and modes of delivery. The study is limited to focusing on the transportation within urban areas since this is where the growth in e-commerce is most prominent. The infrastructure and needs for the rural areas are assumed to differ greatly wherefore including those would broaden the scope. The report focuses on studying the transportation operations between e-tailer and end consumer since the upstream transportation is deemed to not differ from non e-commerce operations and are generally conducted across continents. Furthermore, the study is limited to investigating B2C e-commerce operations for physical goods. The report does not take into account the juridical side of the e-commerce development unless it is specifically mentioned in the empirical data, meaning that the authors will not study the laws and regulations that exist specifically for this kind of distribution.

1.5 Outline of the thesis

The thesis consists of seven chapters, which is organized as shown in figure 1.1 below. The second chapter contains a literature review with the relevant theoretical frameworks connected to the subject at hand, these are merged and summarized with an analytical framework to be applied to the empirical material. Following the literature is the methodology, presenting how the study has been conducted. Thereafter the empirical material is presented, followed by an analysis, discussion and concluding remarks. Appendices are added to supplement the main report.

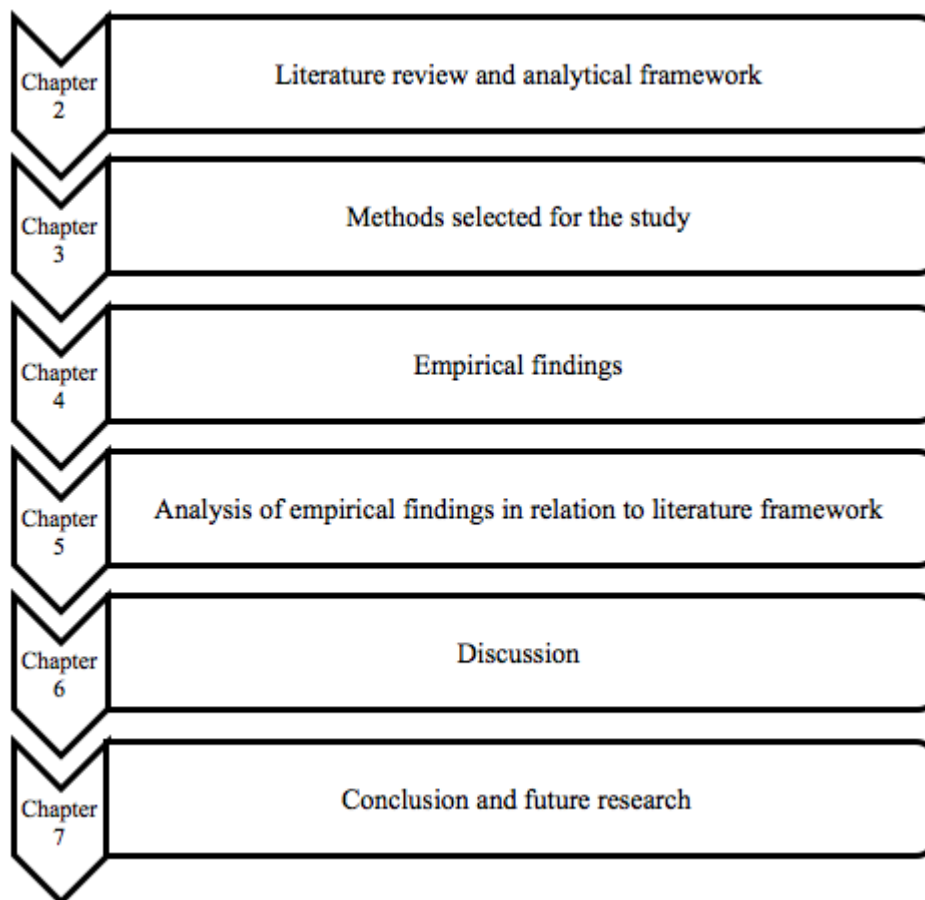


Figure 1.1 - Chapters of the thesis

2. LITERATURE REVIEW

The literature review introduces the terminology and concepts that are necessary for fulfilling the purpose of the research. Chapter 2.1 defines e-commerce and its parts, followed by the concept of distribution in 2.2, what stakeholders are present in a distribution chain in 2.3 and what requirements have been studied this far in 2.4. Lastly a division of the elements of the transporting truck is presented in 2.5.

2.1 E-commerce

Wienclaw (2017, p.1) describes e-commerce as “the process of conducting business online through sales transactions and information exchange”. Mourya & Gupta (2014) state that e-commerce refers to transactions that are based on computer networks and that it dates back as far as the 70s. However, since the introduction of the internet as the main computer network, e-commerce is generally used as a description of transactions taking place there (Mourya & Gupta, 2014). Thus excluding the technologies such as electronic data interchanges (EDI) and electronic funds transfer (EFT) that were previously under the banner of e-commerce and focusing on commercial, consumer directed websites (Mourya & Gupta, 2014).

2.1.1 E-commerce actors

Van den Bossche et al. (2017) divide e-commerce into two distinct variants: pure players and multichannel retailers. Van den Bossche et al. explain that pure players are characterized as being strictly limited to online platforms, selling only via the web. In contrast, the multichannel retailers are active on several platforms, for example having brick and mortar stores as well as an online presence (Ibid.). Generally, the latter are firms that started out as brick and mortar and has adapted to the changing sales climate whereas the former started as companies purely dedicated to web sales (Van den Bossche et al., 2017).

Ducret (2014) provides an overview of the different logistics players on the French, German and UK urban delivery markets where three different categories of players are presented. Firstly, according to Ducret, there are the logistical heirs, which are the firms and organizations that are already established in the distribution sector with focus on express parcel deliveries. These are in turn divided by Ducret into four kinds: national post offices (NPO), express providers, mail order logistics providers and couriers. The second category is, by Ducret, given the name other players and consist of two types: other logistics providers and subcontractors. Ducret explains that these refer to companies with focus on longer heavier hauling of goods and pallets and/or companies with no clear logistical distinction. Lastly, Ducret presents that there are the new players on the market, including pickup point networks, e-tailers, miscellaneous postal companies (non-NPO) and specialized delivery providers (innovative urban parcel providers). The heirs were 2011, with a large margin, the largest operators on the market, followed by the other logistics providers (Ibid.).

2.1.2 E-commerce activities

Van den Bossche et al. (2017) make a distinction between two categories of delivery in e-commerce, home delivery and delivery collection. They further divide these into several methods; four types of home deliveries exist. *On demand delivery* or instant delivery is one of the newer methods of delivery in which the customer expects to receive the goods shortly after ordering it (Van den Bossche et al., 2017; Wang & Pettit, 2016). Van den Bossche et al. name Amazon prime as the most commonly known provider of this service. The interface is either constructed so that the delivery company is visible for the customer or so that customer only is aware of which retailer he or she is buying from (Van den Bossche et al., 2017). These deliveries are very quick, easily accessed through mobile devices, cheap and can be tracked by the customers (UPS, 2015). *Parcel delivery* is the traditional home delivery option where the firm delivers the goods to the consumer at a time where he or she is believed to be home (Van den Bossche et al., 2017). According to Van den Bossche et al. this has generally generated issues with the last mile deliveries since there is a risk that the delivery will fail. *Smart boxes* are installed at residential areas and houses to circumvent the time window problem since access to these boxes are always possible for the delivery company (Ibid.). Furthermore, Van den Bossche et al. state that they can be connected to various tracking systems, enhancing the visibility of the delivery. *E-groceries* is a special case due to the complexities of buying groceries since they need to be cold and are bought in a higher frequency than any other types of wares in combination with low margins and certain inertia to buying them online (Van den Bossche et al., 2017).

Three types of delivery collection methods exist; where *Pickup points* is the traditional method where the customer orders their goods online and decide where (and when) to pick it up, choosing amongst different stores (Van den Bossche et al., 2017). The second method, according to Van den Bossche et al. is *Delivery collection at retailer*, also known as *click and collect*, and it represents the method of ordering something online and then proceeding to pick up the ware at a nearby store that the retailer controls. Wang & Pettit (2016) elaborate that this method has had a rapid growth because it offers a valid alternative to customers who are not willing to pay additional sums for other solutions and have time to wait for a delivery. *Automated parcel lockers* are boxes, similar to the smart boxes, to which the goods are delivered (Van den Bossche, 2017; Yu et al. 2016). These are not personally assigned to individual houses or apartments but carry locks that only the receiver can unlock via, for example, a certain code. Wang & Pettit (2016) give examples of UK firms who are directly changing their business ideas from supplying the end-customer with boxes to focusing on stores because of the higher convenience and lower installation prices.

Another, relatively new method of delivery is the concept of drop-shipping (Wang & Pettit, 2016). This method entails communicating customer orders from the e-tailer directly to the goods manufactures who in turn takes charge of the logistical operation of delivering the goods to the end-customer (Ibid.). This means that no stock or storage is kept by the e-tailer, which are the companies involved in B2C e-commerce, leading to lower costs for them (Wang & Pettit, 2016). However, depending on the logistical capacity of the suppliers, the customer service might suffer as a result of the method due to lack of control for the e-tailer (Ibid.).

2.2 Distribution

Distribution in the e-commerce market is quite complex where transport actors are constantly looking to increase service level together with a constant strive for decreasing cost of delivery, which creates a conflict of objectives (Punakivi et al., 2001). The definition of distribution can be described as “the range of activities involved in the movement of goods from points of production to final points of sale and consumption” (Hesse & Rodrigue, 2004)

Lumsden (2007) divides distribution into processes, their respective processing utility and processing points in a distribution network. Lumsden (2007) divides the different types of processes in distribution into transportation, handling, storing, sorting and transformation. Transportation have transport as processing point into the network where all other processes have a logistic center as their processing point (Ibid.).

These different processes, processing utilities and processing points in a network and its connection in the e-commerce environment is conceptualized in figure 2.1 below. The logistic functions comprise order from customer to goods receiving of the same (Taniguchi & Thompson, 2014). The report focusses on road transport of physical goods which means that the movement inside logistic center, such as intra-center transport, is excluded from further investigation.

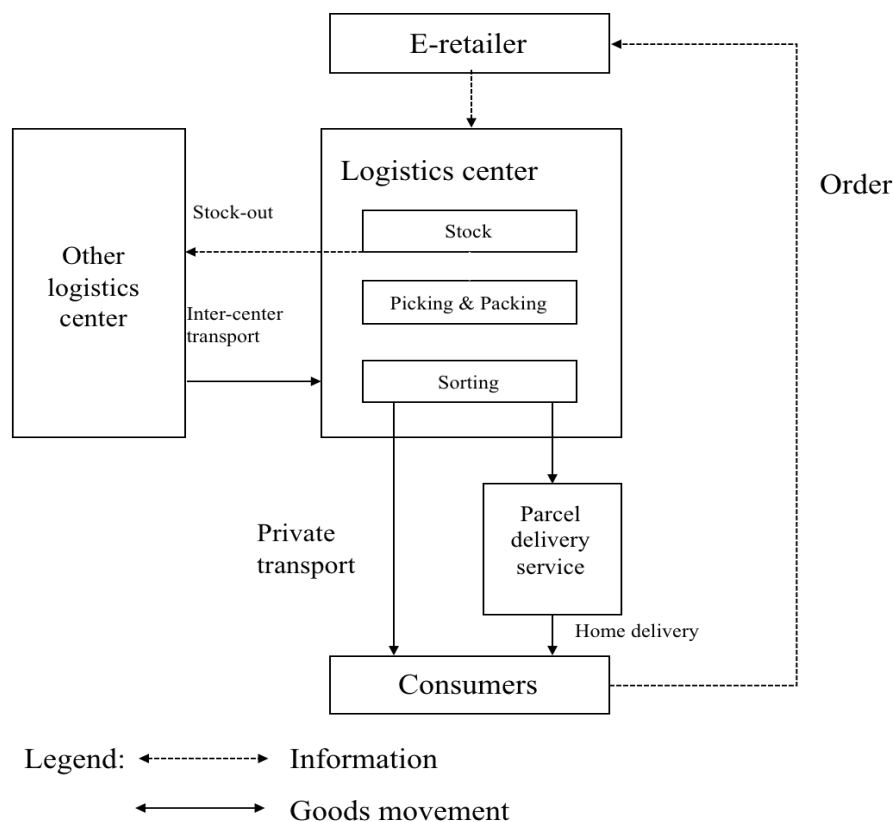


Figure 2.1 - Distribution elements in e-commerce, Taniguchi & Thompson (2014)

2.2.1 Transport operation division

Lumsden (2007, p.22) defines transport as “a service that can be copied and that provides the transportation buyer time and place utility”. Lumsden (2007) also separates the transport assignment between the material part and the immaterial part. Material part of the assignment include transport and handling of goods while immaterial part includes information, quality and security. Macharis & Melo (2011) present a general description of a standard logistics chain. This chain consists of four different steps which all require transport operations to move the goods in between them. First, raw material or commodities are obtained. These are transported to be processed, generally in some sort of factory. Macharis & Melo explain that in many cases, the processing is divided in many steps to produce whole products, and all of these steps need transportation between. After the processing is finished, the goods are moved to storage facilities and/or a distribution center which in turn moves the goods to either a collection point or delivers it straight home to the end-customer (Ibid.). The two first steps of transportation can generally be called long-haul transportations (Crainic, 2003).

2.2.2 Last Mile

Macharis & Melo (2011) define last mile as the final part of transport in B2C, where parcels are delivered either to the customers door or to a collection point. They further describe last mile activity as “*one of the more expensive, least efficient and most polluting sections of the entire logistics chain*” (Macharis & Melo, 2011, p.56). This sector is known for being highly competitive with many independent actors where actors often have low profit margins and with poor utilization of vehicles (Allen et al., 2018). Allen et al. further discuss that last mile is operated in a customer-focused culture with an approach of “everyone-delivers-everywhere” and that this collective way of thinking leads to a transport behavior that is not fully understood.

As last mile operations are costly, logistic distributors are therefore trying to place their logistic centers close to urban areas in order to minimize both the length of this stretch both also in order to minimize lead time to consumer (Taniguchi & Thompson, 2014). This can also be supported by simulations where last mile home delivery costs clearly decrease with population density (Gevaers et al., 2014). Dolan (2018) further investigate last mile inefficiencies and finds issues such as, invalid or incorrect address details, hard-to-locate locations, no one home to accept delivery, buyer remorse, lack of nearby parking and elevators out of service. All these inefficiencies add costs, times and cause problem for an already competitive business where last mile delivery is the biggest costs in comparison to the other activities (Ibid.).

Yu et al. (2016) present two different strategy logistical activities. They explain that given that logistic service quality is very important, especially last-mile delivery, it can be considered to be a success factor for e-commerce business. Thus, according to Yu et al., the first strategy entails controlling the logistic service from storage to distribution so that it becomes possible to control reliability and variability. Furthermore, Yu et al. explain that the downside with being self-supporting in a logistic network are, as mentioned before, costly and resource demanding activities. According to Yu et al. it has led to that companies in operating their own network has faced little profit and suffered from capital shortage. Another problem that is mentioned is that a controlled logistics service has to have both a national or even global coverage.

The other strategy is a pure outsourcing model for the last-mile, which has come to be an important model in e-commerce logistics (Yu et al., 2016). The main reason for choosing outsourcing is that logistical heirs, then can focus on their core business and avoid investment in a new logistic network. The biggest disadvantages mentioned in Yu et al. of outsourcing logistic activities, is the lack of control over the logistic network and difficulty ensuring that the service level meet the customers' requirements on the last part.

The strategies presented by Yu et al. (2016) is supported by Ducret (2014) in a French based case study that argues that logistic strategies can either be offensive or defensive. Ducret's (2014) model divide business into these two categories depending on their view on level of innovation, investment and the use of subcontracting in its transportation network. Offensive strategy supports Yu et al.'s (2016) strategy of being self-supportive whilst being defensive matches Yu et al.'s description of outsourcing. Offensive strategy according to Ducret (2014) is a company's willingness to provide innovative solutions and have a special focus in service innovation dedicated to parcel delivery for the last mile. Ducret (2014) argues that these types of business target a customer base located in urban areas that are affluent and willing to pay for the level of innovativeness. Examples of these innovative solutions can be offering reverse logistic, same day delivery, weekend delivery or scheduled delivery (Ibid.). Further, Ducret (2014) considers offensive strategy to involve innovative routing scheduling and advanced information tools. In terms of transport modes, the use of innovative solutions with electric vehicles or other carbon neutral alternatives for delivery (Ibid.). However, the downside with many of these innovative solutions is the limited carrying capacity for these alternative vehicles which leads to organizations having to organize city hubs for storing (Ducret, 2014). Ducret argues that it is easier for new actors to be innovative because they have a plain field which makes offensive strategy more common among new actors.

Defensive strategy is an outsourcing strategy where traditional parcel providers outsource last-mile through subcontracting or partnership (Ducret, 2014). Ducret (2014) states that this defensive strategy makes it possible for logistical heirs to use service innovation through outsourcing in order to increase the logistic offering. Furthermore, Ducret (2014) argues that defensive companies consider sustainability more as an obligation from public authorities.

Ducret (2014) presents four alternative solution of logistic organization in regard to his view on offensive and defensive strategy. The first alternative is a classic hub and spoke system often used by logistical heirs. The final part of transport, referred as last-mile, is conducted from a suburban hub where companies then subcontract specialist for the last-mile operations. This last-mile can be operated in many different ways, with different configurations and vehicles depending on logistic organizations or geographical set according to Ducret. But as mentioned about defensive strategy, the focus in having green or carbon-neutral vehicles is often not as prevalent as abiding laws or restrictions. The other three alternatives are related to innovative solutions where logistic players own their chain from retailer to final user. The offensive strategy is associated with larger spread of different layouts, configurations and vehicles. Ducret discusses that small city hubs from either suburbs but often inner cities are used in the innovative solutions to support parcel delivery.

Taniguchi & Thompson (2014) argue that Amazon is a defensive player in terms of that they own their chain except the home delivery functions where they collaborate with other actors. As mentioned about last-mile, it requires many different resources including vehicles and drivers which in this defensive strategy for Amazon makes it possible for them to be more effective in utilizing their resources. Yu et al. (2016) also discuss the general strategy for Amazon in the e-commerce distribution. They state that Amazon create hubs in close proximity to where customers are concentrated in which individual orders are processed, consolidated and sent to a distribution center where inventories are kept. This method makes sure to minimize the individual last mile deliveries so that the majority of the distribution still is carried out by heavy trucks, thus keeping the costs low. However, Yu et al. (2016) still state that the most important part of the distribution in the future will be focusing on the last mile deliveries and satisfying all last mile customer requirements.

2.2.3 Reverse logistics

Customers shopping behavior associated with e-commerce is a growing issue, where companies are facing great costs for reverse logistics (Mukhopadhyay & Setoputro, 2004). According to Mukhopadhyay & Setoputro returned goods has since long been a big issue for parties in the supply chain. de Brito & de Koster (2004) state that reverse logistics is even more costly than the receiving transport. Mukhopadhyay & Setoputro (2004) further state that the returned goods range from 2 to 50 percent of total sales. This is supported by de Brito & de Koster (2004) that state that return rates can be as high as over 20% in fashion business. The big problem for the e-tailers is that by having a generous return policy it will increase sales revenue but on the other hand these returns will also increase costs which creates a situation where both sides of the profit equation are affected (Mukhopadhyay & Setoputro, 2004).

2.3 Stakeholders

Lumsden (2007) describes the actors engaged in the logistical activities of a company and separate the different possible logistics activity scenarios by the number of actors or parties involved. Figure 2.2 shows scenarios with four or less actors.

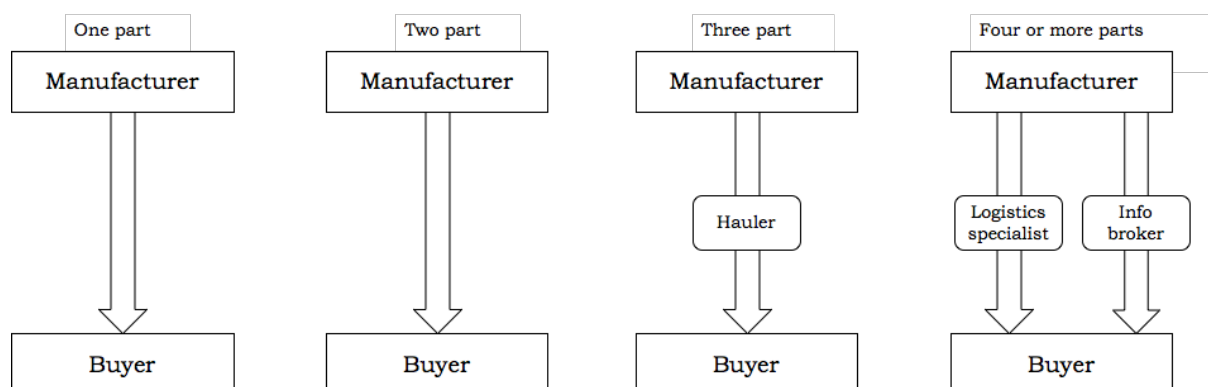


Figure 2.2 - Scenarios for distribution, Lumsden (2007)

The illustration with the caption “one part”, denotes a scenario where there are two actors, a manufacturer/supplier and their customer (Lumsden, 2007). In this case one of these two actors handle the logistical functions completely. A two-part solution is instead separated between the two parties where some parts of the logistical operations are performed by one actor and some by the other. The three-part solution, naturally, includes a third party (3PL) that takes responsibility for a certain part of the activities, normally the transportation. Furthermore, another actor in the shape of a broker can be present if the transport or logistical functions outsourced is not of a long-term nature as seen in the last illustration of figure 2.2. The reason for this is so that the customer and supplier can be devoid of all coordinating responsibilities and capabilities.

The type of relationships that exist amongst transport actors can be divided according to level of integration (Rodrigue et al., 2017). The higher level of integration represents the lower part of the pyramid in figure 2.3. According to Rodrigue et al. (2017) these levels are first-, second-, third-, and fourth-party. *First party logistics* (1PL) refers to where manufacturer or retailer performs their own logistical activity. *Second party logistics* (2PL) involvement is the providing of transport service from carriers. *Third party logistics* (3PL) is a more integrated logistical service provider that offers more comprehensive freight distribution services along the chain such as warehousing, transloading, terminal operations and activities such as packaging and labeling. In addition to this has *fourth party logistic* (4PL) developed during the last few years where logistical actors provide a complete supply chain strategy for customers. These additional services can include outsourcing decision, supplier selection and routing of cargo to support supply chain management (Rodrigue et al., 2017).

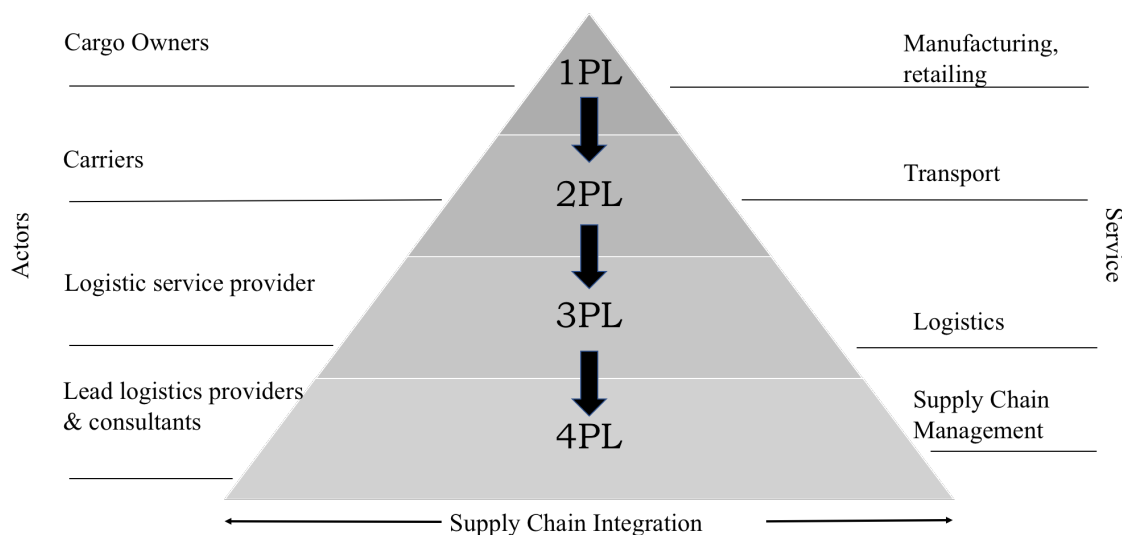


Figure 2.3 - The relation between different logistic partners, Rodrigue et al. (2017)

Taniguchi et al. (2001) divide stakeholders in urban freight environments into four overarching categories: administrators, suppliers, carriers and receivers. The *administrator* is the governing, legislative and rule setting organs present at the local delivery site. For example, the national government or city district who try to optimize and influence the movement of goods through the urban area. The *suppliers* supply the goods that enter the urban area, no distinction is made

between manufacturers, retailers, wholesalers or any different kind of supplier. The *carriers* are actors performing the distributing activities. They are not excluded to driving operators but also forwarders and general third-party logistics firms. The *receivers* are the targets of the distribution, whether they are individuals or companies such as shops and restaurants. With base in Taniguchi et al.'s (2001) model, Anand & van Duin (2016) present an ontology of agents existing in city logistics. One additional stakeholder is presented: *residents and/or visitors* of the urban area where the distributing activity takes place. Worth noting in this model is that the stakeholders can take different roles depending on the situation. A restaurant can often be a receiver, but also provide customers with distributed food services and thus becoming a supplier as well (Ibid.).

2.3.1 E-commerce stakeholders

Figure 2.4 shows a conceptual mapping of the home delivery supply chains in e-commerce (Ferne & Mckinnon, 2004). They separate parcel delivery and groceries since these two distributive chains differ fundamentally. According to Ferne & Mckinnon (2004) groceries will either move through a store or a dedicated fulfillment center, designed to supply only customer of e-commerce. As for the parcel deliveries, these move through a series of distribution centers, all depending on the nature of delivery area. Ferne & Mckinnon (2004) further explain that the ownership of the different steps along the home delivery chain is undefined, wherefore many possibilities how the stakeholders are set up exist, where certain firms might own the whole chain and others have one stakeholder per level .

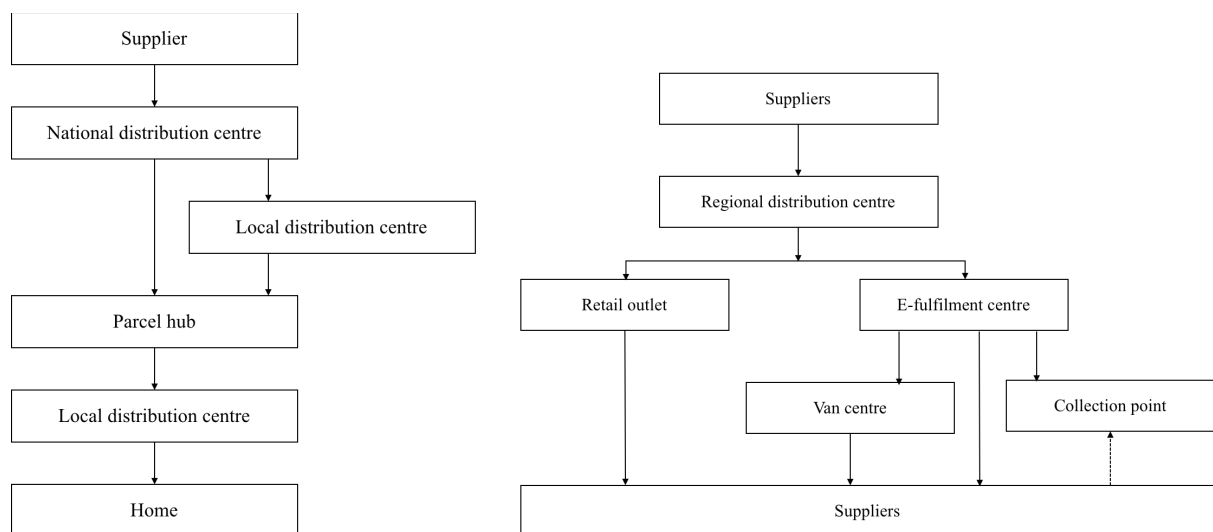


Figure 2.4 - The e-commerce home delivery supply chains for parcel goods and groceries respectively, Ferne & Mckinnon, (2004)

Van den Bossche et al. (2017) make a distinction between the different logistical operators active on the e-commerce market. Four possible operators exist according to the study: National Post Operators (NPOs), Global Integrators, Parcel Carriers, and Last Mile Specialists. The *national post operators* are the organizations obliged to carry out the postal operations within each country such as Postnord on the Swedish and Danish market (Postnord, n.d.; Van den Bossche et al., 2017). In the European context, these companies almost all offer home and work deliveries as well as provide returns possibilities, parcel tracking and the use of pick-up locations (Van den Bossche, 2017). *Global integrators* are actors with a major presence on the

international market with a sole focus on distributive services, however their focus is often on larger operations and shipments and not parcel deliveries (Ibid). The most notable actor in Europe is DHL according to Van den Bossche et al.. *Parcel Carriers* are the actors most associated with e-commerce operations, these are non-governmental companies handling parcel deliveries in both B2B and B2C settings. *Last Mile specialist* are operating in more densely populated regions and cities and exist to cover the last part of the distribution chain, such as the home delivery. These are often constricted by policy and legal restrictions that have arisen in city centers around the world and use creative vehicles and measures to cope with these restrictions (Ibid).

2.4 Transport requirements

The last years of evolution in logistics has resulted in the major logistical players converging in their strategies and methods of operation because of the challenges that have arisen in urban logistics accompanied with a market of fierce competition (Ducret, 2014). Logistical actors seem to move towards an outsourcing strategy in the more densely populated areas due to the complexity of the operations, but also towards keeping less stock and using more direct deliveries.

The different stakeholders in city logistics all have different objectives of the transports that are being carried out (Anand & van Duin, 2016). These objectives can be used to discern what requirements are put on each and every transport. The *administrators* do not have a single objective for the freight logistics carried out in the geographical area they are responsible for since there are several aspects that are of importance when it comes to city architecture, livability and environment (Ibid). Ensuring accessibility in the urban areas for sustainable transportation is highly important, however without any clear means to do so. Keeping the environmental impact on a low level is central, however this is put in contrast to the economic progress and competitiveness of the urban area (Ibid). The *suppliers* main interest follows the nature of competitive firms, namely ensuring market growth and high profitability (Ibid). Naturally, the exact nature of the objectives will differ depending on what strategies are embraced by the focal firm. *Carriers* and transport operators aim to minimize the use of their resource base in order to reach lower cost levels and higher efficiencies (Ibid). Additionally, they wish to circumvent congestion problems since they are often the victims of these - resulting in longer lead times and higher delivery costs (Ibid). They face complex problem such as matching customer demands together with facilities. In order to be efficient, it is critical to find an optimal number of warehouses that match the capacity required. In addition to this it is necessary to find the optimal set of vehicles and thereafter match with suitable routes (Giaglis et al. 2004). The *receivers* aim depends on what type of receiver is studied (Anand & van Duin., 2016). A firm would want to maximize profitability, in line with what was said regarding the suppliers, but also timeliness of the delivery. The *residents* of the urban area where the deliveries take place desire high city accessibility, livability but also availability to shops, goods and deliveries (Anand & van Duin, 2016).

2.4.1 Requirements translation

Lumsden (2007) presents a structural model for translating customer demands to discern the underlying reasons between customer demands and what is actually performed, shown in figure

2.5. He finds that there are four sources of error that skew the requirements. Firstly, Lumsden explains that there is a chance that there is a misunderstanding, an incorrect interpretation of customer demands from the transporting company's side. Secondly, even if the demands are understood correctly, there is a possibility of the demands being wrongly translated into a specification according to Lumsden. The third error according to Lumsden is the only one dependent on the actual quality of the operations and not some mental misunderstanding, that the transport does not reflect the agreed upon specification. Lastly, Lumsden explains that the transporting firm can risk committing the error of not properly communicating what has been successfully accomplished.

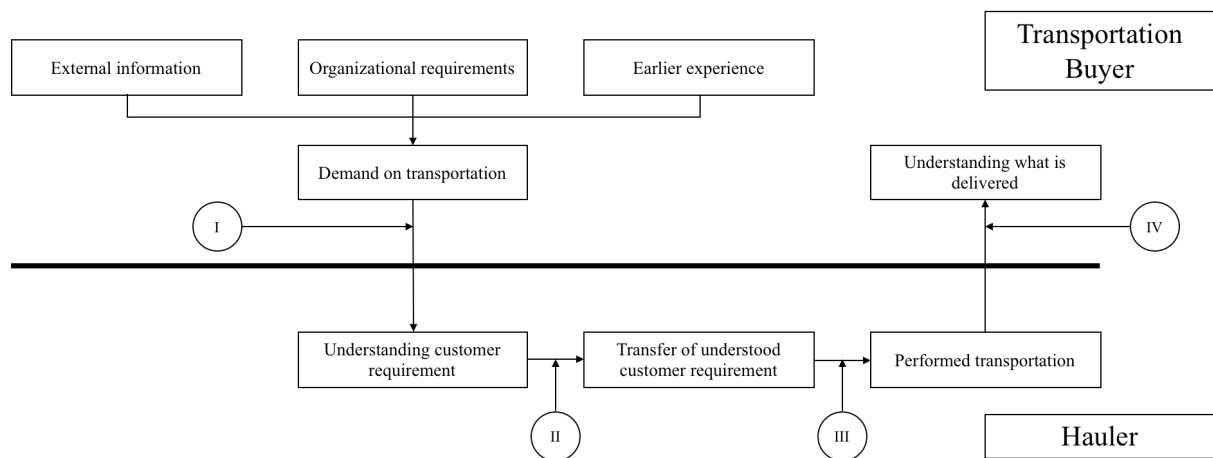


Figure 2.5 - The sources of error for requirements specification and transport execution, Lumsden (2007).

2.4.2 End-customer requirements

Van den Bossche et al. (2017) claim that there are four factors of e-commerce delivery that end-customer value higher than any other, namely: low delivery prices, home delivery, possibility to track orders and easily handled returns. This goes in line with Punakivi et al.'s (2001) ideas, that there is a conflict of interest between low prices and better service (home deliveries). Furthermore, Van den Bossche et al. (2017) explain that there are calls for the use of information technology and the associated services. Zákorová (2017) list four broad categories of what affects customer the most in the Czech Republic: timeliness, delivery cost, service and the use of additional services. Okholm et al. (2016) found that other than desiring track and trace, electronic notifications and delivery predictability, 25 percent of all customers prefer alternative delivery locations to their home. Moreover, the majority of customers prefer free delivery over paying extra for certain additional service such as faster delivery unless they are dealing with seasonal products or groceries (Van den Bossche et al., 2017).

The previous statement is supported by Joerss et al. (2016) who found that 25 percent of e-commerce end-customers have a willingness to pay up to an extra 3 Euro for same day delivery while 70 percent still prefer the cheapest option on the German, US and Chinese markets. 50 percent chose the delivery method only based on price, while 20 percent prefer home delivery, but only the cheapest method for it (Ibid.). This willingness, however, varies with the type of goods delivered, where groceries are the most desired ware to receive with faster home

delivery, but also small electronics and automotive parts (Ibid.). However, only 2 percent of customers are willing to pay more than the 3 EUR for instant delivery (Ibid.). In US it is noteworthy that many of the customers that are willing to pay extra for same day delivery would not pay more than 1 USD extra than a free, slow delivery (Ibid.).

Additionally, very few desire delivery services that are based on indirect, unattended methods such as boxes or lockers when comparing delivery methods regardless of price (Joerss et al., 2016). However, when cost is taken into account, the majority prefers the unattended methods if the alternative is 3 EUR more expensive. When comparing the transportation costs for attended and unattended delivery the result of this is that fully flexible and unattended delivery, which is the least convenient for the customer, reduces transportation cost by 30 percent compared to attended delivery within a 2-hour window (Agatz et al. 2008). Joerss et al. (2016) summarize what delivery methods are most fitting and preferred by customers for countries with high labor costs, today estimated between ten and twelve euros, and find that lockers with the autonomous delivery is most fitting for regular parcels, time window and same day delivery options in urban areas. For on demand deliveries bike couriers (or automated options in the future) are the most viable.

Esper et al. (2003) found that end-customers are more likely to buy wares when they know a large delivery firm is in charge of the delivery, i.e. customers are more likely to choose FedEx over a smaller, new player. As for the home deliveries, Taniguchi & Thompson (2015) argue that the market has been moving towards faster home deliveries and when the standard is lowered, customers will change supplier if that supplier cannot deliver with the same standard (e.g. same day delivery) as they have experienced from other sites.

2.4.3 Sustainability requirements

The end-customer is also one of the main drivers for sustainable practices since they are becoming more and more aware of the environment and caring of environmental practices (Schöder et al., 2016). Schöder et al. explain that e-commerce can generally lead to several issues with sustainability. Firstly, deliveries are required to be quick and more flexible than before, which often leads to lower utilization of vehicles and a larger amount of transports. Additionally, these are often home deliveries thus causing the logistical operators to drive further. Lastly, reverse logistics is a growing issue where many countries have more than half of their goods returned, often without a fee, creating more traffic and potentially obsolete goods. For meeting this growing demand, urban logistics companies are mainly focusing on internal practices and not that of the whole distribution chain (Ibid). Schöder et al. (2016) argue that two of the more viable tools for achieving a more sustainable urban freight related to e-commerce are electrical power trains and high degree of integration between the actors in the chains. In contrast to Schöder et al. (2016), Andersson et al. (2005) state that sustainability change comes from either companies themselves or governmental institutions. The company related changes come from the company's inherent desires to improve, these improvements can be made either technologically, or organizing the supply chain. Taniguchi & Thompson (2014) provide a list of the policy options and schemes that governing bodies have in urban logistics, such as emission standards and transport regulations, summarized in appendix A. In Europe, these regulations are layered, and local regulations might need to adhere to the ones

set by the European commission which further complicates what demands are put on the vehicles and transport operators (Ducret, 2014). The two most common vehicle related instruments are consolidation of goods and transports and restrictions on accessibility in the city centers (Ibid.).

2.4.4 System integration requirements

Wang & Pettit (2016) explain that there is a general lack of system integration amongst transport operators. One operator does not generally own a fleet of trucks from a single manufacturer but a mix of different brands. The different brands have all separately developed information sharing systems that only translate to other vehicles from the same brand. Wang & Pettit (2016) continue to state that the issue does not lie in the data gathering or format itself, but the products used to overview the data, which are usually compatible with the manufacturer's own trucks only, even if the data is practically all the same due to universal standards, the vehicles only communicate with the designated software. Furthermore, to integrate data the quality needs to be high all over, meaning that transport operators desire a homogenous high-quality level of data regardless of the brand of truck or its system providing it (Ibid.). The telematics data offered by the vehicle manufacturers is often paired with high prices which is another hindering factor for the development of integrated communicative and analytical systems in e-logistics (Wang & Pettit, 2016).

2.5 Truck Elements

The definition of a truck in this report will include both hardware and software. Hardware, meaning the physical vehicle, can thereafter be divided into a load carrying capacity part and one technical part whose role is to move the unit (Lumsden, 2007). The vehicle's performance and preference are limited under laws and restrictions from both EU both also by individual nations concerning length, height and width (Lumsden, 2007). The load carrying unit, or body, is customized for its purpose but should be given as large parts as possible since the generated profit comes from the available capacity (Lumsden, 2007).

2.5.1 Telematics systems

Vehicles and load carriers are equipped with an extensive amount of information technology, which can be divided into vehicle monitoring, driver and safety and fleet management systems (Schiller et al., 2016). Appendix A contains a table with detailed description of what use of these systems entail, divided between level of maturity of less than five years and from five years.

Given the competitive market in logistic, the interest for new economic or technological development has increased significantly (de Brito & de Koster, 2004). In order to be competitive de Brito & de Koster (2004) further state that concepts such as just-in-time denoting distribution systems where goods are delivered in the right quantity at the right time and place are crucial in order to be effective. They further discuss the need for real-time information such as vehicle position and traffic conditions in order to be effective. Given the rapid growth in innovation of communication and information technologies in the beginning of 21st century it has become possible to access real-time information easier (Ibid.).

Vehicle monitoring

Most vehicles today also carry global positioning (GPS) systems (Wang & Pettit, 2016). Contrary to common belief GPS systems are not mainly used for tracking of position as much as tracking arrivals and departures, optimizing routes and estimations of time lapses of routes. This is supported by Lumsden (2007) who claims positioning systems makes it possible to get a precise location of vehicles, which can help actors that have many trucks in their fleet better distribute transportation assignments between their vehicles and utilize their resources more efficiently. Schiller et al. (2016) describe maintenance related solutions to be the core usage in vehicle monitoring, e.g. components monitored to communicate when a repair or change is needed. Schiller et al. (2016) further state the importance of vehicle monitoring in terms of real time info on fuel consumption and suggestions for driver improvement e.g. live warnings for inappropriate driving style.

Fleet management as a supply chain integrator

Transport management systems are information systems external to the vehicles themselves (Wang & Pettit, 2016). They are designed to keep track of the details of the orders, its current state, the order documentation and lists, the start and finishing geographical locations and all times related to this. Yu et al. (2016) studied how transport management system can be used for managing large fleets with large sets of data and how it can be used to affect the sustainable factors of freight positively by optimizing different truck related factors. They also stressed the growth and importance of big data and data analysis techniques for better functioning transportation management systems. Schiller et al. (2016) name route optimization as the most promising factor in fleet management because the concrete implications it comes with regarding finance and sustainability.

Meyer et al. (2014) discuss using trucks and truck elements as intelligent products. This means creating trucks, pallets and products that are able to create and keep data regarding itself and base decisions related to its path on this data (McFarlane et al, 2003). A useful tool to make sure the data is connected to a certain item are RFID tags (Meyer et al., 2014). This presents possibilities of application in tracking technology for transporting firms based on actively communicating and trucks instead of the need for drivers to communicate, save and send data to the freight operators leading to a more well-functioning and detailed system control. Yu et al. (2016) support these ideas by explaining how the use of *internet of things* (IoT) and intelligent products is beneficial for e-commerce logistics, not only connecting the trucks but all possible entities to a communicative system. IoT can be described as an infrastructure of interconnected objects, people and systems which is processed by information resources in order to connect the physical and virtual world (Hassan et al., 2018). Furthermore, Yu et al. (2016) promote the use of RFID technology to cope with the growing costs of last mile deliveries by differentiating customer segments and their corresponding products. If the customers are separated and segmented on importance and preferences, certain products that are bound to the important customers could have an RFID tag attached to ensure the speed and service of the delivery to these customers while focusing solely on costs for the other customers (Ibid.).

2.6 Summary of the analytical framework

An analytical model is constructed and shown in figure 2.6. It describes the distribution chains in the domain of e-commerce, showing the stakeholders that are affected or involved in it and how the transport requirements translate between them. With base in this chapter, this is a summary that ties together the literature.

The figure shows a distribution chain in the realm of e-commerce, where every order is conducted over online networks (van den Bossche et al., 2017). Ducret (2014) describes the market for e-commerce deliveries and what actors exist on it today, such as national post offices and logistical heirs, providing a setting of what the general market looks like. Along the same lines, van den Bossche et al. (2017) and Wang & Pettit (2016) describe the different delivery settings that exist today. This market description is represented by the outer frame with the title e-commerce in the illustration.

Within this frame distribution of e-commerce goods takes place, represented by the square with the title distribution. Lumsden (2007) explains that distribution is divided into a number of activities, amongst them transportation. These transports are divided into different stretches by Macharis & Melo (2011) and Crainic (2003) where the moving of goods from hubs to hubs or between warehouses is known as long haul and the last transportation to the end-customer is called last mile. The last mile stretch is represented by the arrow directed upwards between carriers and receivers in the figure. Yu et al. (2016) and Ducret (2014) describe that the last mile transports can be handled with various strategies from different companies. Mukhopadhyay & Setoputro (2004) and de Brito & de Koster (2004) describe the importance of the reverse logistics, represented by the opposite arrows in the figure.

Lumsden (2007) describes the products moving from the e-tailer to the carriers and forward to the receivers represented by the upwards-moving arrows in the figure. This movement can be done in a number of different constellations with the use of first, second, third- or fourth-party logistics carriers (Lumsden, 2007; Rodrigue et al., 2017). The stakeholders, represented by the stakeholder squares, are based on the theories of Taniguchi et al. (2001) and Anand & van Duin (2016) and include suppliers (e-tailers), carriers, receivers (end-customers), administrators and residents. In this model administrators and residents have been merged to an external stakeholder since these are often deemed to be represented by the same stakeholder and have the same preferences.

The requirements are represented by the dotted arrows in the figure. These are put on the transportation, operated by the carriers and differ in nature since the different stakeholders have different objectives for the transport (Anand & van Duin, 2016). Lumsden (2007) describes that these are often miscommunicated. There is plenty of information regarding the end-customer requirements that is described by many authors such as Zákarová (2017) and van den Bossche et al. (2017). The requirements are represented by the arrow between the receivers and the carriers. Furthermore, system integration and sustainability are two themes of requirements, explained by Wang & Pettit (2016) and Schöder et al. (2016).

Lumsden (2007) describe that the distributing trucks are made up of hardware and software. The software side of truck is described by, amongst others, Wang & Pettit (2016), Schiller et al. (2016) with a focus on monitoring systems, safety related issues and fleet management systems. The requirements put on the transport can for the heavy truck manufacturers be translated into these hardware and software elements, represented by the filled squares in the framework.

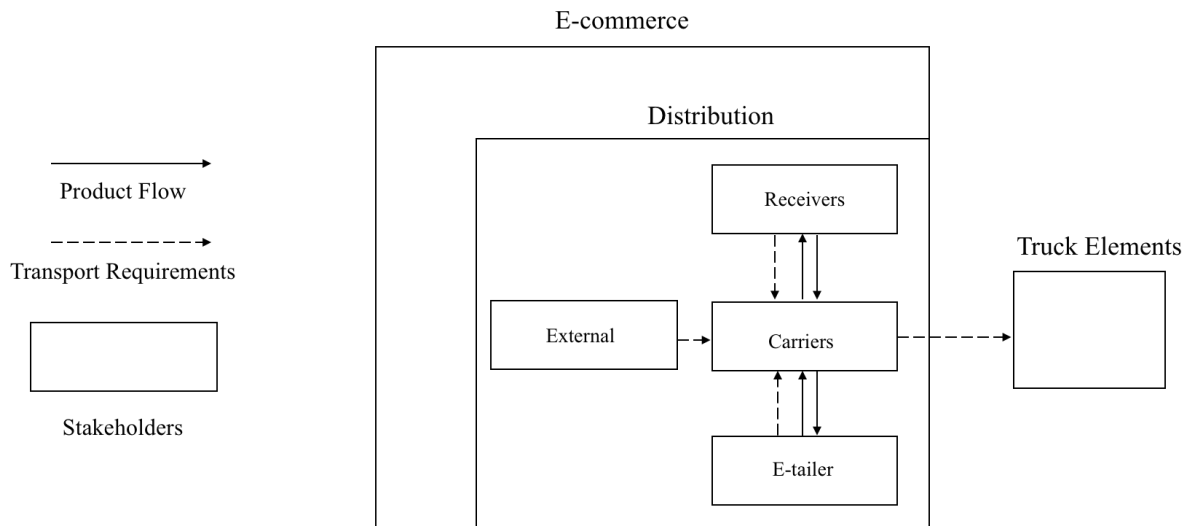


Figure 2.6 - Analytical framework for e-commerce distribution and its relation to trucks.

3. METHOD

This section provides an overview of the research design in and methodological process in 3.1 followed by a deep dive in 3.2 into how the data collection was executed. This is further divided into secondary data in 3.2.1 and interview data in 3.2.2. The method of analysis is presented in 3.3 and lastly, the reliability and validity of the study is discussed in 3.4.

3.1 Research design

The thesis is of an inductive nature, denoting a study where the findings precedes the theory generation, instead of using theory as a frame for creating deductive hypothesis (Bryman & Bell, 2015). The inductive approach needs no base hypothesis, unknown data can be discovered without any prior knowledge which is why it fits this particular thesis where the topic of study is uncharted (Bryman & Bell, 2015). The thesis is a qualitative study, where the data is focused on the context and is not produced through any statistical measures such as in a quantitative one (Kuada, 2012; Sreejesh, 2014). Bryman & Bell (2015) describe qualitative methods as a useful research strategy when the focus is on words in the analysis of data instead of quantification, leading to generation of theories rather than testing hypotheses. The specific literature on the topic of logistics in e-commerce is relatively limited which is why such a method of generating theories is appropriate for this study since few previous theories exist.

The study followed Bryman & Bell's (2015) description of the main steps for conducting qualitative research, starting with the step of formulating research questions. The next step according to Bryman & Bell (2015) is selecting relevant sites to study, in this case, the relevant distribution chains to scrutinize. Pruzan (2016) describes that the method of a project must be highly coherent with the research questions that have been decided on. Therefore, the research projects data collection was aimed at sources that could provide direct answers to the two formulated research questions. The third step according to Bryman & Bell (2015) is the collection of data, followed by an interpretation of the data. Thereafter, the data is put in contrast to the theoretical framework and lastly the findings are formulated (ibid.). Appendices are added to supplement the main report.

The interviews were structured in three phases, where first phase was focused on e-tailers in order to get information on how companies operate. The information from interviews with e-tailers were then used in the second phase that included interviews with carriers, logistical actors and logistical information facilitators. Third phase was interviews within heavy truck manufacturers where interviews were held within areas of previous findings.

3.2 Data Collection

In order to cross-check the information that is gathered Bryman & Bell (2015) suggests using the method of triangulation, which entail sampling data from a number of different types of sources. According to Bryman & Bell this will ensure that no misunderstandings take place since the researcher can double check data across sources and makes sure the data becomes anchored in reality. Thus, the data in this study was collected from three different types of sources in order to ensure that the results that were found would represent reality. First,

secondary data was collected from documents and statistical sites. Another secondary data collection came through participating in lectures, exhibitions and presentations on the subject of e-commerce and logistics. However, the bulk of the information came from interviewing relevant stakeholders in the e-commerce distribution.

3.2.1 Secondary Data

The report includes secondary data gathered and analyzed by governments, institutions and organizations with the purpose of mapping the e-commerce business in Europe to be able to analyze where heavy truck manufacturers are relevant. A thorough collection of secondary data includes going through a number of varying sources and databases (Kothari, 2004). This was kept in mind when collecting the data in this research piece, with the bulk of the secondary data being published and originating from statistical websites and governmental organizations.

The thesis used another source of secondary data to complete the triangulation as described previously by Bryman & Bell (2015). This source consisted of visits to exhibitions, presentations and lectures by companies, organizations and academics with expert knowledge on the topic of e-commerce and logistics. The sources are presented in table 3.1 below, and consists of four academics, one company and one organization active in the transportation planning area. This data collection was conducted quite early in the project to create a general understanding of the topic and help formulate a relevant focus for the rest of the study.

Table 3.1 - Exhibition sources

Exhibition	Exhibitor	Organization	Date
Svensk Handel	Henrik Ekelund	Svensk Handel	6-9-2018
Vref Urban freight	Ceren Altunas Vural	Chalmers University of Technology	17-10-2018
Vref Urban freight	Joris Beckers	Universiteit Antwerpen	17-10-2018
Vref Urban freight	Heleen Buldeo Rai	Vrije Universiteit Brussel	17-10-2018
Vref Urban freight	Edoardo Marcucci	University of Roma	17-10-2018
Vref Urban freight	Sara Rogersson	SSPA	17-10-2018
Vref Urban freight	Maik Trott	Hochschule Hannover	17-10-2018
Logistik och Transport	Michael Brown	University of Gothenburg	7-11-2018
Logistik och Transport	Jan Conradson	Inquire	7-11-2018
Logistik och Transport	Lina Olsson	Closer	7-11-2018
Logistik och Transport	Frans Prenekert	Örebro University	7-11-2018

3.2.2 Interviews

The bulk of the data collection was collected through interviews. The nature of these, the sampling techniques and chosen interviewees are presented below. Interviews is a suitable method for data collection when, as in this case, the study is explorative and calls for certain flexibility (Kothari, 2004). The interviewees were found through web searches and the use of the authors contact networks and the interview proposals were made via email.

Sampling

The interviews were semi-structured with open ended questions to ensure that the interviews would be steered to focus on what is discovered to be relevant for the study (Collins & Hussey, 2014). The sampling for the study was non-probability purposive, meaning the interviewees was selected subjectively based on the purpose of the study and not by random or probability sampling (Kothari, 2004; Sreejesh, 2014). This is because the aim of study, *investigate how heavy truck manufacturers can adapt to the e-commerce transport operations requirements in the European market*, is to represent only the relevant industries, in line with the first research question, where e-commerce is a growing or a prevalent purchasing option, and not the European transport sector as a whole. Furthermore, it ensured that the study could be executed under the given time and resource constraints. Interviews with relevant employees at Volvo were also conducted. The sample for these was decided in collaboration with Volvo, since they are aware of where their knowledge lies in the organization.

Interview objects

The literature review worked as basis in the sampling of interview objects, where some industries were found more relevant to study. The study was conducted on European level and interview objects were chosen that are present in both Sweden and on European level, out of convenience. Industries with large revenue in e-commerce and industries with a big potential was targeted as interview objects. Industries that were subjectively found interesting were clothing, groceries, furniture, pharmacy and electronics. Electronics was not furthered examined due to that six out of six respondents declined an interview. For other industries the response rate was much higher and companies in respective industry were thereafter targeted in order of relevance, out of previously stated sampling reasons. The response rate for other categories was much higher, where nine out of thirteen accepted. For each interviewed organization, specific interview objects were targeted that were relevant to the area of e-commerce and logistics.

Bryman & Bell (2015) describe the method of snowball sampling which was partly used in this study. This concept is based on letting the sample grow by getting information of other possible interviewees during the interviews. For example, the literature did not cover the importance of interface integration in transportation, but during interviews this was frequently discussed as a relevant factor in the chain. Therefore, Unifaun was contacted, who work as an interface integrator between carrier, e-tailer and end-customer.

Literature together with empirical findings was later used a base for selecting interview objects within the heavy truck manufacturer Volvo, together with the supervisor at Volvo. Relevant areas in the findings were matched with same field of area within Volvo, for instance, the case of communications and telematics. All interview objects are presented in table 3.2. In total, 15 interviews were conducted.

Table 3.2 - Interview objects

Name	Company	Role	Communication	Date	Duration	Phase
Annika Mårtensson	Ellos	CEO at Homeroom.se (Ellos Group)	In person	7-11-2018	1 h	
Jerry Gustafsson	Dagab	Logistics developer	Phone	13-11-2018	0,5 h	
Karin Anesand	Willys	Head of CRM	In person	8-11-2018	0,5 h	
Julia Larsson	Apotea	Customer service officer	Phone	9-11-2018	1 h	1
Erik Kinsch	Relex	Operation director	Phone	21-11-2018	1 h	
Johnny Sällberg	Urb-it	Chief sales officer	Phone	20-11-2018	1 h	
Jörgen Olsson	Postnord	Logistics counsellor	In person	16-11-2018	1,5 h	
Maria Oscott	Closer	Project manager	In person	29-11-2018	1 h	
Staffan Isaksson	Unifaun	Product strategy	In person	26-11-2018	1 h	2
Klas Nilsson	Volvo Trucks	Product manager	In person	23-11-2018	2 h	
Anders Pettersson	Volvo Trucks	Director transport industry analysis	In person	11-10-2018	1 h	
Malin Gabre	Volvo Trucks	Senior feature manager	In person	23-11-2018	1 h	
Björn Tynelius	Volvo Trucks	Feature specialist	In person	23-11-2018	1 h	
Jörgen Visen Wahlund	Volvo Group Connected solutions	Director product planning	In person	29-11-2018	1 h	
Henrik Willford	Volvo Group Connected solutions	Senior innovation manager	In person	10-12-2018	1 h	3

Semi-structured interviews

Interview objects were contacted through mail or phone, where contact through phone was favored over email conversation, after the sampling procedure. Interviews were semi-structured, open questions based, in order to get general but also in-depth knowledge of the topic (Bryman & Bell, 2015). Before each interview the interviewees were briefed with the questions beforehand so there would be no misunderstandings and so they could prepare and give more thorough answers (Kothari, 2004). The questionnaires can be found in appendix C. Questions that were not included in the interview guide were asked when they came up as the interviewer picked up on something during interview and also for interviewees to clear up inconsistencies in answers (Bryman & Bell, 2015). The interviews were focused on the understanding and the implications of requirements connected to e-commerce and its transport. Interviews were held with a clear focus in order to address more specific issues and started with a brief introduction and the purpose of study to get more accurate and precise answers relevant to the thesis (Bryman & Bell, 2015).

Interviews were preferably held in person, but some interviews were held over phone, but there was no difference in approach between these two interview settings. Recording together with transcription were used if the interviewees accepted and in other cases where tape recording was not accepted only transliteration was conducted. Recording was used in order to assure that nothing was left out and also a more thorough examination of what was said during interviews (Bryman & Bell, 2015). The interviews were held in the same way, in terms of the same interviewer and approach when conducting the interviews. This was done in order to assure that different interviewers could not affect the interview and lead to different outcomes. The duration of the interviews ranged from 30 minutes to 90 minutes with an average of an hour.

3.3 Method of analysis

Regarding the analysis, a qualitative review normally includes a less formal approach than that of a quantitative (Bryman & Bell, 2015). Therefore, it is of high importance to be structured when treating the collected data. For a proper, qualitative data analysis to take place the collected data must be transcribed, categorized and structured carefully so that the data can be treated homogeneously (Collins & Hussey, 2014). The interviews were transcribed carefully and the material was categorized for easier extraction of the data (Kothari, 2004). These categories were created to fit the analytical model presented in chapter 2.5, in which requirements were presented from the point of view of various stakeholders. Thus, the categories were based on these stakeholders. The transcribed material was color-coded to match a certain category of requirements and then extracted to be used in the empirical material in the thesis. The transcriptions can be reviewed upon request.

The basis for the analysis was the analytical model, described in chapter 2.6 which was used in relation to the presented empirical data to find similarities, holes and differences between the material and the framework. The analyzed material was then structured according to the major themes of the framework: e-commerce, distribution, stakeholders, their requirements and lastly the heavy truck manufacturers role.

3.4 Reliability and validity

The reliability of the research denotes the consistency over the collection of the data, meaning that all separate measurements of data should be conducted identically so that no instance of the collection will give skewed result (Pruzan, 2016). This was ensured through using the same interviewers for all data collection, so that no changes on approach could be seen during the interviews. Additionally, the interviews were structured beforehand with a set a pre-prepared questions, although they sometimes strayed in line with the nature of semi-structured interviews. Furthermore, all data was categorized using the same framework which ensured equal treatment of the data for the analysis.

The validity of a research denotes how well it has been established in reality, meaning if it actually measures what it sets out to measure (Pruzan, 2016). Internal validity was increased by continuous scrutinization of the analytical framework. Furthermore, having collected secondary data representative for the population the study targets ensures that a discussing regarding the primary data is grounded in reality. External validity is defined as the extent a research project can be generalized over a population, which for this thesis is limited because of the scope of studying a single case truck manufacturer (Pruzan, 2016).

There are some factors that might have affected the study keep in mind. Purposive and judgmental sampling might lead to sampling biases since they will not present completely representative results (Sreejesh et al., 2014). This means that the companies chosen to be studied might not rightly represent the industries as such. Or, they may be chosen to support prior biases that the researchers have and therefore leading to desired but unreliable results (Kothari, 2004). Additionally, the study runs a risk of not picking the most relevant sample if not the absolutely newest possible literature is used. The e-commerce business is moving rapidly, wherefore it is important to study the trends that can be seen today and not years ago,

therefore the literature provided is based on the current streams of literature including some reports published outside of academic journals. The same goes for the case study for the heavy truck manufacturer, Volvo might not represent truck manufacturers as such since they are bound to be more proficient in some areas than others (e.g. combustion engines and not IT). Furthermore, qualitative interviews carry the risk of having subjective results due to the researcher/interviewer's pre-notions, prior biases or subjective views on the subject matter (Pruzan, 2016).

4. EMPIRICAL FINDINGS

The following chapter includes e-commerce in Europe in 4.1, followed by different stakeholder requirements and heavy manufacturers role in e-commerce distribution in 4.2.

In 4.2.1, the requirements from end-customers that have been found is presented, followed by 4.2.2, covering carrier requirements. 4.2.3 presents the e-tailer requirements and 4.2.4 the external requirements. Then, lastly, the role of heavy truck manufacturers is covered in 4.2.5.

These empirical findings are summarized in table 4.1 below, following the structure of the analytical framework with the categories: e-commerce, distribution, stakeholders, transport requirements and truck elements.

Table 4.1 - Summary of empirical findings

E-commerce	Distribution	Stakeholders	Transport requirements	Truck elements
<ul style="list-style-type: none"> E-commerce growth varies greatly across Europe 	<ul style="list-style-type: none"> New modes of delivery are becoming more important 	<ul style="list-style-type: none"> New stakeholders such as last mile actors and information system integrators affect the distribution 	<ul style="list-style-type: none"> Poor alignment of requirements from stakeholders 	<ul style="list-style-type: none"> Need for connectivity solutions
<ul style="list-style-type: none"> Cross-border shopping growth 	<ul style="list-style-type: none"> Growing issues with last mile and reverse logistics deliveries 		<ul style="list-style-type: none"> Requirements on flexibility of mode of delivery 	<ul style="list-style-type: none"> Possibility to connect APIs to facilitate information sharing
<ul style="list-style-type: none"> Groceries as a potential new market 			<ul style="list-style-type: none"> The need for systems integration 	<ul style="list-style-type: none"> Cross-border streamlining of trucks
			<ul style="list-style-type: none"> Service as a differentiator 	<ul style="list-style-type: none"> The middle size segment of trucks is decreasing

4.1 E-commerce in Europe

The development of e-commerce has increased significantly since 2011 and Postnord (2018) refers to this as a digital market shift. One driver for a booming e-commerce market is the increasing internet penetration which has gone from 68% in 2011 to 81% in 2016 (Ecommerce Europe, 2018; appendix B). Internet penetration in Europe differs between regions, where northern and western parts of Europe are highly developed and have approximately 90% internet penetration, in comparison to eastern parts where only 66% have internet. In addition to that internet penetration is increasing it is clear that customers in Europe have a reduced resistance towards shopping online (Postnord, 2018). What is notable is that the shopping behavior is quite different dependent on age span; where the younger tend to be more open to shopping online and it is the younger population that drives the rapid increase of e-commerce (Postnord, 2018; appendix B).

Another example of this digital market shift is the market of consumer discretionary in Sweden, where 2015 a large share of growth came from physical stores but in 2017 almost all growth emanates from online shopping (appendix B). The e-commerce market is forecasted to 2018 be almost twice as big as in 2013 (Ecommerce News, 2018). In 2017 e-commerce generated a turnover of 543 billion EUR and is estimated to grow to 602 billion in 2018 in Europe (ibid; appendix B). The growth of e-commerce in Europe has been on a high level the last years but is forecasted to slowly decline after 2020 (Statista, 2018; appendix B). There is a huge spread between the growth rate between the countries in Europe where countries in the eastern and southern parts of Europe are growing very fast, while Nordic countries and the UK are seeing slower development (Ecommerce Europe, 2017). Countries such as Romania and Ukraine are growing with more than 30% in 2017 while Sweden only grew by 4% (ibid; appendix B).

There exists a large spread in the level of turnover between countries in Europe which is visualized in figure 4.1 below, where UK stands for approximately 78 billion EUR in relation to Estonia (the lowest) that stands for 0,3 billion EUR in revenue. The reason for that e-commerce in Germany, UK and France are bigger are both due to e-commerce maturity and the population size being far bigger than the other countries in Europe (Svensk Handel, 2018). Looking at the domestic turnover for the European countries, these three countries stand for 60 percent of Europe's total e-commerce (Statista, 2018). They also have a large part of the total online sales share where 81.5% out of all sales emanate from Germany, UK, and France (Enterprise Europe Network, 2018). If dividing turnover in Europe into same regions as in internet penetration, it can be seen that there is a big spread also between regions (Enterprise Europe Network, 2018; appendix B). Western and central Europe, which include UK, Germany, and France, are the largest regions in revenue. Noticeable from this table is that western region has ten times bigger market share than the eastern region, despite the fact that eastern regions have a larger population size.

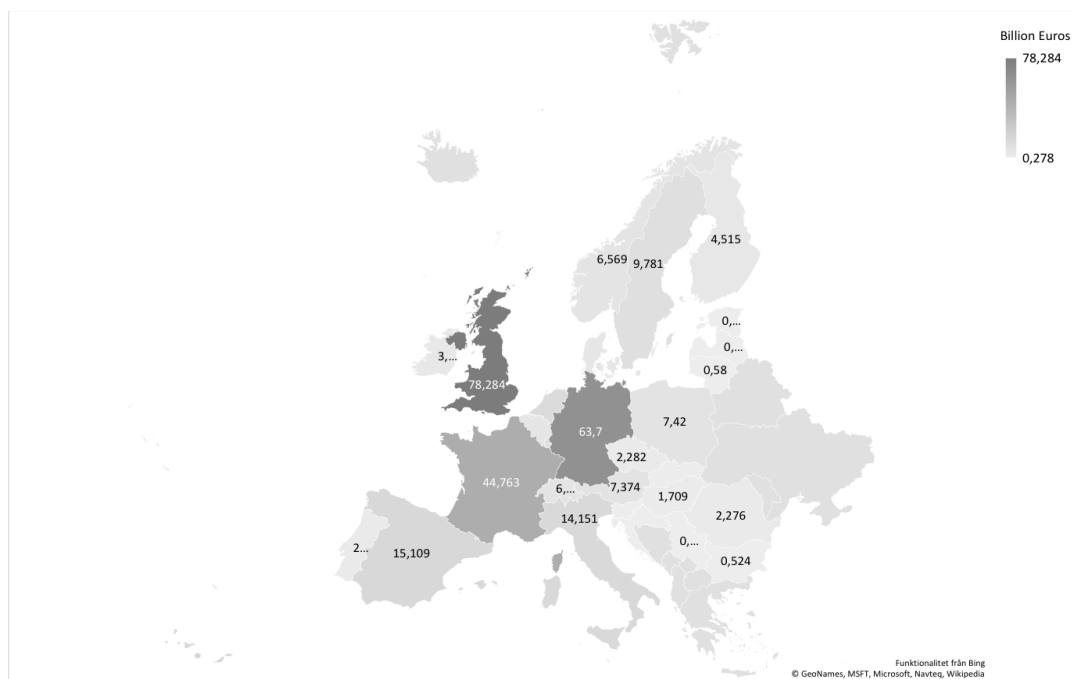


Figure 4.1 - Dispersion of e-commerce in Europe, data from Statista (2018)

Despite the digital change, physical stores still stand for the biggest share of the revenue in retail. UK is the most digitally developed country in Europe where the online share stood for 16,2% in 2016, in relation to Europe at large where the online share is 8,2 % (Enterprise Europe Network, 2018; appendix B). When looking at the European market on an industry level it can be seen that major industries such as clothes and sporting goods, household goods, electronic equipment, food and medicine are growing between 2016 to 2017 (Ecommerce Europe, 2017; appendix B). The above statement is supported by a study conducted by Svensk Handel (2018) that shows clothing, books and electronics being the industries most common in e-commerce, both in total and in relation to their respective turnover. The grocery market is the most untapped in relation to the potential turnover as can be seen in figure 4.2.

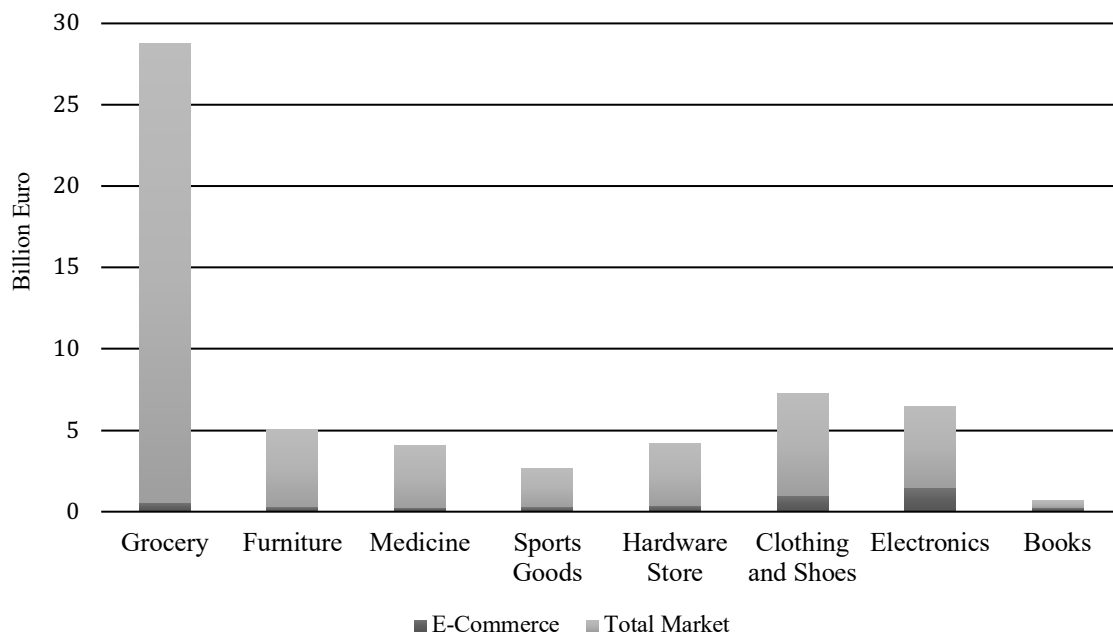


Figure 4.2 - Industries in Sweden with online share, adapted from Svensk Handel (2018)

Customers today are stated to be more open to using online channels for their purchases. PwC (2017) has investigated which channels customers prefer for different types of goods. There exists a gap in relation to preferred channel of purchase in relation to what is actually bought online in almost every product group. For example, groceries, where 23 percent of customers stated that they want to buy online but today only two percent of revenue comes from online channels (ibid; appendix B).

It is most common to buy e-commerce wares from a vendor situated in the same country as the buyer. However, cross-border shopping is increasing both amongst EU countries and across the globe (Ecommerce Europe, 2017; appendix B). This is supported by a Postnord (2018) study that shows that the behavior is increasingly global, and that people are more open to shop cross border. There is a legislation in Europe, that from 2015, a truck can carry up to 44 tons across Europe despite existing national laws, ensuring free movement of goods in Europe (European Union Law, 2015). When enterprises are asked what issues exist with cross border shopping, the most prominent are the high delivery and return costs, language barriers, complaints handling, labelling of products and restrictions in the current supply chain

(European Commission, 2017). For customers, the issues are mostly related to long lead times and technical failures (Ecommerce Europe, 2017).

There is a wide array of preferred methods for pickup around Europe (Ecommerce Europe, 2017). Most common is home delivery and mailbox delivery with Sweden as an exception where pickup centers is the preferred method. The customers are demanding faster and more flexible solutions, but the notion of price is still important, notably more important than good service (Barclays, 2014). Because of this, click & collect is expected to grow as the preferred choice of delivery, as well as lockers and collection points in the UK market, while home delivery will take off first when safer and more convenient methods are ready (Barclays, 2014). Additionally, click and collect is also the first choice when asking the retailers, followed by the use of NPO and operating own delivery vans (Ibid.). Most UK retailers deem click and collect to be the most used method in the future. This is a result of the retailers realizing there are issues with delivery when customers are not home, which is the largest concern for e-tailers today, followed by high managing costs, issues in handling peak delivery periods and damaged goods (Ibid.). When asked about future development that will drive growth for the last mile deliveries logistical providers claim that improved tracking, customer alerts, Sunday delivery, recovery options, safer deliveries and locker boxes are the most prominent (Barclays, 2014).

The European Commission (2017) has investigated the parcel delivery market and its actors and found that still a few actors are dominating (appendix B). The biggest actors today are DHL, Hermes, DPD and TNT; together they represent 75 percent of the parcel delivery market in Europe (European Commission, 2017). Dolan (2018) divides transportation activities into sorting, collection, long haul and last mile. The two biggest expenditures are last mile and long haul that stands for 53 and 37 percent of total cost (appendix B). European Commission (2017) give a broader range of cost for last mile delivery and state that it can vary between 13 to 75 percent of total cost.

The clear tendency is that economies of scale have a great impact on lowering logistic costs. Companies with turnover less €100 million have logistical cost of more than eleven percent. For company size bigger than €2000 million its respective number is less than five percent (The Establish Davis Database, 2016; appendix B). Logistical cost on individual products tend to go down with the price of the product. Logistical cost for individual products with a value below €10 have a cost of ten percent and products with a value of more than €20 are only about four percent (The Establish Davis Database, 2016; appendix B).

4.2 Stakeholder Requirements on e-commerce transport

This section provides the gathered empirical material regarding what requirements the various stakeholders from the analytical framework have. In order to give an understanding of how the interviewees are linked together a visualization is presented below in figure 4.3. Phase 1 of the study is represented by e-commerce actors in figure below that includes actors within groceries, pharmacy and clothing. Phase 2 includes transport actors, parcel delivery interface, warehouse management and lastly external stakeholders, where the three latter are facilitators in the logistical activities but are not active in moving the goods and are therefore not linked to other actors in chain. Phase 3 includes interviews within several business areas of Volvo that is

depending on previous findings. The arrows in figure 4.3 represent the physical flow of goods. The link between heavy truck manufacturer and transport actors represent the flow of information between these actors. All interview objects are presented in table 3.2.

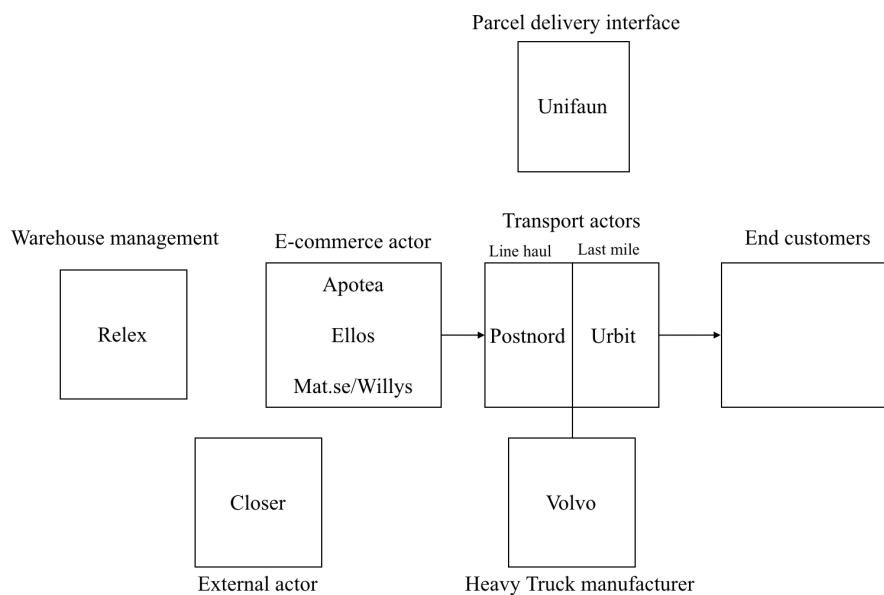


Figure 4.3 - Visualization of stakeholders and their involvement in the e-commerce chain.

4.2.1 E-tailer requirements

This section consists of gathered information from interviews with e-tailers focusing on their activities and their requirements. The following section is divided with requirements by industry into clothing, medicine, groceries and lastly furniture. The distribution is not always e-tailers main focus. The Product strategist at Unifaun explains:

“It is not included in the creative process of e-tailing to handle distribution”

Most e-tailers are clear on their business statement but they are often not clear on how to distribute their goods in terms of picking, packing and the transport which often is neglected.

Clothing - Ellos

Ellos is a company who sell clothing and accessories. All warehouse activities such as stocking, picking & packing and sorting are operated by themselves. Ellos state that they have trouble in peaks to operate warehousing activities quick enough and that the bottleneck in delivery often is at their own warehouse. Ellos operate both the Swedish and Norwegian market from their warehouse but they separate the two flows to the different countries in outbound. Ellos has limited amount of delivery options in check-out. The CEO at Homeroom.se at Ellos group explains:

“We have discussed since long if customers are to be given more choices - but we consider that customers today already have so many options that that the logistics will become too complex”

Ellos state that customers today can choose between regular or express delivery from Postnord. Regular delivery is delivery within 2-4 days, which is free above 449 SEK and for orders below are customers charged with 50 SEK. Ellos other option is express delivery where customers get their goods next day if they place the order before noon for an additional cost of 69 SEK. Express delivery has grown latter years and is a used as an upsell towards customers. Ellos have internally been discussing whether or not they should offer different kinds of options for delivery but decided that customers today already are facing a sufficient range of choices.

Ellos do not operate their transport activities, instead they have a third-party deal with Postnord for delivery. According to Ellos, Postnord is either delivering parcel to a pick-up point or smaller packages that are delivered as A-classified letter¹ as home delivery. Ellos do not offer delivery to terminals because they state that they consider this delivery method to give to low customer experience, mainly for that terminals are located outside city centers.

According to Ellos their requirements towards their transport actors are restricted to lead time and keeping cost of transport low. Ellos consider their part of the transaction towards customer completed when goods leave outbound. After that point, Ellos mainly focus on overseeing that lead times to consumers are followed and that the goods are not damaged or held by the transport actor. Given that they do not differentiate delivery time for customers, Ellos mean that they have no incentive to let Postnord have flexible options on delivery times.

Ellos state that they are working hard with increasing service for customers in terms of faster delivery and other possible solutions for delivery. Today's focus is on improving contracts with existing transport partners where Ellos are trying to integrate Postnord's ordering system into Ellos webpage in order to make transport more transparent. Ellos state that they have limited access to track parcels after that parcel leave outbound. Ellos track their parcels through Postnord's API third party tracking system Unifaun, where information about scanning points in the flow are visualized. For package sent in letters there is no possibility to track goods between outbound and delivery.

The clothing business is in general facing lot of issues with reverse logistic according to Ellos. Ellos can see that, depending on product group, reverse logistic differ but for jeans and shoes return rates are as high as forty percent. Ellos have chosen to charge customers for reverse shipping which helps keeping down return rate, but they state that competitors with free returns have as high as seventy percent in return rate. Ellos fear that customer behavior of return shipping would escalate if having free returns which is the biggest reason for charging customers. Ellos state that reverse logistic not only ties capital but also creates waste in form of damaged packages which is a big issue.

Pharmacy - Apotea

Apotea is a large online pharmacy actor present on the Swedish market. Apotea have one large central warehouse in Sweden where they operate their own activities. Apotea state that their vision is to deliver a great assortment, low prices and convenient deliveries. Therefore, Apotea

¹ A parcel that is delivered with the standard post flow.

have contracted a lot of transport actors in Sweden in order to give the customers a wide range of delivery options. Apotea state that they have contracts with most of the big transport actors such as Postnord, DHL and Schenker and additionally many small actors providing last mile delivery services. Apotea have several options in delivery methods with everything from home delivery such as delivery with pure home delivery actors, delivery with morning paper, automated parcel lockers and pick-up points. Parcel lockers are only optional in Stockholm, where they are situated on tactical locations where people pass by, such as subway stations and inside stores. Parcel lockers have, according to Apotea, low impact on emissions and the use of this service has increased a lot.

According to Apotea customer preferences have earlier been pick-up points, but it has started to switch towards home delivery. Apotea state that home delivery is increasing rapidly but the delivery method pick-up points still stands for fifty percent. Apotea explain that they help customers with making a suggestion for which transport actor or solution that is best depending on geographical location, and most customers chose the suggested solution.

Apotea explain that they are contracting transport actors by two party agreements so that they are still in command of transport. Apotea do this in order to assure delivery service and to handle the information flow by themselves. Apotea explain that carriers pick up packages at their warehouse and that Apotea trace their trucks. Apotea offer their customers transparency for tracking parcels via tracking link provided by Unifaun which is highlighted with the quotation below, as stated by the Customer service officer at Apotea.

“Traceability is the alpha and omega. If the customers goods are missing we want to know where the problem lies”

Apotea have set high requirements, both internal and external, on their transport operations. Apotea explain that their main driver is to have a high customer satisfaction. Apotea have high requirements from Läkemedelsverket on packaging and how parcels are being transported in terms of temperature and how goods are handled. Apotea further explain that they have broken their distribution down to some key metrics such as number of delivered parcels, how many successful deliveries, number of broken packaging and price for the transport. Apotea consider themselves in the forefront of sustainability work where they from 2019 only will allow Euro Class 6 trucks, with some exemption on Euro Class 5, on their property in order to promote low emission transportation. Despite working for a more sustainable future, they still offer free shipping. The Customer service officer at Apotea states:

“We have always had free shipping and believe that it should be that way”

Apotea today offer free shipping for all goods and state that shipping has always been free and that it is a necessity. For Apotea, the price of last mile delivery has decreased since customer behavior tendency towards home delivery has increased and therefore the density of parcels has grown. Apotea argue that their home deliveries have been successful and that their last mile partners have good local knowledge and good contact with customers which is an advantage according to Apotea.

In terms of problems with reverse logistics, Apotea state that they have very low return rate since pharmaceutical goods have a no return policy due to legislation. For other goods such as shampoo are they offering comprehensive information about the item on the webpage and if package are broken customers can no longer return the goods. Apotea consider that one of the biggest problems with their transport is that their shipments have too low filling degree and look at optimization and cooperation in flows so that no unnecessary shipments are conducted.

Groceries - Willys and Mat.se

Sweden today have many actors within the market for groceries. There are two types of actors, where some offer home delivery and others that have a more of a multichannel approach and additionally offers pick-up in stores. Two players in this market are Mat.se and Willys which both are included in Axfood group. Mat.se are only operating as an online actor with home delivery as the only option, while Willys additionally offers pick-up in stores.

For Mat.se, the pure online player, Dagab operate everything from warehouse activities to transportation. Online orders from customers to Willys that choose home delivery are handled in the same flow as Mat.se. Dagab further explain that the transportation of groceries is today conducted solely by 3,5-ton trucks. Dagab explain that customers can choose between delivery windows with two different intervals, either one hour or three-hour slots, with different pricing. Today accessibility to shop groceries online situated in the bigger cities is higher than less dense areas according to Dagab.

Dagab state that they have several requirements on transport, both in terms of service and on the truck. The truck has requirements in terms of classification on the engine and also regarding emissions. In addition to the truck Dagab also have monitoring of the body where they have qualitative requirements in terms of temperature and hygiene. Dagab track their truck fleet and also the goods within through a GPS system and can with it monitor delivery planning. Dagab sets high requirements on their service which is explained by Logistics developer at Dagab:

“In order to succeed you should be able to deliver the best quality at the best price. Ensuring that the customers get the same quality as in stores och feel a warm reception when they meet the driver.”

In terms of service Dagab have a strategy of delivering more than just groceries. Drivers have direct contact with customers which makes the customer satisfaction important regarding both the grocery and delivery quality. Dagab emphasize that they put a lot of focus in the customer relationship in order to get a good review and therefore reach out to new customers.

Dagab argue that the customers choosing the home delivery option are willing to pay for last mile delivery services and state that they do not have considered the cost of last mile, they see it as a necessity to offer in order to be an attractive actor. In addition to home delivery, Willys also have the possibility to choose pick-up in store which is a less expensive choice of delivery where customers conduct the last mile. Willys explain that they have installed automated parcel

lockers with cooling systems inside their physical store entrance. Willys further explain that customers choose groceries online and then choose between pick-up options of three-hour slots. Store personnel then pick and pack groceries in bags and later put the bags in the parcel lockers. According to Willys, customers are showing an increasing tendency of choosing this mode of delivery.

Furniture - Ellos

For Ellos, furniture and household goods is the fastest increasing branch of e-commerce and stands for halve of Ellos revenue. According to Ellos, the rapid development of this sector has led to that they are building a new warehouse exclusively for furniture.

The distribution for these types of products differs from clothing, where furniture as the product group often include bulky goods that take lot of space, both in inventory and during transport. Ellos explain that furniture flows are more complex than their other product groups where some goods are stored in their warehouse and some are sent by drop shipping. Ellos further state that they have contracted several different actors for different types of goods, where Postnord handle smaller and semi-bulky goods and DHL handle everything above. For goods that are shipped from suppliers through drop-shipping Ellos have contracted Postnord.

Ellos charge customers for shipping on all furniture goods with an administrative cost of 50 SEK. Ellos further explain that smaller goods are shipped to a Postnord collection point or can choose home delivery for an additional cost. For bulky goods there are two options of delivery, goods are either shipped to a terminal for an administrative cost or delivered home for an additional fee. According to Ellos customers are more willing to face longer lead times on furniture than clothing. On these types of product service level is often more important in terms of choosing delivery when at home. Ellos state that home deliveries are often conducted during day-time, which they consider as a problem for the customer experience. The CEO at Homeroom.se at Ellos explains that:

“When it comes to furniture customers are willing to pay for home delivery. The more expensive goods the more okay customers are paying for delivery”

Furniture goods are often more expensive and Ellos experience that customers are willing to pay extra for delivery on these types of goods. The costs of transport for these product groups are often higher which has led to that customers have to pay for delivery and additional service, such as last mile and reverse logistic. Reverse logistic is not as big problem in these product groups where some products, such as sofas, have less than one percent in return rate. Ellos argue that the return rate is held low due to that customers have to pay for returns.

4.2.2 Carrier requirements

This section covers the requirements on the transport operations that the carriers experience. This includes both the long-haul carriers such as Postnord and the last mile actors. This section lays out what preferences carriers have regarding delivery options, an overall view on last mile deliveries from carriers, what information requirements carriers have on the distribution chain

and lastly, what requirements on service that carriers have themselves, such as customer experience or reverse logistics. The Feature specialist at Volvo describes the carrier market as:

“The e-commerce market for carriers does not look the same today as it did three years ago”

The quotation expressed that logistical activities connected to e-commerce is developing rapidly. Big carriers are not used to adapting requirements from other stakeholders, their business is more built for producing an even process to get high filling degree according to Unifaun. They have more difficulty to adapt to the new market flexibility because of that they carry a heritage and a set way of working. In addition to this, big carriers usually face low margin for their long-haul activities according to Unifaun.

Carrier delivery options requirements

Ellos mean that the long-haul carriers have raised the question of trying deliveries based on end-consumers desired time of delivery. This would make the scheduling for the carriers easier since they would have a set date in the future and plan accordingly instead of the case today where the customer orders and the item is sent as instantly. Ellos have tried this method for larger items in the home furniture side of the business since customers need to be home and able accept the piece of furniture but have not implement it yet for the apparel deliveries. This is explained with the fact that they have no possibility to hold their apparels in stock for a longer period of time. Postnord explain that carriers themselves are not able to put requirements on the price structure of the transportation since they in turn are paid a certain amount from the e-tailers. Meaning, the e-tailers are setting the prices and that these are not transparently set to create a sustainable nor profitable system since most e-tailers are only interested in growth according to Postnord. Postnord have tried the use of automated parcel lockers but experiences an issue with the size of the investment since there is not enough scalability of the model, but also explain that the model is much more popular in the rest of Europe.

Urb-it put requirements on their deliveries to make successful deliveries in time and have this far been largely successful with a success rate of 98,6 percent. Urb-it explain that these are very high numbers in relation to traditional home deliveries. Furthermore, a large focus is put on providing a high service standard with every delivery, therefore they educate all of their personnel in how to present themselves when reaching the end-customer. To follow up on this, they have a system, included in the app where their service is provided where the end-customer can rate the delivery. Thus, their only real requirement on their own transport is high customer satisfaction.

According to Inquire (2018), a wide selection of delivery options only exists in highly urbanized areas today for a reason. For last mile deliveries to be efficient for carriers there needs to be scalability of the operations, which naturally does not exist in less urbanized areas.

Carriers and last mile

The Chief sales officer at Urb-it said the following quotation regarding the current base of logistical actors:

“Big logistical actors are good at shipping great volumes, long distances. But they are not strong at last mile services”

Postnord and the Feature specialist at Volvo both explain that the large, established carriers are not separating e-commerce flows from other package flows, e.g. the B2B package transports so that they can create large, easily handled distribution streams. The carriers are generally only producing standard services for transports, taking on the role as a third party logistics carrier. However, towards smaller and mid-sized e-tailers Postnord have started a new program that includes assistance with many parts of the logistics chain, with focus on warehousing. The nature of the carrier's own requirements on the transportation is complex since they are constantly shifting their vehicle base. However, one of the main objectives is mentioned as always focusing on efficiency of the whole distribution system. Postnord explain that setting new requirements which in turn leads to changing out the existing vehicle base is not a sustainable method since that would bring forth an unnecessary production pattern of vehicles as well as disturb the already efficient distribution chains.

Postnord emphasize that many e-commerce actors have problems with their profitability because of their distribution. The Logistics counsellor at Postnord explains his view of e-commerce distribution:

“E-commerce logistics is trivial and nobody is making any money”

The above quotation demonstrates Postnord's view and requirements on last mile transportation. Postnord believe that it is an inefficient business which will only survive as long as the e-tailers are pushing out wares to the end-customers. The capacity of the carriers such as Postnord is so much greater than all the other actors combined which is why last mile is not a large issue for them and leads them to being open to co-operations but stick to pick up points as their own concept. Postnord are also discussing other methods such as drive-in pick up points to avoid having to use warehouses and areas in inner cities. Furthermore, scalability of the last mile operators is limited since the large carriers are the only ones to have any established distribution networks in less dense areas, Postnord claim that everyone else are only interested in logistics where the urban density is high. An interesting factor to take into consideration is that Urb-it refer to themselves as a new kind of player, not a last mile actor, but a last yard actor.

Carrier information requirements

Regarding requirements on information, Urb-it need to obtain data on the name, location and how to access the end consumer. This information is not necessarily provided through the previous carrier in every respective delivery but can be obtained directly from the customer via their app interface. However, certain information regarding the weight and measurements is needed from the long-haul carrier to ascertain that the package can be transported by their deliverer. Lastly, they also need some kind of proof or security procedure so that the package can be picked up by the delivery personnel. This information needs to come from the end consumer themselves, as a part of the API interface. But in general, Urb-it mean that the cooperation between themselves and the long-haul carriers is essential for successful

distribution. The quotation below from the Logistics counsellor at Postnord shows their view on last mile activities.

“We don't see much advantage in last mile activities, we may be forced to start collaborating with last mile actors”

According to Postnord, the most important piece of information for larger carriers concerns the safety of their vehicles. Postnord have tried using RFID in their load carriers but as of now it is a technology that is too expensive in relation to its life span and the customers are not seeing a clear value in it. Focus is put on tracking certain high value products or products from high value customers. Internet of things is a growing matter in distribution, Postnord provide the computer manufacturers as an example of an industry who have implemented communicative tracking devices in their products themselves.

Postnord mean that tracking is an unimportant issue until the e-tailers are able to be transparent in their chains, which contradicts other stakeholders view. Today, the enterprise resource systems are not designed to be linked together, every actor have their own information sharing system. Postnord explain that the whole distribution industry is waiting for some sort of technology that makes it possible to link all these systems which is why Postnord only use their information for safety measures as of now. Furthermore, such a technology would need to be able to link together the companies in a one-to-many structure, the technologies that have tried have only been able to link a few actors with each other when in reality Postnord have a vast number of customers. For example, when an item is ready to be distributed the e-tailer notifies Postnord who in turn notifies the customer when they have scanned the product. This whole step would have been skipped if the e-tailers notified the customer in the first place, but this is not possible today because of the interface to the end-customer being owned by Postnord only. Postnord explain that there is a new driving force in the strive towards system integration in the shape of the new last mile actors.

Service requirements

Ellos explain that they are part of a larger flow in which their carriers consolidate their items, with items from other actors that have customers in the same areas. Meaning the carriers, in this case Postnord, require possibilities for distribution concurrence for their system to function. Ellos explain that the logistical heirs themselves have no incentives for careful and accurate deliveries since they have written long contracts that leave room for a certain degree of damages on the goods.

Urb-it recognize the looming entrance of Amazon on the European stage. Urb-it explain that Amazon are experts on fast deliveries and scale but can't provide the service that local e-tailers may and that their delivery options are few in reality since they are mainly operating limited geographical areas. This means, that upon the entrance of Amazon the carriers will have to put larger requirements on the service of their delivery operations instead of focusing on price and assortment (for e-tailers), highlighted by the quotation below from the Chief sales officer at Urb-it:

“Service will surpass price as the most important differentiator. Logistics will be more important than ever”

Regarding reverse logistics, Ellos explain that the carriers have discussed the use of trucks as flexible warehouses so that the goods can be resold quickly to customers again. Urb-it, as a last mile carrier, want to explore the reverse logistics possibilities but have no part in it today. Urb-it emphasize cooperation between the e-tailers and carriers as a key in this area. However, they have a large focus on environmental friendliness in general since none of their deliveries take place with motorized vehicles, with the motivation of both reducing traffic jams and emissions. Postnord claim that the issue of returns is not mainly in their hands, they are capable of returning items with a short notice but there is a lacking will from the e-tailers. However, they are noticing growing issues with their own return flow capacity since the volumes are getting huge.

Relax and Postnord bring up the issue of handling large quantities of deliveries from e-tailers and that delays are often incurred because of production or warehouse problems at the e-tailer themselves and not because of any issues with the carriers. Relax relate the issue to not having good enough tools for sales prognosis and that the issue will always be there as long as there are irregularities in sales.

4.2.3 End-Customer requirements

This section is divided into the main themes that were brought up by the interviewees. This empirical findings regarding end-customer requirements covers what delivery options the end-customers prefer, the requirements on the lead time of the deliveries, followed by a presentation of what information is relevant to the end consumers in. Lastly, data regarding the customer service and its usefulness in deliveries is presented.

End-customer delivery options requirements

The interviewed companies represent different views on customers delivery option requirements. Ellos explain that customers are willing to pay more depending on the price and nature of the product itself. For example, they explain that home delivery is more desired in the case of furniture than clothing. This can be attributed to both the size of the items delivered but also that customers are willing to pay a higher delivery fee for more expensive items. For the clothing items, customers demand free shipping, except for express deliveries which customers are more willing to pay for which is why Ellos are working towards managing faster deliveries for their customers. Apotea have completely different beliefs in what the customers are asking for in terms of delivery and have thus created a different strategy, they believe customers are desiring different options since no customers life is like another. Therefore, they are offering a wider range of delivery possibilities with different companies, vehicles, delivery modes. Urb-it are certain that there are customers willing to pay more for more flexible and quicker delivery solutions, however it is product dependent. Furthermore, it seems to be a grey area as to how much a carrier can charge the customers for these deliveries. As of now, they know that it cannot exceed the amount the less flexible solutions cost. The customers are not sure of what exactly they want which is why many solutions and price models need to be tried before anything can be considered certain. Urb-it have had contacts who launching an

environmental delivery option, which even though being more expensive, quickly became the most popular option amongst the end-customers. Closer support this statement by saying that customer awareness will first be created when at least three options are presented to the customers, instead of just providing one cheap and one expensive alternative. In general, Urb-it believe that there is not one path forward, customers demand different modes of delivery depending on many factors and single customers might not want their deliveries the same way every time since their context and situation might change from order to order.

Postnord presents a somewhat conflicting idea, compared to Urb-it, of what the customer values the most with the following statement by the Logistics counsellor at Postnord:

“Price is still the most important value delivered to the customer“

Postnord mean that the segment that is willing to pay for the convenience of delivery is not to be overestimated and is generally concentrated to small, inner-city areas in larger cities. However, they still believe there is a need for easier and more sustainable last mile deliveries today due to the fact that the car as a transportation medium is not as prominent in younger generations. Dagab present no notion of what the end-customers require in terms of the delivery but focus more on the product side. The only notable requirement for customers buying food online is that the items they have bought are believed to have the same quality as in store. If they are not, reverse logistics becomes an issue for Dagab, however as of this day they have not experienced any issues with this. Prenkert (2018) explains that, regardless of what customers are deciding as their distribution option, 85 percent always want to decide the mode of delivery themselves. This is supported by Urb-it who claim that customers never want to be given a time of delivery but instead decide completely for themselves within a narrower delivery window. If these requirements on the delivery are not met, 38 percent of the customers will not return to the e-tailer according to Urb-it. Lastly, Closer present that there seems to be a general tendency amongst customers for automated parcel lockers as their first choice of delivery.

Delivery time requirements

The Chief sales officer at Urb-it state the following regarding the end-customer delivery time requirements:

“The time span for delivery has to be less than one hour in order to make the customer satisfied.”

Apotea believe that customers need a larger span of choice in terms of lead time of the delivery. Using Apotea, the customers can choose to get delivery from the next day until one week ahead. The reason for not having a larger span is motivated with that customers generally will generally not plan ahead more than one week. In line with this strategy, Inquire (2018) present that customers have up to this day set their requirements for their deliveries based on the factors where, when and how. This has changed to the customers requiring the deliveries when they are actually needed and not as fast as possible. However, 90 percent of Apoteas customers always chose the first quickest possible delivery option. No competing actor have the same

spectrum of delivery possibilities on the market which is why Apotea are considered a market leader by the other interviewees. Relex support the statement that customers are not always wanting the fastest possible delivery and correlates to what type of product is ordered. Relex explain that the key is delivering when it is promised and not necessarily quickly. Thus, there is a call for differentiating product delivery times based on the delivery time requirements for each product. However, the situation today is that the majority of the e-tailers today lack control of their production and warehousing wherefore they cannot promise deliveries for certain items when other are blocking up the logistics flow.

End-customer information requirements

Ellos have noticed that information sharing is of great value for the customer, but not only for tracing the necessary information such as actions, change of ownership or faults that might occur somewhere along the distribution route. The quotation below by CEO at Homeroom.se at Ellos group shows the extent of the use of tracing:

“We have received information that customer traces their goods on average ten times during each delivery”

The average end-customer uses the track and trace functionality on their package about ten times for every ware that is sold, which they refer to as the customer trying to satisfy some kind of need for control along the chain. Postnord supports this by saying that customers even if the delivery is expected or known to take many days there is still an interest in tracking the items, which they attribute to a need for convenience, regardless of the nature of the delivery. However, today the information shared does not adhere to this convenience, customers would want information already in the checkout phase of the purchase which is not a current reality. For this problem to be solved they propose a better use of application programming interfaces (API). The Chief sales officer at Urb-it presents an interesting view on the tracing requirement:

“One of the most important pieces of information is to know exact ETA for delivery, this is however only a symptom of a larger problem that has been caused by the fact that delivery companies have long been failing delivering what is promised in time.”

The above quotation shows Urb-it's view on why tracing is central. Meaning, customers track packages intensively because there is no trust that the package will arrive in time as a result of previous experiences. If the expected time of arrivals that are set would be more reliable this behavior would disappear. This is supported by Inquire (2018) that state that people have low trust towards big carriers and their delivery and that they often track parcels in order to see that delivery is conducted as agreed upon.

Urb-it also explain that 64 percent of the end-customers want to be able to update their delivery place and time after the order has been made. This is truer for larger cities than in rural areas because the people living in urban areas are generally on the move more than others.

Customer service requirements

Postnord believe their customers require a high service delivery standard. Carriers have been working towards becoming service instead of delivery firms for a long time, but logistical heirs are generally slow and hard to change. The reason people experience better service from the younger, smaller companies is that it is easier to build a high delivery service with the start of a firm according to Postnord. Furthermore, this issue is only experienced in larger cities because of the turnover of employees that exists in more dense urban areas. This is also considered by Urb-it, who explain that customer service will soon be the most important differentiator towards the customers, overtaking price. Inquire (2018) categorize the customers into three different types with three different main goals: timeliness, price, and convenience. Where the customers who prefer timeliness usually want fast or deliveries based on when they want it, the price-sensitive customers mostly focus on getting the cheapest option and the ones premiering convenience are willing to pay for a certain comfortableness.

Postnord believe that if the end-customers requirements are not fulfilled the delivery complaints generally end up with the carriers and their customer service, regardless of whether the fault lies with them or not. The Logistics counsellor at Postnord explains that:

“We have made a mapping of the customer journey to rid ourselves of customer complaints. The problem is that the customers always blame Postnord regardless of where the fault lies.”

This is explained with the customer using them as an interface as soon as the order has been put at the e-tailer. Meaning, the e-tailer relieves themselves of all delivery responsibility as soon as the purchase happens. This interface is the track and trace mobile apps that are owned and operated by the carriers. So, if an e-tailer accepts an order but fails to produce the items that are supposed be given to the carriers for distribution the blame will still lie with the carriers, which is why Postnord call for better transparency in the distribution chain.

Postnord have experienced issues with customer requirements when it comes to the ownership of the last mile home delivery. As an NPO they have traditionally been the company to deliver parcels in Denmark and Sweden, but they are aware that the price for these deliveries are high and have investigated different methods for circulating these kinds of deliveries. In attempts to outsource the last mile deliveries to more efficient actors the response from the end-customers have been negative, they have experienced a certain inertia towards not having an NPO delivering their packages.

4.2.4 External requirements

The following chapter is divided into the future role of heavy trucks in e-commerce, the sustainability requirements followed by the information requirements on trucks, the set-up of delivery modes across Europe and lastly, external requirements on interface integration across the distribution chains.

Heavy Trucks role urban logistics

Browne (2018) sums up a generally accepted view of future urban logistics with the fact that nobody seems to imagine large and heavy vehicles as part of urban areas in the future regardless

of the volumes they are shipping today. He also mentions that activities are generally concentrated around certain periods which is why off-peak deliveries is considered a solution. Closer state that it will be long before heavy trucks will be irrelevant in e-commerce and urban logistics, but that the future entails stepwise scaling down the size of the vehicle until you reach the city centers. Meaning that sophisticated feeding systems need to be in place. However, a large part of distribution will still include heavy vehicles since a large part of all transports are of hefty size. Prenkert (2018) adds that return flows are a growing issue for cities since it is more and more becoming a standard in e-commerce and creates separate flows that are not under control as of now. To eradicate this problem, he claims that the change needs to come from end-customers and not structural changes.

Postnord believe that the major shifts in distribution will come when smart cities are implemented and are unsure what the development will look like by then but believe that there will be no major societal shifts on requirements until that happens. Postnord also note that this will mean a large challenge for the new last mile actors, since these are the companies operating in areas where the change will take place. Closer explain that the future must entail the integration of city and distribution planning, however the horizon for any changes is quite long. As the climate is today, there are many requirements as well as many ideas and interesting startups. Closer believe that patterns and standards of what is functioning and not, will be discernible in a few years' time. This mean setting external requirements on distribution that is flexible and easy to change. Furthermore, Closer explain that the integration between B2B and B2C deliveries can be crucial in the future since many heavy trucks that are necessary are already traversing the cities within the operations of B2B, such as construction projects. However, Closer mean it is crucial that these vehicles are free from fossil fuels. Moreover, Closer explain that e-commerce has resulted in flows being moved from malls to inner cities, however the volumes remain intact for the inner-city physical stores. Svensk Handel (2018) state that shopping areas, such as cluster of retail actors in city areas have increased its market share since 2005. They further conclude that e-commerce increased its market share but shopping malls, situated outside city centers, and retailers with separated stores are decreasing its market share significantly during same time span (Svensk Handel, 2018). Closer explain that this creates a problem since retailers are generally separating their e-commerce and Brick and Mortar distribution flows even if they are being transported to the same general area. Thus, there is a call for integration of flows and moving away from the old distribution structures according to Closer.

Sustainability requirements

Closer explain that the major challenges within future urban logistics are related to noise, congestion and carbon dioxide. The last issue is now taken care of through the implementation of zero emission areas in new areas of the inner cities. Closer also explain that the major issue is not the transportation conducted with heavy trucks, these are generally well filled and only link to one destination but the smaller trucks and vans that are taking care of most last mile operations. Urb-it believe that the market is responding only to what the end-customer wants. This behavior will lead to an environment where governmental decisions will need to be taken to put a stop to the behavior, if it does not change by itself. This development is further exaggerated with the introduction of many actors on very small geographical areas. To change

this behavior Closer explain that change will come in the shape of regulations since e-tailers risk being outcompeted if they, for example start setting prices for their transports. Moreover, deliveries are based on fixed points today, Closer suggest that the movement and flow of people should be considered when for example setting up pick-up points.

Postnord means that government is not taking whole distribution chains into account when setting requirements on the vehicles that are used. This is elaborated by the Logistics counsellor at Postnord:

“The worst investment is to throw away what already works. Replacing an old truck with a new will have greater effects on sustainability.”

For example, municipalities often put requirements on what types of vehicles can be used which in turn leads to companies like Postnord needing to acquire new vehicles. This creates an unnecessary consumption behavior and is in itself unsustainable since there is a whole system to take into account. In contrast to this, Closer explain that the replacement of old vehicles mean that these are then further sold to markets where the emission standards are lower in turn replacing even older trucks that are still used on these markets thus creating sustainability in more than one market. Additionally, regarding calls for replacing the active vehicle fleet, Closer bring up geofencing as a growing technology for the control of vehicle flows in cities, however this technology is only efficient when implementable in every vehicle in the market.

External information requirements

Regarding the requirements on information that is interesting from a societal point of view Closer state that the data that is most important is knowing when and where errors, stops and faults are occurring so that these can be worked around through changing the city networks. Closer are also interested in specifications and sizes of vehicles used so that any regulatory measurements taken are set within the realm of reality. For example, there have been previous examples of government agencies setting size restrictions on vehicles used within the city limits to just below the standard size of the truck manufacturers vehicles which lead the transporters to use noticeably smaller vehicles and therefore lose efficiency in the distribution.

Modes of Delivery

Today, Closer explain that lack of transparency leads to a distortion of delivery modes. The Project manager at Closer state the following, showing their view of what role governments must take in the logistics of e-commerce:

“Make the price of transport transparent. Then it will be possible to differentiate, where the cheapest option will be connected with longer lead times and more expensive choices would mean shorter and more convenient delivery. [...] But it has to be regulated from government, otherwise companies that charge for delivery would be outrivaled by competitors.”

Across Europe, the prerequisites and requirements regarding the methods of delivery varies greatly as explained by Closer. Where some areas, such as the Nordics pick-up points have

been the standard for a long time it has now only been introduced recently into certain countries. Furthermore, there might be regulatory issues regarding some modes, for instance in Belgium and Netherlands where parcel boxes are restricted as a result of laws regarding safety. Generally, there is no one solution that can be used across Europe. Furthermore, Closer explain that all solutions are tied to certain actors and that the society would benefit from a neutralization of the transportations, this seems to be supported by actors owning facilities in the cities who are experiencing an unnecessary spread of deliveries to their facilities.

Interface integration

E-tailers are using interfaces for tracking parcel in order to inform all actors in the chain. The structure of these were mainly laid out during the interview with the company Unifaun.

Unifaun is a Swedish company that works as a tracking interface between e-tailers, carriers and end-customer. For B2C retailers Unifaun are handling preparation of transport, creating transport documents and tracking transport with scanning points in the flow. Unifaun's solution makes it possible to collect and present data for all actors regardless carrier. Unifaun state that they handle data of more than 250 million parcels every year including many types of additional data such as emissions but also quality on agencies handling collection points. Unifaun further state that they provide follow-up for companies who wish to know lead time and pricing from carriers. Unifaun argue that it is pointless to track price data for single parcels for e-tailers because pricing of parcels rarely is wrong. Unifaun state that most e-tailers that buy follow-up do so for a couple of months until they realize that carriers seldom price parcels wrong from. However, lead time are often more interesting. This data makes it possible for e-tailers to be proactive towards customers and be able to better predict delivery time and thereby offer higher quality and also create loyalty with customers.

Unifaun explain that historically, e-tailers presentation of delivery options on their webpage has been done poorly, therefore has Unifaun developed and launched a software that e-tailers can integrate into existing platforms that easily can present different modes of delivery. Unifaun state that it is beneficial for e-tailers to present a delivery options in a perspicuous way. Unifaun elaborates on Apoteas many modes of delivery and that it was groundbreaking at the time but that Unifaun considers their check out to be to complex and confusing for customers to scroll through ten different options. Unifaun think that there is a possibility to make a more intelligent visualization of choices depending on what type of goods that are sold and historical data.

Unifaun state that they have no knowledge today of the cost structure for the different parts of the transport but are well aware that last mile is the most expensive. Carriers are facing low margins on transports where end-customer conduct last mile operation and that carriers should make up for this by charging for pickup and home delivery according to Unifaun. Unifaun argue that there is extreme competition from smaller actors and that big carriers cannot compete with smaller actors flexibility regarding last mile, because their transport set-up. Unifaun mean that the smaller actors today are highly innovative which drives the sector forward but there is a gap when there is no interface to order these services. In addition to this Unifaun mean that these innovative services most often offer home delivery and almost never within time slots.

In order to make distribution more convenient and increase options for end-customers Unifaun are planning on launching a solution in their customer interface where customer can change delivery options whilst parcels are on its way. This is explained by the Product strategist at Unifaun with the following statement:

“Under the right circumstances transport is worth everything - to capture these situations where customers are willing to pay is the transport business dilemma”

Unifaun explain that depending on situation customers can be willing to pay extra, for instance if ordering pharmacy to a collection point during a rainy day, Unifaun found that customers are willing to pay additional 125 SEK to get it delivered to the door. The app facilitates both for increased customer service and the possibility for carriers to sell additional services.

Unifaun state that the data of emissions from carriers are inadequate and are only based on templates. Unifaun further state that they want better data of emissions but that they have no exact way of measuring this. Their own data together with estimates and templates give a better estimation than the data the carriers can provide today. According to Unifaun e-tailers have rarely demanded to get information about emissions and sustainability from Unifaun and state that e-commerce has created an unsustainable branch with free shipping and free returns. Unifaun further think that the value of transport has to be visualized and priced accordingly.

Unifaun have no possibility to track exact location of goods today, the information today is excluded to scanning points. Unifaun state that they are aware of that heavy truck manufacturers today have the possibility to get better accuracy of lead time and positioning. Unifaun argue that better accuracy is not requested from carriers and that today it is not possible to present since heavy truck manufacturers are using different communicative language and that it is hard to compile in the same interface. Another issue according to Unifaun is that there exists at least one actor in between themselves and the heavy truck manufacturers regarding their relations and that Unifaun do not want to bypass their customers, the carriers, in any development. Unifaun explain that they have been part on a pilot project where RFID tags were used in order to track parcels. Unifaun used printed RFID tags which were proven not to be sufficient and it was not possible to scan all parcels through a scanning arch. The solution was proven to be costly and the conclusion was that the RFID technology is most suited for expensive goods.

Today there exists a big problem that tracking is hard across borders and that parcels need to be relabeled when passing country borders. Unifaun explain that not even DHL can track their parcels within its own company when it is crossing borders because the system cannot format telephone numbers cross border. Unifaun state that there have been initiatives in the European Union to standardize transport document in order to better track parcels cross border, but these have all failed. Unifaun further state that they believe that, within three years, customers will have a more seamless interface of transport.

4.2.5 The role of heavy truck manufacturers

This section explains how heavy truck manufacturers view the use of their trucks in e-commerce. First, this section introduces the general use of their trucks followed by what requirements they experience directly from customers. The last section focuses solely on the information sharing aspect of the trucks. The Senior feature manager at Volvo explains Volvos offering:

“Customers that buy a truck are in charge over what specifications are needed. From the product development side they have no specific focus on this”

This summarize Volvo’s sales process where buyers are left to make the choices of what specific features that is required. Volvo have their focus on offering a wide range of specifications more than offering a truck with a specific purpose.

Trucks in e-commerce

The senior feature manager at Volvo explains that they are dividing the transport operations that their trucks are taking part in a number of different segments. Today, e-commerce is a part of several different segments depending on what is carried by the truck. Since e-commerce is not restricted to any type of goods these could fall under a wide range of segments. In general, the e-commerce trucks are ones handling standardized package goods, however these are designed to handle homogenous, same sized pallets, who in turn are designed to carry same sized goods, and not different sized packages and parcels which creates issues with the filling degree of the trucks according to the Feature specialist at Volvo. For these types of standardized goods, the Senior future manager at Volvo describe a separation depending on which is the limiting factor, weight or volume for the transports and decides the body design based on this. For e-commerce, the limiting factor is believed to be volume since this is usually the case when separate articles are packed in one cargo. The Product manager at Volvo explain that the requirements of the trucks varies between what type of customers are buying, the smaller customers, owning only a few trucks generally buy more expensive and well-equipped vehicles than the major firms and 99 percent of Volvos customer base are these smaller customers (not volume). The actors with larger fleets usually require more in terms of supportive information systems or integration into their own systems. The systems, however are not segment specific (i.e. e-commerce or construction) but of general nature.

The owner of the vehicles is setting the requirements on the vehicles and are usually only after services connected to productivity improvements. Their requirements in turn, depend on the contracts they have with the carrier companies. This is elaborated by the Director of product planning at Volvo:

“The owner of the vehicle sets the requirements. The ones that buy the systems want control over their business and put requirements in order to increase productivity”

Requirements across Europe

Volvo have studied how the requirements differ between countries across Europe according to the senior feature manager. From a product planning point of view, requirements are

surprisingly similar since they expected lower requirement standards from the less developed European countries. Some areas stood out in terms of differences, most noticeably regarding safety systems of the trucks, where eastern European countries have lower demands. On the other hand, Volvos Director of product planning state that eastern Europe have lower demand on information technology system than Germany, UK, France and northern Europe. Emission zones are growing in certain parts of Europe, as well as off-peak deliveries, stated by Closer. The latter come with requirements on the noise of the truck since they are generally transporting during the night. Furthermore, regarding sustainability, the most innovative heavy truck manufacturers are producing complete concepts for specific situations such as quiet deliveries where the whole truck is designed for this purpose according to the Senior innovation manager. The Product manager explains that across European countries there are different standards to what weight and size of the vehicles are used, since each country have their own regulations aside the EU-regulatory framework. In Sweden for example, heavier vehicles are allowed than in the central and western European countries, according to the Product Manager who further explains that Volvo have introduced a solution to this issue by introducing shorter trailers that can be attached sequentially to the trucks. Generally, Volvo are experiencing a trend that the medium sized vehicles are slowly disappearing and growth in either very heavy vehicles or very light ones is steady according to the Senior feature manager. In this equation, the Feature specialist explains that Volvo see their role as providing the heavier trucks which will still be relevant in the long-haul transportations but not quite as much for the last mile deliveries.

The truck requirements are communicated by the ones acquiring the truck today, meaning no direct requirements from other stakeholders in the distribution chains are received according to the Product manager. However, Volvo are working with logging vehicles, studying their usage when sold to get a better representation of what happens to their truck during its lifetime. In general, Volvo experience that e-tailers often are vocal about setting high requirements regarding sustainability, when they in reality are only following the current regulations and laws that Volvo are already complying with according to the Senior feature manager. However, Volvo have noticed that there is a certain aversion regarding the use of non-sustainable fuels, there are for instance cases of firms not putting their company logo on the vehicles that are using diesel engines. Volvos core business is selling trucks and higher regulatory standards can generally be seen as a positive development for them since that would mean a larger demand of their trucks even if Euro 5 and 6 classifications are quite similar in their specifications according to the Product manager.

Regarding service, the Feature specialist believes that they could simplify the unloading processes of the trucks. Instead of lowering the elevator and fetching the package that is supposed to be delivered doors could be installed at the sides, saving time and effort for the drivers.

Information requirements

The Product manager at Volvo state that they have three different focus areas, namely, driver, goods and truck. The Product manager further state that their main focus is on the actual truck followed by driver environment and lastly goods as the least important. Volvo are aware that time management for the delivery of e-commerce wares is of high importance from talking to

the users of their trucks according to the Senior feature manager. Furthermore, the Senior feature manager believes that positioning is the most valuable piece of information that they can provide across the distribution chain. In general, Volvo mean that customers want every possible piece of information available to them and that they can provide a lot of different information that is not used today. For example, information on the weight of the goods and carbon print, as well as temperature logging and navigational services connected to geofencing from every transport as mentioned by the Product manager. However, the Product manager stresses that the only information that they have complete ownership of is the vehicle monitoring while all else is shared with other actors. There is an abundance of communication systems across heavy truck manufacturers but also the users of the trucks and few of these systems are integrated or even integrable according to the Product manager. The Director of product planning states that Volvo are working towards developing platform solutions to be integrated with applications where items can be tracked. Summarized, the issues lie within the application programming interfaces (API) where the Director of product planning believes there needs to be more flexibility so that APIs can connect to many systems.

The Feature specialist experiences that the carriers such as DHL focus on keeping a homogenous stream of deliveries but that the market is becoming more and more specialized and explains that the requirements are growing, especially when it comes to delivery security. Today, the information that is shared comes with a device provided by the carriers that is not integrated with the truck according to the Feature specialist. The Feature specialist explains that between the carrier and the truck owner/operator, enterprise systems are used to put orders and that these quite often lead to mistakes. The carriers are controlling the weight and volumes at the terminals, however this is not always accurate and if the volume is not correct the transport operators will suffer in their planning of the deliveries and risk losing time and money according to the Feature specialist. The Product manager states that they can provide weighing systems with their trucks but that these are not specific enough for the goods but more reliable when weighing total cargos.

The Senior innovation manager believes that it is highly important to work towards unbroken distribution chains, today the situation is that there are many different actors with very little integration in between. The Director of product planning explains that Volvo can include sensor information from any kind of body on the trucks, the problem is the APIs connecting this information to some system. For example, they see potential in handling packaging information that could be provided to the transport systems so that the transport buyer is certain of the placement and position of their goods, especially since all packaging is manual and ad-hoc as of today according to the Director of product planning. The carriers today are not interested in binding the information to specific trucks, only devices that are sent with the trucks. This could however be solved with an interface between the information device and the truck and then between the truck and an external system or application, as explained by the Director of product planning. The Director of product planning further states that the APIs have not been considered core in Volvos sales since they have been focusing on selling a product, however this is changing since they are moving towards providing a service more than a product. This is highlighted by the following quotation by the Director of product planning at Volvo.

“Our core business is to sell trucks; if we strive outside of making trucks we risk losing, since it is a conservative industry”

The Director of product planning explains that there are standards for handling the information, but they are lacking in quality. Currently, there is a European project for developing new communicative standards for the trucks, but these types of projects usually take long time to complete while the technology behind changes very rapidly according to the Director of product planning. Volvo have the structure for implementing RFID-tags to track individual packages on board the trucks, however they are not sure whether these kinds of solutions are to be developed by them or externally according to the Director of product planning.

The information on the heavy trucks are today generally gathered in two different types of systems according to the Director of product planning; both systems are used for serving the purposes of improving uptime, creating fleet management systems and internal product development. Either the trucks have a device that is communicating with an external database that provides the driver information or the truck has an integrated system that receives the same information but directly from the trucks telematics according to the Director of product planning. Volvo also provides a third option with a device that communicates directly with the truck or the database. The Director of product planning states that the second alternative presents issues since trucks are replaced every five to ten years while the telematics systems are developing rapidly which is why Volvo is focusing on creating APIs to communicate with portable devices with their trucks.

Furthermore, the Director of product planning explains that these APIs can communicate with fleet management systems in real time which could provide an opportunity of constant information sharing along the distribution chain, especially towards the last mile actors in e-commerce. Today, no integration is being made since Volvo are focusing on their core. The Director of product planning further state that it will be important that the integrated systems that are delivered are not branded by the developer since e-tailers never would use a system without their own brand attached to it.

The Director of product planning mention that the entrance of driverless and autonomous vehicles will change the market. By then, these vehicles will need to be able to integrate with ordering and dispatch systems as well as being visible for the whole distribution chain. That means having systems that have integrated ordering, transport operations management and monitoring. However, it is not clear whether these communicative systems should be developed by themselves or not according to the Director of product planning. In e-commerce, they are experiencing a move from stock reduction and just-in-time concept to focusing on short lead times out to customer where solutions with warehouses in the suburbs is a growing concept according to the Director of product planning.

5. ANALYSIS

This chapter will link together the literature framework with the collected secondary data together and the primary data from interviews. Section 5.1 presents an analysis concerning the current trends in E-commerce followed by an analysis of distribution in 5.2, the stakeholders in 5.3, what transport requirements exist in 5.4 and lastly an analysis of the truck elements in 5.5.

The booming e-commerce market is changing so radically that distribution is not the same as it only three years ago as stated in the interviews. Customers today have access to shop globally and from almost every e-tailer which opens up for an unlimited assortment. Despite customers in Europe have unlimited access today, they still prefer to shop from national vendors. The reason for this is that customers still prefer having safe and short lead times, which indicates the importance of transport in an e-commerce transaction.

5.1 E-commerce

This section covers trends in Europe of how customers shop, choice of delivery and what their customer behavior leads to. The main findings are cross-border shopping growth, groceries as a potential new market, new modes of delivery, price and service differentiation and growing issues with last mile and reverse logistics deliveries.

The trend in Europe is clear, customers are changing their behavior of shopping and thus also retail actors. E-tailer actors in Europe today are working more with their product and visual offering whilst the way of delivering goods has been more vicious, as stated during interviews. The trend is that e-retailer work as defensive players as defined by Ducret (2014) Retail actors today are showing a tendency of considering their part of transaction done when goods leave their outbound area of warehouse and hence leaving a big part in their offering in the hands of carriers as stated in the interview with the CEO of Homerom.se at Ellos group.

Data of cross-border shopping in Europe shows that it is increasing and that customers are more willing to shop from abroad. This will open up for transports between both countries and regions. Today, with different legislation of the truck regarding weights and dimension, it is hard to conduct transport between different countries which is highlighted by Postnord (2018) and goes in line with what Lumsden (2007) states about varying truck regulations. For e-tailers that are having large flows that are transported cross-border it is important to have disposal over trucks that can be used in all regions crossed. The majority of e-tailers do not have their own fleet, which puts this requirement onto carriers. European legislation has facilitated for cross-border transports by setting requirements of 44-ton transports which is frequently used in these types of goods movement. Therefore should transport actors that wants to perform e-commerce related transport across Europe have fleets that are customized to meet these requirements .

One trend that support the thesis that e-commerce will continue to grow is that there is still a big gap between the preferred channel of purchase and what is actually bought online, and the

trend is continuing to shift towards an openness to shop online. Biggest potential is found within groceries, clothing, electronics and furniture. The market for groceries in Sweden has a turnover of almost €30 billion where only two percent are bought online despite that PWC (2017) state that 23 percent have online as their preferred channel of purchase. This is one reason for that many actors are trying to penetrate this market with a huge potential. The grocery sector in relation to other online goods are fairly immature with a big potential of development. Van den Bossche et al. (2017) argue that E-groceries is complex and that customers show inertia to shop online but further state that groceries is an industry where customers actually are willing to pay for additional service such as home delivery, which is supported by Joerss et al. (2016). The market today is characterized by many actors that are struggling to reach out to new customers and find an effective way of distributing wares. Fernie & Mckinnon (2004) separate the flows of parcel delivery and groceries due to that these two distributive chains differ fundamentally. In relation to parcel delivery there has been limited research on food distributing chains which might be one reason for that actors today are not clear how to manage an efficient flow. Van den Bossche et al. (2017) state that grocery market, in general, has low margins which makes the element of service more important, to find a creative and cost-effective solution is a big business opportunity.

5.2 Distribution

Distribution in the e-commerce market in literature is stated to be quite complex and transport actors are constantly looking to increase service level together with a constant strive for decreasing cost of delivery, which creates a conflict of objectives. One of the reasons for that this is requested is that literature states that customers want their goods delivered to the door fast and as cheap as possible, which has shown to be a misconception according to empirical findings. The empirical findings point towards that customer want their goods in the least expensive way, but they are often willing to wait or conduct last mile activity by themselves in order to save cost. Unifaun state that all big transport actors today face low margins for long-haul transport which indicates that in order to be able to be a profitable actor, the element of service has to be increased as many interviews point towards. Ducret (2014) state that new transport actors carry no history which facilitate for being innovative and finding new modes of delivery. Both literature and interviews point towards that customers are requesting both different modes of delivery and in a different way. Another view on this is lifted by Allen et al. (2018), they state e-commerce is a customer-focused culture with an approach of “everyone-delivers-everywhere” and that this collective way of thinking leads to a transport behavior that is not fully understood.

Yu et al. (2016) state that high logistic service quality, especially on last mile delivery, is a success factor for e-commerce business which is supported by the empirical findings where companies that are working with their logistical offering are more successful. Last mile specialist Urb-it state they have managed to get a success rate of 98,6 percent which according to them is because of their ability to be transparent in delivery towards customers. Lot of inefficiencies such as invalid or incorrect address details, hard-to-locate locations, no one home to accept delivery can be avoided if information sharing between actors are transparent. Given that these inefficiencies add cost, time and lead to unsatisfied customers it is important to find better and more efficient ways of delivering goods. To overcome these inefficiencies is it

necessary to offer customers different choices of delivery so that customers can choose the preferred way of delivery. If conducting home delivery, it has to be done on customers terms or customer satisfaction tend to be low. All interviewed e-tailers state that they want to increase customer service related to transport but few are working hard with developing their offering and let carriers be responsible for customer experience. The most common choice for e-tailers is to contract big logistical actors in their distribution and they are often showing less flexibility than new players and are less service minded which in the end is reflected on the e-tailer.

Literature regarding e-commerce and transportation has a lot of focus on last mile activities where some references consider last mile to be highly connected to home delivery, which could be argued for that it is not true where stakeholders state that there are several different modes of last mile delivery. Last mile delivery and especially home delivery, are costly, inefficient and polluting. Few e-tailers in Europe have considered the implication of free shipping and free returns, especially home delivery, and see this arrangement as a necessity. E-clothing business in Europe is not making money which is probably going to change distribution to find a more diversified delivery option according to Postnord. Many stakeholders state that the price of distribution should be transparent towards the customer and that the customer should be given choices regarding lead time, delivery window, customer's purchasing power and delivery mode. The most cost-effective and convenient modes of delivery are delivery modes where last mile activity is conducted by customers such as click and collect, collection points and parcel lockers. As long as these previous solutions are conducted without vehicles it is also sustainable in terms of emissions and also effective for carriers that are able to get more high-density transport routes. Another reason to promote click and collect for e-tailers is that the problem with reverse logistic is handled. De Brito & de Koster (2004) state that back in the beginning of 21th century the return rate could be as high as 20 percent for fashion business which has escalated for companies that today face a return rate of over 70 percent. Customer behavior of buying four pairs of shoes and returning three is not sustainable for either monetary nor environmental reasons.

5.3 Stakeholders

In line with the purpose of discerning the requirements on transportation along the distribution chain, it is important to illustrate how the e-commerce chain looks in relation to what has been described in the literature. This section lays out which stakeholders are prevalent, their status in the chain and how it affects the distribution.

It is difficult to discern any trends regarding how the distribution chains are constructed within e-commerce. Especially in relation to what has been described in terms of modes and types of deliveries. In contrast to what Lumsden (2007) and Taniguchi et al. (2001) describe, the carriers seem to have been divided into several actors along the distribution chain with the growing prominence of last mile deliveries. Furthermore, the growing importance of external actors is evident with the development of internet of things and technologies as mentioned by Closer since communicative systems will not only be needed to be integrated amongst the stakeholders along the chain but also the infrastructure, such as in the case of smart cities which is where Postnord believe the big change in distribution will come.

The more offensive players such as Apotea are introducing more than one carrier in their distribution system, this can be argued to be a result of wanting to control all the aspects of the chain more thoroughly themselves. This goes in line with what Ducret (2014) presents regarding offensive actors and how they are premiering the service of the delivery, using innovative vehicles and driving change in sustainability. However, Apotea have managed to cancel the risk that Ducret (2014) mentions regarding the risk of losing capacity while using innovative last mile options by using a large number of these options. Furthermore, this offensive strategy is regarded as a success strategy according to many of the interviewees. Ellos can both be considered a defensive actor which is evident, for instance, in their sustainability work where they are not the driving force. Furthermore, these defensive companies tend to use third-party solutions more than the offensive players.

In contrast to what Taniguchi et al. (2001) and Anand & van Duin (2016) present regarding what stakeholders exist in city distribution this study presents another stakeholder, not mentioned in these frameworks. For e-commerce there exist actors such as Unifaun, who provide a facilitating service with a focus on interface, tracking and customer service as a result of the high level of digitalization of the distribution chains in the sector.

The grocery side of e-commerce has been found to utilize synergies between the e-commerce flows, close to what Fergie & Mckinnon describes (2004) in the literature where the fulfillment centers (in the case of Willys) act as both collection points and base for the home delivery services. This can be attributed to that these facilities already being designed for both handling large amounts of goods and storing the goods for the brick and mortar section of the business.

The empirical data resonates with what Schöder et al. (2016) describe concerning companies only looking to improve their operations internally. Unifaun summarized this issue well when they described that when developing their interface they are not able to bypass their closest customers, the carriers, to improve the transparency and information exchange and reach the other actors throughout the distribution chain. Even if doing so would improve the efficiency and customer service across the whole chain. This seems to be especially true when looking at the logistical heirs and NPOs, since they seem to have a power position, certainly in the cases where they are delivering goods for defensive e-tailers. The interviewees expressed that they experienced a certain inertia to change by logistical heirs and NPOs, this is even confirmed by the NPOs themselves in saying that they have a very efficient system in terms of moving many packages/parcels but have no interest in innovative last mile solutions. Furthermore, Ducret (2014) describes that logistical actors are moving towards an outsourcing strategy in urban areas which is found not to be completely true since the logistical heirs are not outsourcing the last mile as of yet but are instead competing against the new last mile actors.

5.4 Transport requirements

This section presents the general streams found regarding what requirements exist and sets them in relation to the literature. It is divided into the major findings that were common themes in many of the interviews. First the fault in communicating and misinterpretations that exist along the distribution chain are explained. Followed by an explanation what requirements the stakeholders have on different modes of deliveries and thereafter an analysis of the

sustainability requirements presented by the interviewees. The requirements on system and information integration is presented and lastly, service differentiation is analyzed.

Poor alignment of requirements from stakeholders

The empirical data makes it evident that what is being delivered in terms of transportation operations is not in line with what is requested from the chain. This is not only the fault of a misunderstanding between the transportation buyer and the carrier since the buyer (the e-tailers) do not share the same requirements on the transport as the end-customer which makes the e-commerce transportation operations stand out from the model presented by Lumsden (2007) regarding transport requirement misunderstandings. Meaning that there are not only two actors involved in the specification process. Thus, the transporting company only interprets the demand of the e-tailer and the real wish of the end-customer is not fulfilled, the issue is not what is described in the literature as a problem of misinterpreting the demands but lacking the information about the real demands from end-customers. The second misinterpretation as mentioned by Lumsden (2007), translating the demands wrongly into the specification can be seen with the tracking technology in the chain. Most commonly, the goods are only scanned at certain points (e.g. warehouses, terminals) along the route. The e-tailers are asking for a continuous tracking of the goods but are only provided a discrete service, meaning the specification does not correspond with what is asked for. As for the third misinterpretation, stating that the transport does not correspond with the agreed upon specification, the carriers seem to have trouble with fulfilling the service element of a delivery. However, this seems to vary greatly from company to company. Lastly, the carriers are struggling with communicating what has been accomplished with their transportations. They are generally handling massive volumes of parcels and there are few actual errors when put in perspective. In many cases, such as Ellos, the carriers are fulfilling their end of the contract completely but are still not seen as successfully delivering the goods at times, so even if the carriers are completing their task it is not fully communicated.

Requirements on flexibility of mode of delivery

The literature put emphasis on low prices and having fast home deliveries as two of the main elements of customer satisfaction, for example, Zákarová (2017) and Van den Bossche et al. (2017). The empirical material in this study points in another direction where the reality is more multifaceted and situation-based than this. There seems to be a general belief that customers are requiring different modes of delivery and prices based on the specific situation they are ordering in. At certain points, the customers want home delivery and are willing to pay for this, while sometimes they might want to pick up the parcel at a location they want to choose themselves. Thus, the required mode of delivery is not home delivery but rather a broad range of different possibilities both costly and cheap. However, it can be said that certain modes of delivery are more efficient both economically and regarding sustainability. Parcel lockers and click and collect are two methods that are growing, in line with what is described by Wang & Pettit (2016), because of the advantages they have regarding scalability and not having to conduct the last mile deliveries with a vehicle.

Growing issue of sustainability in e-commerce

As mentioned previously, reverse logistics is a growing and pressing issue when discussing sustainability. The empirical data shows that both the e-tailers as well as external stakeholders are the driving forces behind the call for action regarding the problem. Ellos discussion of how it is less costly to discard the goods upon return than to handle it is evident how e-tailers would be open for a solution on the matter. External stakeholders share the view of the wastefulness of the ordeal but focus more on the added flows of transportation and movement that it entails. The carriers themselves do not show any incentives for changing the behavior, Postnord for example only state that from their side there is no issue since they have the capacity to handle the returns. From the end-customers, the possibility of free returns seems to have become expected and the sustainability issues regarding it have not been communicated properly to reach them, which speaks against Schöder et al. (2016) theories stating that the end-customer is one of the main drivers for sustainability. While it is certainly an issue in line with what is described by Mukhopadhyay & Setoputro (2004) there also seems to be active discussions of how it can be solved, and several concrete solutions are on the table for many of the actors, for instance having a moving truck as a mobile warehouse or installing brick and mortar stores to handle returns as mentioned by Ellos.

The theories described by Ducret (2014) concerning offensive actors having more genuine interest in working with sustainability while defensive ones are only trying to comply with the regulations and laws that have been set up is found to be true. Apotea for example keep strict, proactive policies while the other actors are not as vocal about their work. The e-tailers that are not handling their distributive chain, using a third-party solution are not putting as large requirements on the transport, which could be the result of them being in a position of less power than one with a myriad of choices of delivery. Furthermore, controlling the complete distribution chain adds even more influence in contrast to the actors who are outsourcing it.

There also seems to be an unstated requirement on transparency of the effect the transport has on the climate on from certain stakeholders. The level of detail of the information that can be shared amongst the stakeholders today is low, since it is only calculated from general tables and are not transport specific. This goes in line with what is presented by Schöder et al. (2016) as one of the main solutions regarding sustainability issues of e-commerce. The stakeholders not in direct contact with the heavy truck manufacturers know that this data can be provided by the trucks themselves but that the initiative has to come from the ones ordering the trucks since the other actors believe that they are not in a position to bypass their customers in the distribution chain. Furthermore, this issue can be a driver of the lack of sustainability requirements from the end-customers side since they are not aware of the impact each delivery or parcel has on the climate. Additionally, they are not given the opportunity to choose the options which may cause the least harm. Both Closer and Urb-it brought up that the awareness of the end-customers is raised when given another, sustainable alternative for delivery but as of today these options are seldom communicated nor existing at all.

The need for systems integration

Requirements on system integration is a central theme expressed by many of the interviewees but has many layers that can be analyzed. The most common issue presented by the

interviewees is that of tracking systems, but the analysis also focuses on RFID tags, cross-border information sharing issues and the difficulty in compiling the different truck manufacturers systems.

The possibilities of positioning systems are well described in the literature (Lumsden, 2007), however the reality today does not precisely represent what is described. The trucks have the systems in place, ready to be used, however for e-commerce these are not used for the betterment of the timeliness of deliveries as one might expect, with the exception of a number of upcoming last mile actors. Instead, during the major part of the delivery, the tracking is only conducted at certain scanning points which are communicated to the customer. Wang & Pettit (2016) state the fact that positioning systems are not used for actual tracking of position which is in line with reality, but they seem to have no notion of the fact that the market is actually requiring this service. The end-customers are expressing more exact delivery time windows, which is an indirect effect of not tracking the vehicles and parcels/goods. The new last mile carriers are tracking their parcels but cannot provide full tracking services since they are not in control of what happens before they receive the parcels. The external actor will have future interest in the tracking of individual vehicles to be able to control city transport flows. The issue seems to lie within the logistical heirs, NPOs and defensive e-tailers who are not seeing an incentive for implementing a full-scale tracking solution. The carriers are not willing to bind any information to specific trucks and use mobile devices that carry the information instead. The future importance of the issue might also depend on the distribution structure adapted by the e-tailers, if they keep decentralized warehouses the tracking services on the long-haul deliveries become less important since these will not be conducted upon order but only to supply warehouses.

Meyer et al. (2014) along with Yu et al. (2016) presented RFID tags as a useful tool, especially in terms of tracking services for vehicles and parcels. The empirical data shows that, currently, the application range of RFID is very limited. Several of the interviewees described cases where the technology had been tried out but showed no promise due to the high costs it incurred in combination with a lack demand for the information it could provide. The only instance where it can be considered a useful technology was in the case of expensive goods since the element of security is more important for these and RFID can provide tracking and information of, for instance, stolen products.

Wang & Pettit (2016) are correct in their assessment that one of the underlying reasons for the lack of system integration is the fact that the vehicle manufactures are using different system for communicating with and no integration is available. This is presented by both the manufacturers themselves but also stakeholder along the distribution chain who are working with communication and claim that compiling all the different systems is difficult. Furthermore, the technologies for information sharing differs across the manufacturers which makes the sharing even more problematic.

There are also issues concerning cross-border distribution and information exchange between the stakeholders in the operating countries. There are different formats in different countries for certain types of data, the issue of phone numbers was presented in the empirical data as an

example of this. Furthermore, the possibility of tracking is widely varying across countries in Europe. A good example of this from the empirical material was a customer placing an order and following it, quite precisely, in one country and as soon as the vehicle crosses a certain border all tracking disappears. The issue of cross-border information sharing might be considered a sub-problem of vehicle monitoring but is still unexplored territory in the literature.

Service as a differentiator

With the rise of the last mile delivery and the myriad of actors' customer service requirements seem to be growing. Service is now used as a differentiator to reach out to more customers and the consequences of not living up to it can be severe as described by Unifaun. Zákárová (2017) described service as one of the main customer requirements and certain e-tailers, but most notably carriers have started to pick this up with Unifaun being the one of the best examples where the customers are able to rate the service of the delivery on each separate occasion.

One delivery service factor that has not been mentioned in the literature is the notion of having dynamic delivery options. This was mentioned in the interviews as a requirement that is not fulfilled as of yet. The requirement refers to being able to change the delivery location, time and specification after the order has been placed and would require a more dynamic delivery system, especially in concerning the information sharing. Closer summarized well when saying that the distribution should be based on the flow of people and not discrete locations. The issues with this lie in making it possible for the end-customer to communicate directly with the carriers of the transportation, but also having information systems that can change their data after it has been set the first time. These issues can be related to the discussion around system integration, which proves to be important not only to fulfill certain tracking requirements but to improve the dynamism of the who distributive chain.

5.5 Truck Elements

There are several areas where heavy truck manufacturers need to develop in order to meet requirements on telematics services, adaptation to new urban logistics concept, sharing concepts and alternative drive systems. Heavy truck manufacturers possibility to adapt to fast moving online e-commerce market is limited to requirements from carriers and omits other stakeholders. Volvo's main focus areas are driver, truck and goods, where focus is mostly on driver and truck. Literature gives a broader picture of facilitators in a fast-moving digital sector where Schiller et al. (2016) divide telematic systems into vehicle monitoring, driver and safety and fleet management systems as cornerstones in truck industry.

There is a general opinion in heavy truck business that transports associated with retail goods are likely to be transported on either very big trucks, on the long haul, or with smaller trucks on the shorter stretches. In long haul several trucks will be replaced with longer and bigger vehicles and short distances will be covered with a product that they don't offer, such as vans and bicycles. This means that they risk being replaced in this customer segment of shorter distances and in long haul sell fewer trucks.

There is a perception from Volvo that e-tailers state that they set high requirements regarding sustainable transports, when they in reality are only following the current regulations and laws

that Volvo are already complying with. From a societal point a view it would be beneficial if e-tailers in collaboration with carriers present the footprint of each delivery so that customers can make a conscious choice.

Volvo state that e-commerce transport is characterized by uneven flows, heterogeneous goods and therefore low filling degree. Volvo on their hand don't offer a special product that are used in e-commerce flows, they consider the offering to be same as standard goods delivery. Both e-tailers and end-customers are stating that the concept of service is increasing and is becoming more relevant. Heavy truck manufacturers are trying their best to adopt to this market by going from the concept of selling trucks to offering transport solutions. Volvo mean that there are several solutions that could increase the offering, mostly within fleet management where carriers could benefit from increase capacity utilization, optimized routing and more efficient fleet use. Schiller et al. (2016) mean that fleet management systems can have a big effect in offering both better economical solutions that also will benefit sustainability. Several ways of adopting heavy truck manufacturing were lifted by Volvo where one example of more sustainable solutions that has started to come up is the need for off hour deliveries, due to congestion in city areas, are starting to arise. This means that there is a need for adaption on vehicles that are possible to operate silent. Amongst other suggestions that were discussed was the possibility to unload truck more convenient, with either unloading possibilities from trucks body or lower trucks solution.

E-commerce related cross-border transports is increasing rapidly, which puts requirements on heavy truck manufacturers to offer trucks that are within legislation in crossed countries. There are still difference within legislation within Europe for heavy truck manufacturers in where they have to adapt their offering towards carriers in order to overcome this cross-border issue. The European Union have introduced some cross-border legislation in order to guarantee free movement of goods which facilitates for using specific trucks across all Europe. Volvo state that they adapt their solution so that it is possible to use both in the countries with strictest legislation and that it will be able to connect additional trailers in order to maximize loading capacity in each country.

There are suggestions from Volvo to connect all information from involved actors and API's into a collaborate interface on a central level to increase the efficiency and sustainability along the distribution chain. Meyer et al. (2014) discuss the adaptation of intelligent products in transport where trucks and truck elements are used as intelligent products that are able to create and keep data regarding itself and base decisions related to its path on this data. One big issue for heavy truck manufacturers in system integration and information sharing, is that information is in the possession of the carriers. Volvo state that in this type of chains there are many different actors with very little integration in between. Volvo argue that they do not want to bypass their customers, because carriers are not to benefiting from the integration. Today external stakeholders request sustainable transports and there are solutions within trucks that could offer the footprint for each parcel, but the same information is according to Volvo highly sensitive for carriers which makes it impossible for Volvo to share this type of information. This is supported by Unifaun that also state that carriers are holding back information because of their competitive business. Volvo state that autonomous vehicle entrance is in a near future,

which means that integration and information sharing between actors will become crucial. Therefore, one reason for more integration and less resistance from carriers could be that they eventually must change anyway.

6. DISCUSSION

The discussion breaks down the major findings of the analysis. First the modes of delivery and e-commerce trends is discussed. Thereafter, discussion regarding the issues with cross-border distribution is followed by a discussion of the requirements misconceptions and system integration requirements. Lastly the role of heavy truck manufacturers and the results regarding truck elements are discussed.

The myriad of methods of delivery can be seen as a product of the lack of information in terms of cost, flexibility and sustainable awareness which is an explanation of Allen et al.'s (2018) statement that "everyone delivers everywhere". One can argue that end-customers would make rational decisions if many delivery methods existed to choose from and all the information was available for each alternative. For example, if the impact on the climate from a regular home delivery was to be presented the market would move towards fewer home deliveries which goes against many sources, such as Ducret (2014), that argues for new creative ways of home delivery options. When it dawns on every stakeholder in the distribution chains what effects the last mile operations and reverse logistics have on both the sustainability but also cost wise one can discuss whether the preferences would move towards more sustainable solutions which as well known in literature, for example what Macharis & Melo (2011) touch upon when they state that last mile operations are "one of the more expensive, least efficient and with most polluting section of the entire logistic chain". No data or research seems to have been conducted regarding which methods are the most relevant from this perspective, but there seems to be a consensus that pick-up points, click and collect and parcel lockers have a scalability which makes them more sustainable. However, in this discussion, actors such as Urb-it who are conducting last mile deliveries without the use of polluting vehicles or any major effects on the transportation flow of the cities have been ignored. It is also important to highlight the issue that not all actors might have incentives for increasing the transparency regarding the climate nor the prices. There are carriers that would lose profit when certain data would be used since they would have to update their fleet and since they are already active on a market with such low margins this issue could be important to avoid. This goes in line with Schöder et al.'s (2016) and Andersson et al.'s (2005) theories that the drivers of sustainable practices are either end-customer, companies or public authorities.

Cross-border issues have been presented as one of the major findings in the study. The standard and requirements on the vehicles used in distribution are found to differ slightly across Europe and vehicle manufacturers must adapt to the different climates as explained by Lumsden (2007). However, the development of technologies and regulations can be argued to diffuse across borders, certainly since the cooperation between European countries is high and the countries that are trailing behind in terms of technical requirements might skip steps of their organic development.

The results point to the existence of several different misconceptions and miscommunications regarding the actual requirements that exist on transport operations in e-commerce which is stated in Lumsden (2007). Up until now, there seems to have existed a consensus that the end-

customers always desire home deliveries as quick as possible. One reason for this could be that the wrong questions have been asked when surveying what requirements exist on a delivery. For instance, if an e-tailer posed a question of how the customer would like the goods delivered without providing any details regarding price, delivery time windows and flexibility they will state home deliveries as the preferred option, which goes in line in what the view on delivery from Van den Bossche et al. (2017) and Zákárová (2007). However, the reality looks different, and the stakeholders are starting to put the delivery requirements in perspective.

The results show that the system and information integration across the distribution chain is a complex issue. There exists an awareness of the possibilities, but no stakeholder seems to see themselves as the solution since they risk overstepping their boundaries regarding their relationships to their closest actor in the chain which is not highlighted in literature. As long as some actors are obstructing the integration the development will be troublesome. Furthermore, since the transportation business has low margins, these solutions will probably not be prioritized. One might argue that this will change as if the transparency of the prices changes since this might bring forth changes regarding the margins.

The low margins could also explain the current state of low use of technological tools. Paper sheets are still standard for delivery information even though there is no lack of systems to use. Literature such as Meyer et al. (2014) suggest RFID as a general useful solution, however when testing RFID and IoT technology; this was found to be too expensive to implement for other cases than high-value goods where they served a purpose of securing the goods position and thus ensuring no valuable items are lost along the distribution.

The biggest issue for the heavy truck manufacturers seems to be to discern their future role in the e-commerce distribution chains. All stakeholders seem convinced that trucks will be a part of urban distribution for many years to come, but that it will be limited. Many solutions are being tried out that do not include trucks for the last mile deliveries while some have extended the use of the heavier trucks in the inner cities, in line with what Ducret (2014) present regarding having a variation of logistics organizations. This is something that speaks for the trend mentioned by Volvo that the middle segment of trucks is disappearing in favor for smaller and larger vehicles, which has not been covered by the literature. The issue for heavy truck manufacturers is the fact that the last mile operations are being replaced by vehicles they are not producing. Meaning that a whole segment of customers they currently have is turning to new solutions, which the manufacturers currently cannot provide. Additionally, even if heavy trucks will be used as a feeding system into the systems the frequency and number of trucks in total will be lower than when the middle segment acted as a base for deliveries.

Another factor concerning the role is which part of the development of the telematics and information technology systems the truck manufacturers will take. Up until now, ordering and fleet management systems have not been considered core in the manufacturers offering even though they may serve an important function. If one truck manufacturer is able to connect trucks within a specific brand with the possibility to integrate every truck where online tracking would create an opportunity to get better use of resources which is supported by Schiller et al. (2016) that discuss the importance of integration. Online tracking facilitates the connection

between both trucks and parcels, where trucks would be possible to get more optimized routing and filling degree when trucks are connected. This would create value for carriers and an incentive to acquire more trucks of the same brand. However, the introduction of autonomous vehicles might bring forth an obligation to promote these systems since they will need to be integrated when the market adapts to these vehicles even if this is a scenario that is not realizable for decades to come.

Lastly, the role that the truck manufacturers will take in increasing the service level towards end-customers is difficult since they are not the manufacturer's direct customers. However, this is not only true for the truck manufacturers but can be related to the conflict of interest that exist along the whole distribution chain where the only one who has to directly adhere to the requirements of the end-customers are the e-tailers. This division of responsibility of service is yet to be covered in literature.

The Empirical data in this study shows that the previous list of relevant stakeholders and their activities, as presented Taniguchi et al. (2001) and Anand & van Duin (2016), is not complete. A new type of stakeholder, represented by Unifaun in this study, has been found and shown to work with the integration of systems and information across the distribution chains, not to be confused with the info broker that Lumsden (2007) presents in his study since the info broker have a narrow focus on transactions. A new model is presented in figure 6.1, including this *information systems integrator* as an indirect part of the distribution chain. This stakeholder provides a facilitation for the information exchange between the other stakeholders, represented in the figure with the dotted arrows between the system integrator and the stakeholders handling the goods.

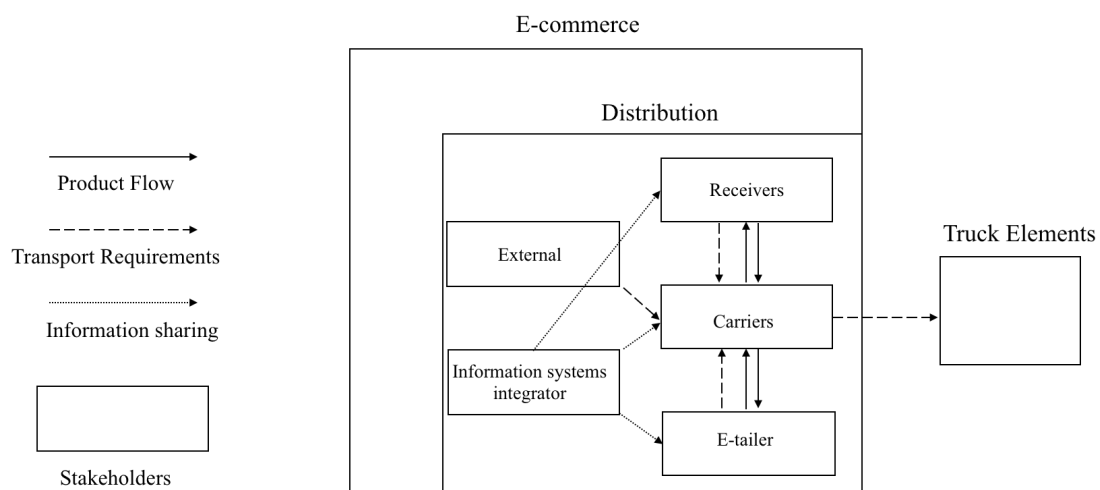


Figure 6.1 - E-commerce distribution stakeholder model

Since heavy truck manufacturers today have their focus on fulfilling their direct customers' needs, it becomes easy for them to miss some crucial key requirements in order to be attractive for e-commerce transports. The issue arises because the heavy truck manufacturers' products are used in these distribution chains, but the manufacturers themselves are not participating in the transport operations. This creates a gap between what is actually required by the stakeholders of the transport operation and what is produced by the disconnected manufacturers.

7. CONCLUSION

In the concluding chapter, the major findings from this thesis are presented through an examination of the two research questions (RQ). In 7.1 recommendations are presented followed by suggestion of further research for future projects in 7.2. This study covers the gap in the literature on transport requirements on an aggregated level where all stakeholders requirements are taken into account, in contrast to previous studies where mostly end-customer requirements have been studied. This end-customer focus on e-commerce transports has been hard for heavy truck manufacturers to translate where they today only look at the demand from the closest transport actors and not the aggregated picture. This study will therefore lead to potential recommendations for heavy truck manufacturers.

Key findings related to first RQ regarding what requirements on e-commerce transport that exists amongst its stakeholders on the European market is presented in table 7.1 below. The key findings are within five different areas, namely delivery modes requirements, international standards, sustainability, systems integration and service differentiation. Within these areas a number of characteristics are presented and furthered explained in the following text.

Table 7.1 - Requirements on e-commerce transport operations

Type of Requirement	Characteristics of the requirement
Delivery mode requirements	<ul style="list-style-type: none"> • Lack of price transparency has led to a wrong belief that customers are asking for fast, home deliveries. • Requirements on more dynamic deliveries based on flows and not discrete locations • Requirements on a mix of delivery options
International standards	<ul style="list-style-type: none"> • Varying physical requirements on the trucks across Europe • Data standards and translation are lacking
Sustainability	<ul style="list-style-type: none"> • Reverse logistics is a growing issue in e-commerce • Zero emission vehicles are required
Systems integration	<ul style="list-style-type: none"> • Requirements on unbroken distribution chains • Integration of information handling systems • Mainly regarding positioning and climate related data
Service differentiation	<ul style="list-style-type: none"> • Continuously growing standards for service level • Concerning accuracy, customer treatment and delivery flexibility

It is important to highlight the *misunderstandings* and *miscommunications* that exist around the e-commerce market which has been built on the belief that end-customers are asking for quick home deliveries while the result of this study is different. Joers et al. (2016) state that customer preference is more often price over home delivery which contradicts the general belief that e-retailers must offer home delivery in order to be competitive. This can be attributed to a lack of transparency regarding prices and practices by different stakeholders along the distribution chain.

The distribution is currently built on discreet deliveries, while this study has found that there are requirements from several stakeholders to change this to a more *dynamic and flexible setting* built on the flow of customers instead of fixed points of delivery. In addition to a more dynamic and flexible setting, there is a general understanding that the market does not ask for one delivery solution but a *mix of different delivery options* to fulfill the different need customers have in different situations. The change towards a more dynamic and flexible setting together with a new mix of different delivery options are most likely to be carried out by either new or innovative players. Which goes in line with what Ducret (2014) suggested.

As a result of varying legislation and regulations across Europe, *international standards* are becoming increasingly important when the cross-border e-commerce is growing.

Reverse logistics is a growing issue for e-commerce industry and its stakeholders. Certain sectors are not affected by it because of legislative issues while others, such as the clothing business are seeing an extreme rise in the reverse flow of goods. This has meant increasing requirements on sustainable solutions from many stakeholders, however, the end-customers have not yet seen the negative effects caused by it. As Schöder et al. (2016) state the change towards a more sustainable future is driven by the end-customer and their behavior. Interviews shows that the requirements on the use of zero and low emission vehicles is growing from e-tailers.

One of the major findings are the requirements put on system integration, *transparent information and unbroken distribution chains*. Despite earlier findings such as Wang & Pettit (2016) that points out that heavy truck manufacturers have been struggling with integration very little have been done on this topic since then. Today, there exists a wide range of systems and interfaces used for information handling and planning but no integration between them. The specific information that is being requested is mostly regarding positioning, but also climate-related data.

Lastly, there are requirements on *higher service level on deliveries*. This has generally been a result of many new last mile actors who have raised the standards of delivery in highly urbanized areas and city centers. The services entail more accurate deliveries, customer treatment and more flexible options regarding the delivery. This goes in line with Yu et al.'s (2016) and Zákárovás (2017) view on delivery as a success factor for e-commerce actors.

Here follows what heavy truck manufacturers can adopt in order to meet these requirements of the European e-commerce market. The thesis lays out four key areas that are presented in table 7.2 below. Findings are within the areas of international standards, sustainability, systems integration and service differentiation that heavy truck manufacturer can adapt to in order to meet the requirements from the stakeholders within e-commerce.

Table 7.2 - Heavy truck manufacturer adaptation

Type of Requirement	Heavy truck manufacturer adaptation
International standards	<ul style="list-style-type: none"> • Streamlining of truck sizes and options • International standardization of data formats
Sustainability	<ul style="list-style-type: none"> • Change in customer and e-tailer behavior is needed regarding reverse logistics, hard to affect for heavy truck manufacturers • Interconnected with systems integration solutions
Systems integration	<ul style="list-style-type: none"> • Creation of APIs that are connectable to other heavy truck manufacturers systems • Creation of APIs that are connected downstream the distribution chain with interface towards end-consumer • The introduction of autonomous vehicles will require the vehicles to share data, automatically driving change
Service differentiation	<ul style="list-style-type: none"> • Adaptations of service elements for trucks transporting to end-customer (large items). • Reduction of off-loading times • Creating an e-commerce transport solution to meet the specific demands of the e-commerce market.

Heavy truck manufacturers have to take into account the prominent cross-border deliveries and *streamline the options for truck and body design* based on standards that are applicable to the whole of Europe. Furthermore, they need to have an international standard for the data that is handled across countries. Heavy truck manufacturers that offer this solution create the possibility to operate on more markets and makes them more equipped as a future supplier within e-commerce transports.

Reverse logistics is a big issue for e-commerce in general, which is driven by e-tailers offering together with customer behavior. There are several solutions for decreasing these transports such as click and collect and charging for reverse shipping. Some stakeholders also wished to have a transparency towards customers in order to create an understanding of the implications of reverse in terms of carbon dioxide footprint. The connection to the offering from heavy truck manufacturers and solutions for reverse logistics has not been able to be determined since they are not able to affect this customer and e-tailer behavior.

As previously described, In e-commerce telematics plays an important role. The most important factors are *vehicle monitoring* and *fleet management systems*, while nothing specifically related to e-commerce can be discerned around driver and safety issues. The development in new vehicle monitoring systems, as described Schiller et al. (2016), has led to that new trucks have increased its productivity which is important when the requirement from end-customer on precision has increased.

The manufacturers will need to adapt to the growing requirement of systems integration. As of now, every manufacturer has their own systems and no integration is possible between them which becomes a problem when the majority of the truck operators own a fleet with a mix of brands. This means that the manufacturers can adapt through effectively *creating APIs that are*

integrable with other systems than their own. Furthermore, information should be shared downstream the distribution chain, and APIs should also be connected to new last mile actors and linked together in order to create a complete integrated interface towards end-customers. There are some actors today that are able to offer end-customers online information regarding delivery, while Schiller et al. (2016) argue that the market maturity is within five years from offering last mile information to mobile phones. An integrated interface will also bring perks regarding sustainability since stakeholders expressed requirements on emission information. If heavy truck manufacturers were able to align information this would be of benefit for carriers as addressed by Wang & Pettit (2016).

The introduction of autonomous vehicles will put *requirements on the vehicles communication, fleet management integration and order planning systems.* This means, that whether or not the heavy truck manufacturers are interested in these services in their offering as of now there will be a point in time when these elements will be required to be a part of the vehicle.

E-commerce distribution is becoming more service-oriented, and while the heavy trucks are not expected to be a part of most parcel last mile deliveries many items still need to be transported with larger vehicles. Thus, the manufacturer will need to take into account adapting to the market with service elements in their trucks, such as *reducing offloading times* at the end-customer.

Some heavy truck manufacturers today state that they are offering transport solutions instead of selling trucks, but today no actors are focusing on delivering an offering that targets e-commerce transport in specific. There exists a business potential for heavy truck manufacturers in *offering suitable systems* for conducting these transports, including elements such as positioning systems, fleet management systems, silent transport alternatives and adapting trucks to a reasonable size for e-commerce.

7.1 Recommendations

Since the intention of the study was to shine a light on the possible adaptation of heavy truck manufacturers offering to the e-commerce several managerial implications for Volvo can be discerned. Solutions in the areas of systems integration and telecommunications would greatly benefit the stakeholder that takes responsibility and ownership of the information. Thus, Volvo should focus on discerning what part they play in this exchange of data and integration.

Volvo have a possibility to make sustainability a priority in their offering by working towards integrating emission data for e-commerce deliveries. This would strengthen their position as a sustainable player amongst the heavy truck manufacturers. There exists potential for Volvo in offering trucks based on elements specific for e-commerce. In doing so Volvo could both tackle the issues of cross-border integration of vehicles as well as ensure that the trucks can fulfill the required services of e-commerce.

Finally, Volvo should work towards trying to capture the actual requirements of the market and go beyond the requirements of their direct customers. There is certainly a conflict of interest here since Volvo can't force their customers to require certain aspects of a truck, however being

aware of what the market is actually asking is beneficial for the development of future offerings.

The study also uncovers some recommendations for e-tailers and shows that offensive players seem to benefit from their controlling behavior since Apotea is considered the prime success story on the Swedish e-commerce market. E-tailers such as Ellos would benefit from a more service-minded, logistically focused approach.

7.2 Further research

A number of relevant areas of further research has been uncovered in the making of this thesis. First, the study braces the theme of sustainability but does not uncover what should be done if the focus is put solely on this issue. Research regarding to what extent e-commerce is affecting sustainability and what the distribution chains should do in order to minimize this is highly relevant. In relation to this, reverse logistics is a pressing issue that should be further studied. The implications, societal costs and sustainability issues related to it can be delved into to show the extent of the problem.

The more technical aspects of the system integration are not delved into further in this study. A more detailed analysis of how APIs and information systems can be connected and integrated is needed before any such integration can take place. One further research area could be the use of Blockchain technology in order to handle today's lack of information integration. Furthermore, the study briefly covers autonomous vehicles and what effect they will have on the distribution chain. Further research on this topic would be highly interesting and relevant.

Qualitative studies of what the end-customer preferences are would put further nuance to the subjects. The studies that exist today show answers based on a limited set of discrete possibilities. For example, if asked whether you prefer a home delivery or pick-up point without any consideration to price, almost all customers answer home delivery while this study shows that the choices are more nuances and situation based than what has previously been stated.

For a fuller picture on the topic, a broader geographical scope would be beneficial to study. Studying e-commerce and its use on other continents could shine a light on other best practices of delivery, give a clearer picture of the situation with Amazon and give a supply chain perspective where the longer freight distances could also be taken into account in the distribution.

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Appendix A

Overview of application areas and preference of Telematics services, Schiller et al (2016)

	Vehicle monitoring	Driver and safety	Fleet management and integrated supply chain
	Original functionalities for the vehicle	Advanced functionalities for the driver and their safety	Functionalities for freight, capacity, ERP operations systems etc.
Benefit	<ul style="list-style-type: none"> • Less wear on the vehicle • Longer lifetime • Shorter standby times • increased productivity 	<ul style="list-style-type: none"> • Monitoring vital status of the driver • Takes administrative work over • Fewer accidents • Attractive workplace 	<ul style="list-style-type: none"> • Integration into production systems • Increase capacity utilization • Optimized routing • More efficient fleet use
Functions with market maturity in <5 years	<ul style="list-style-type: none"> • Consumption, wear and running performance • Real time info on fuel consumption and suggestions for improvement • Preventive maintenance message • Sending error codes to the repair workshop • Repair workshop finder • Surrounding conditions • Road map updates • Traffic gridlock assistant • Forward-looking traffic information • Remote control functions(air-condition, key, horn, warning) • Tracker for stolen vehicle • In-truck ecosystem for apps + web access 	<ul style="list-style-type: none"> • Driving times • Speed • Working hours • Live warnings for inappropriate driving style • Automatic braking and acceleration • Warning of collision • Vital status of the driver • Accident reports 	<ul style="list-style-type: none"> • Customized OEM solutions • Route optimization integrated into the production system • Track and Trace • Transfer of last mile information to mobile phones • Performance reports for fleet owner • Electronic toll payment • Platform for new insurance models based on driving behavior and usage • Load monitoring (real-time freight data for temperature, location etc.) • Electronic toll payment • Platform for new insurance models based on driving behavior and usage
Functions with market maturity in >5 years	<ul style="list-style-type: none"> • Augmented reality with windshield display of routing info • Tracking of several trucks so as to drive in convoy / platooning • Automatic obstacle detection • Fuel theft protection • Remote truck control and parking • Access to native apps and smartphone-integrated apps 	<ul style="list-style-type: none"> • Optimized traffic light timing and traffic flow (communication with infrastructure to avoid traffic jams) • Extended help on emergency call 	<ul style="list-style-type: none"> • Direct mobile payment • Environment and roadway monitoring

City logistics schemes, Taniguchi & Thompson (2014)

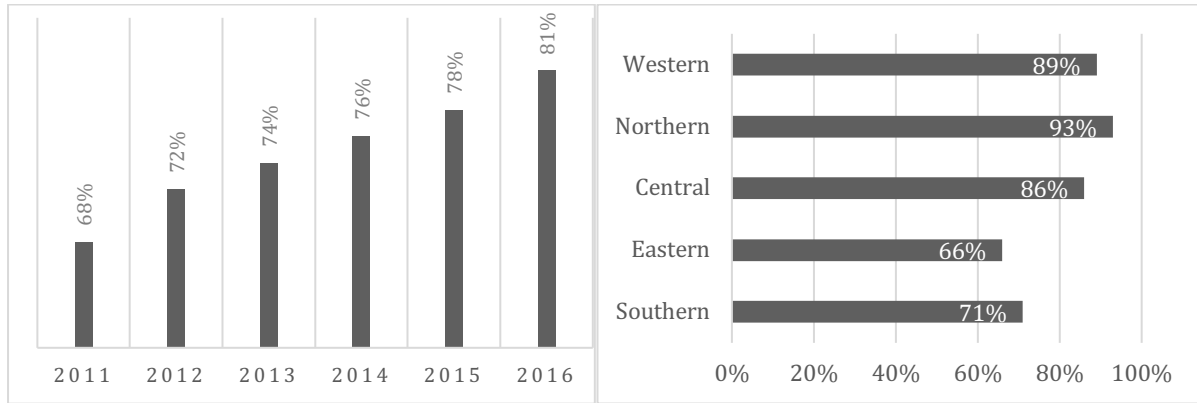
Traffic management	Traffic flow management	Constructing ring road Truck route
		Truck route
		Access control to cities
		Low emission zones
		Providing traffic information using ITS
	Parking management	Truck only parking space
		Loading/unloading space on streets
		Providing parking information using ITS
	Time management	Off-hour delivery
		Time windows for entering cities
		Timesharing between trucks and cars
	Vehicle management	Low emission vehicles
		Optimization of vehicle routing and scheduling
		Road pricing
		Load factor control
Better transport method	Cooperative freight transport	Urban consolidation center
	Intermodal freight transport	Intermodal terminals
	Co-modal freight transport	Pick-up points for delivery
		Using passenger cars or trams for delivery
Harmony with other urban planning	Land use plan	Restriction for location of logistic facilities
Others	Recognition	Recognition of green freight transport companies
	New transport systems	Underground freight transport systems
	Improving building code	Considering truck size and parking in building code
	Organizations	Freight quality partnerships

Policy instruments, Taniguchi & Thompson (2014)

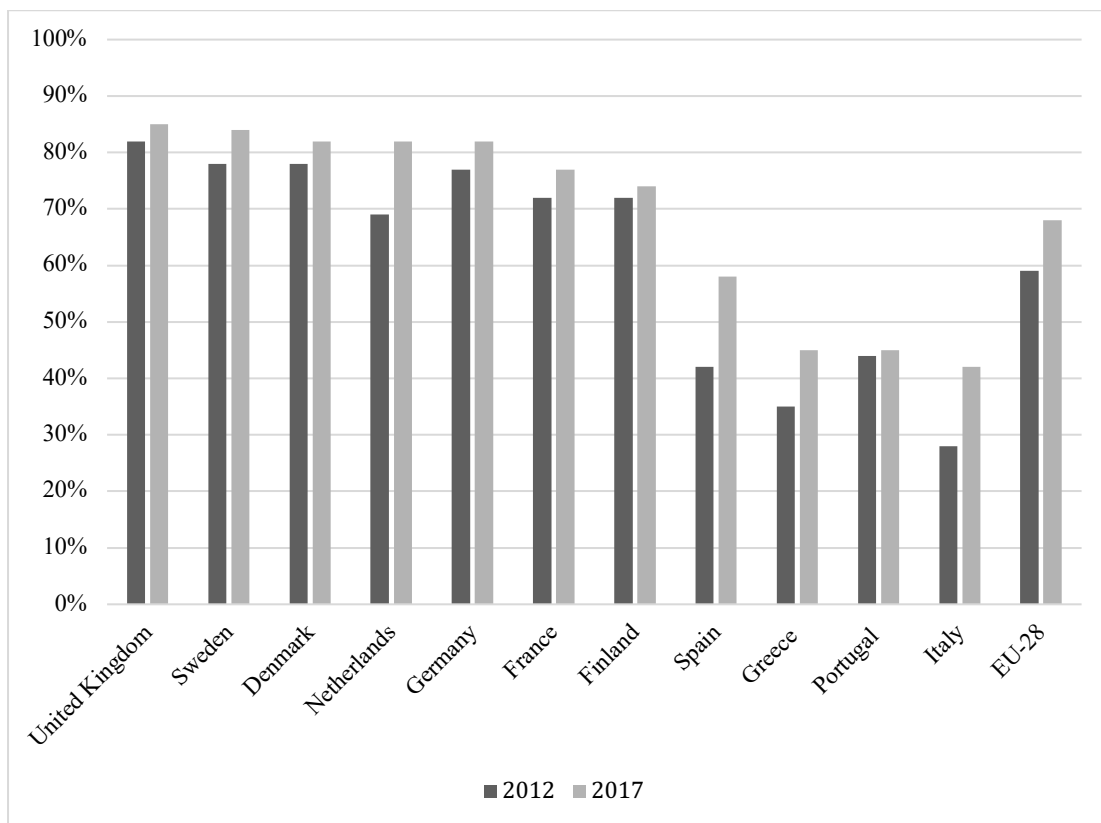
Platforms	National, regional or local freight forums	Communication
Education	Workshops courses, best practices workshops for stakeholders	Communication
Naming and faming/shaming	Green awards	Communication
Benchmarking and monitors	Annual traffic reports	Communication
Licenses, labeling or certification programs	Freight operator recognition scheme	Regulation
Traffic and parking regulations	Daytime or nighttime truck bans, time windows, vehicle restrictions, commercial vehicle parking plan	Regulation
Emissions standards	Low emissions zones	Regulation
Concessions	Concessions for operating urban distribution centers	Regulation
Covenants and agreements	Protocols, codes of conduct, covenants, gentlemen's agreements	Co-regulation
Consultation	Taskforces, commissions	Consultation
Loading and unloading facilities	On-street loading bays	Facilitation
City logistic services	Public consolidation centers, urban delivery services	Law
Arbitration	Mediation, ombudsman, disciplinary	Fiscal and financial instruments
Subsidies	Clean vehicle subsidies, vouchers	Fiscal and financial instruments
Cap-and trade	Emissions trading	Fiscal and financial instruments
Infrastructure provision	Dedicated lanes, freight routes	Infrastructure planning
Launching customer (first buyer)	Ordering of electric vehicles for own use	Market introduction

Appendix B

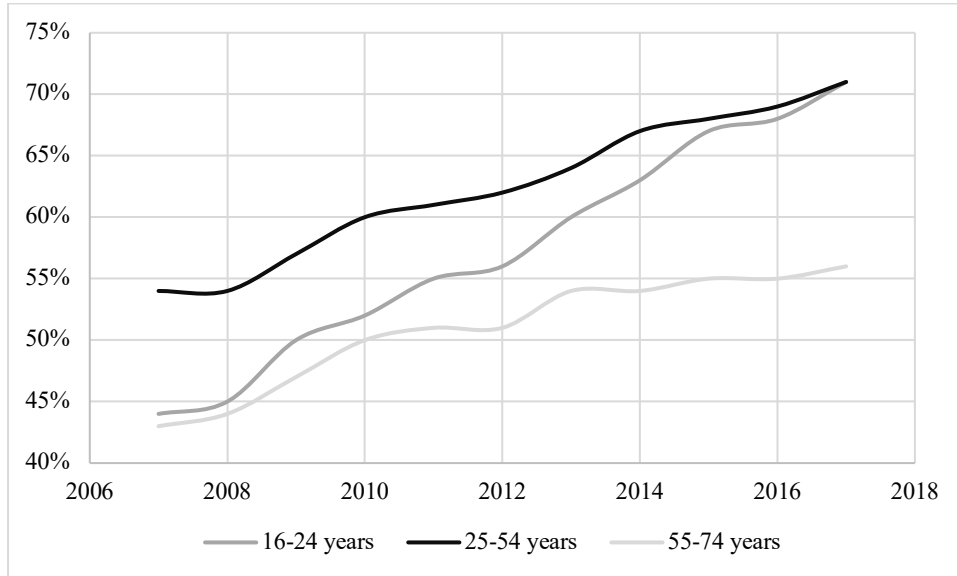
Internet penetrations growth in Europe and regions respective numbers, Ecommerce Europe (2017).



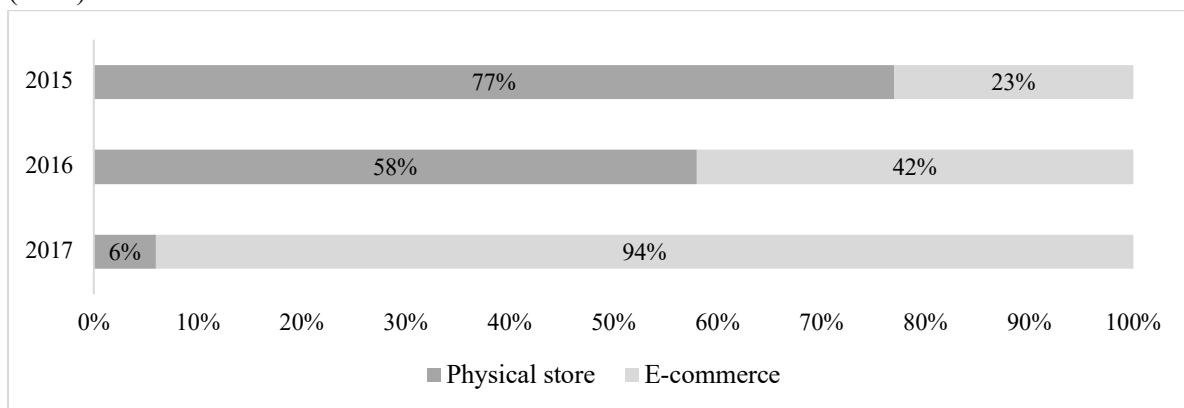
Internet users who bought goods in the last twelve months, Statista (2018)



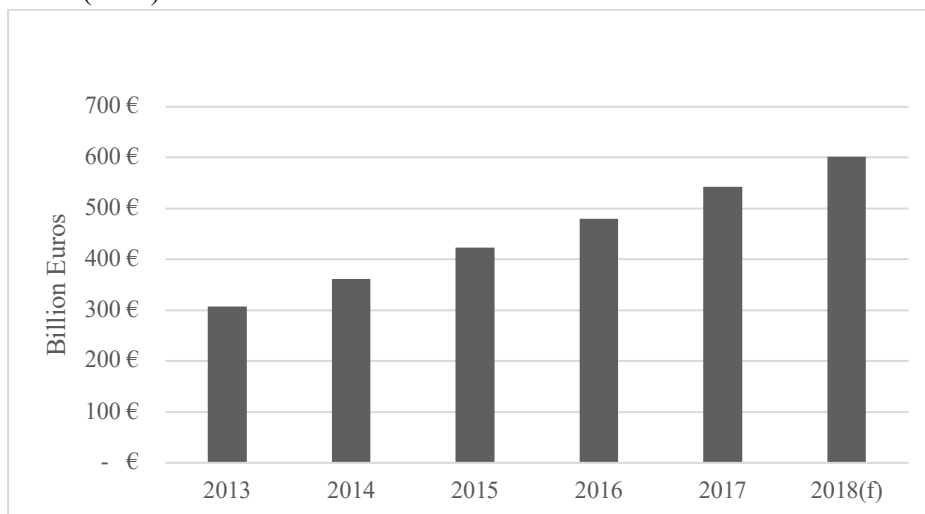
Internet users in Europe who bought goods in the last twelve months separated by age, Statista (2018).



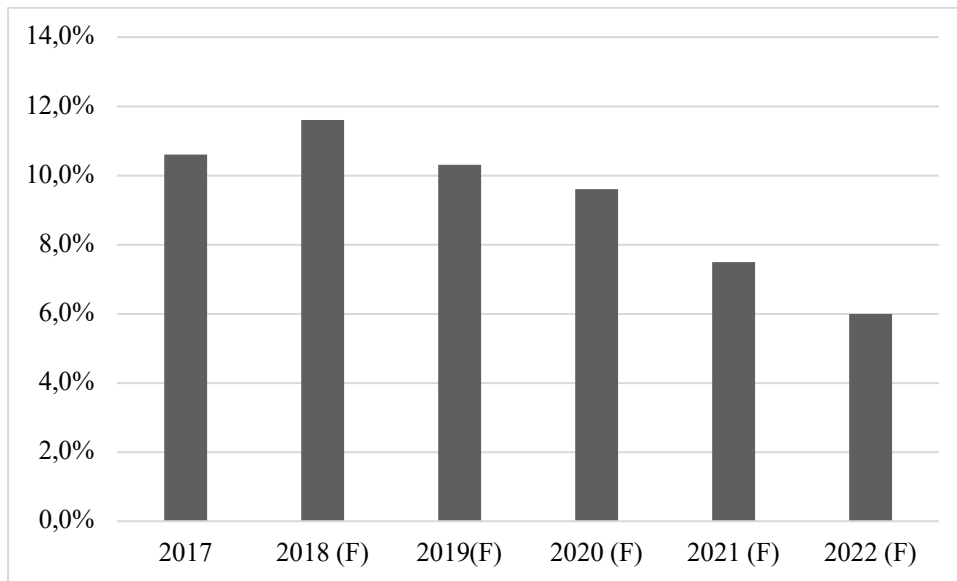
Consumer discretionary sales in relation to channel in Sweden from 2015 to 2017, Svensk Handel (2018).



E-commerce turnover in Europe between 2013 to 2017 and estimated numbers for 2018, Ecommerce News (2018)



Growth rate for 2017 and how e-commerce is estimated to grow next five years, Statista (2018)



E-commerce growth by country, adapted from e-commerce Europe (2017).

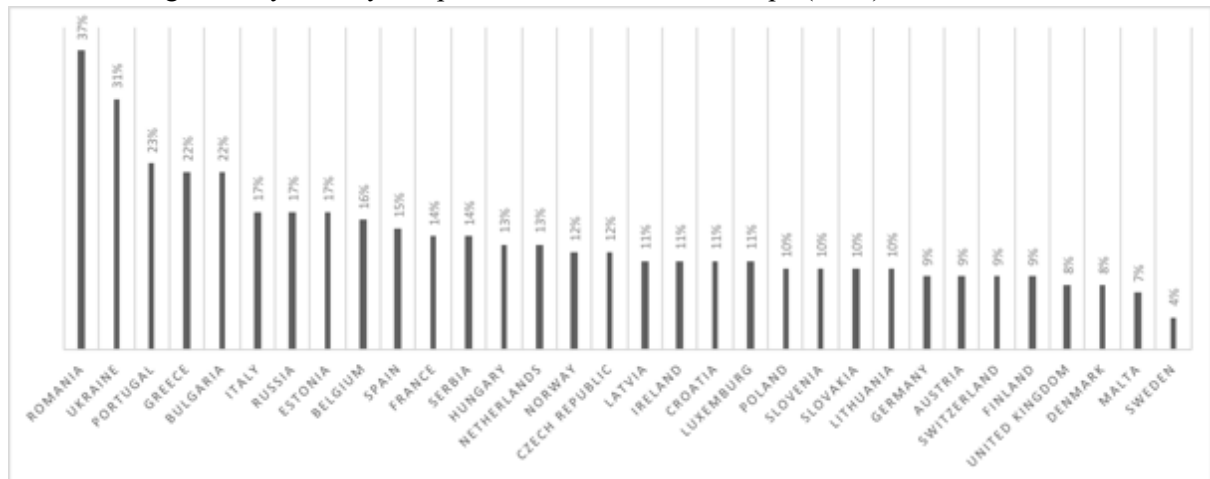
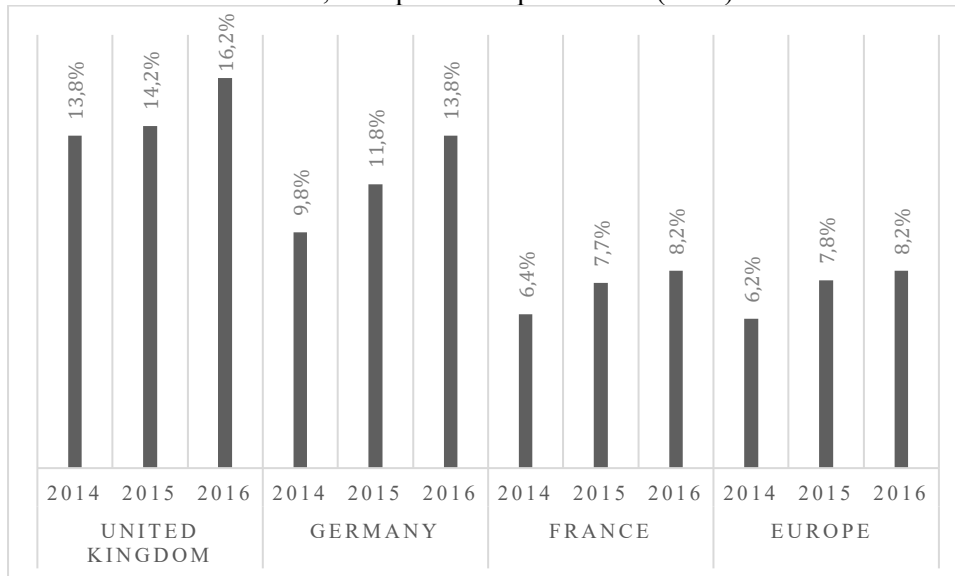


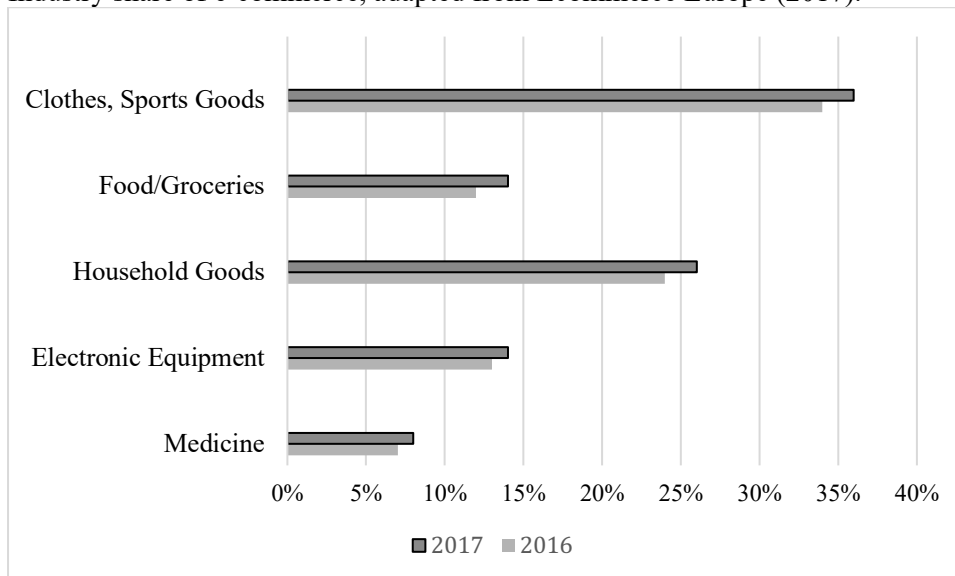
Table xx B2C e-market value for European market under 2015, Enterprise Europe Network (2018)

Europe	455	
West	253	56%
Central	89	20%
South	51	11%
North	38	8%
East	25	5%

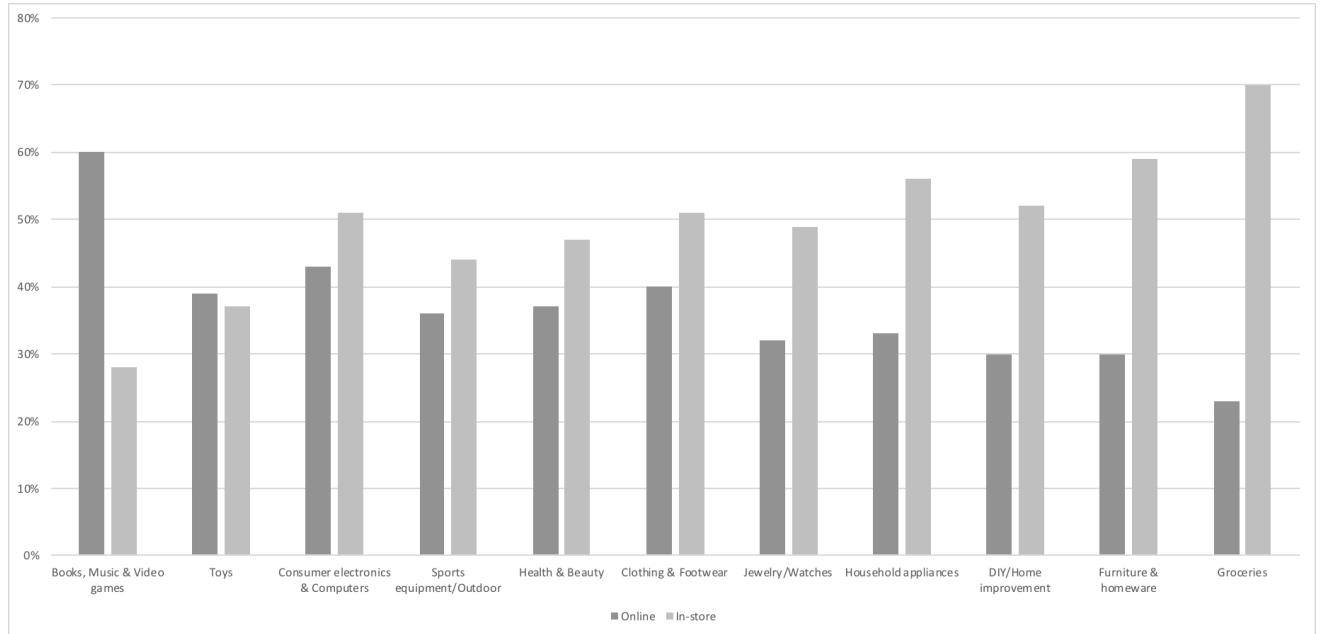
Online share of retail trade, enterprise Europe network (2018)



Industry share of e-commerce, adapted from Ecommerce Europe (2017).



Preferred channel of purchase, by category. adapted from PwC (2017).



The location of vendors in e-commerce adapted from Ecommerce Europe (2017).

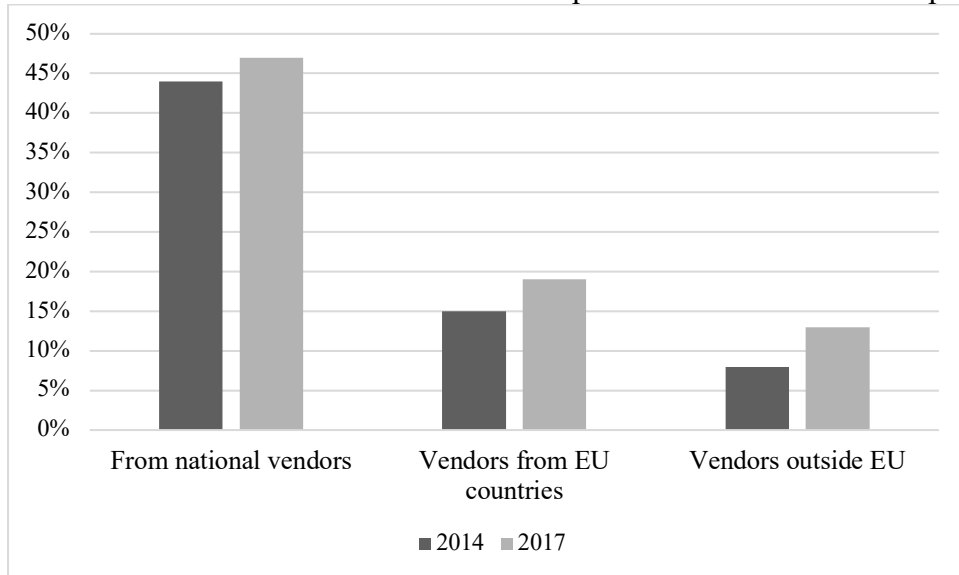
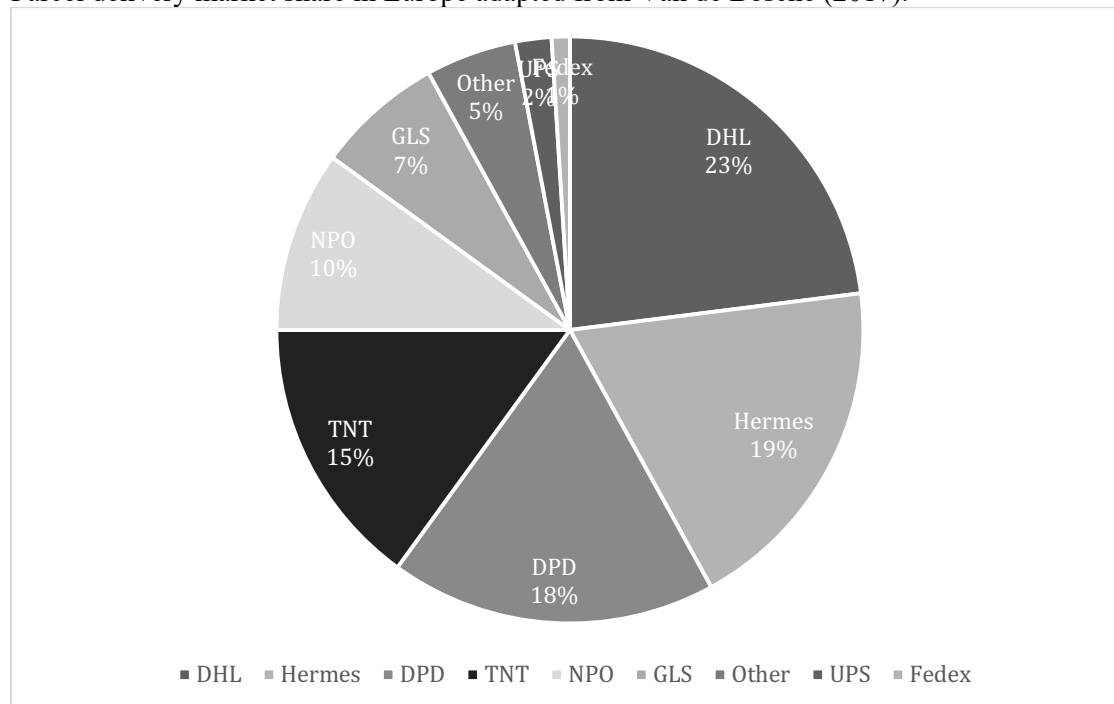


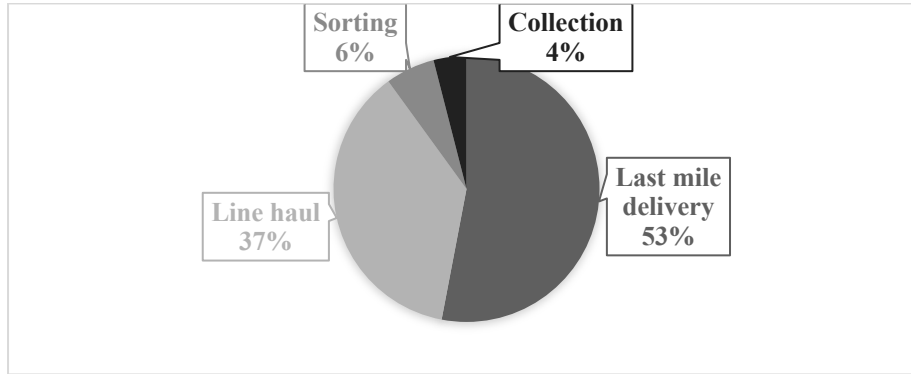
Table over cross border shopping, Statista (2018)

	UK	Belgium	Netherlands	Italy	Poland	Spain	Germany	France	Nordics
Sweden	2%	1%	2%	1%	1%	1%	2%	2%	14%
Denmark	2%	1%	2%	0%	1%	1%	3%	1%	6%
Norway	2%	0%	2%	0%	1%	0%	2%	1%	2%
Finland	1%	1%	1%	0%	1%	0%	1%	1%	1%
Iceland	2%	0%	1%	0%	0%	0%	1%	1%	1%
UK	0%	10%	11%	19%	10%	20%	14%	18%	27%
Germany	9%	15%	15%	16%	14%	14%	0%	16%	21%
Netherlands	3%	34%	0%	2%	2%	1%	5%	2%	4%
France	4%	7%	3%	6%	2%	6%	4%	0%	3%
Spain	2%	1%	1%	5%	2%	0%	2%	5%	2%
Italy	3%	1%	2%	0%	1%	5%	3%	4%	2%
Russia	0%	0%	0%	1%	0%	1%	1%	1%	1%
Rest of Europe	4%	2%	3%	3%	3%	2%	5%	2%	4%
USA	21%	7%	10%	9%	6%	15%	13%	9%	21%
Canada	2%	1%	2%	1%	0%	1%	1%	2%	2%
China	31%	16%	34%	18%	18%	36%	26%	27%	32%
India	2%	0%	1%	0%	1%	1%	1%	1%	1%
Japan	5%	1%	2%	3%	1%	4%	2%	4%	3%
Rest of Asia	2%	1%	2%	1%	1%	2%	2%	1%	4%
Australia	2%	1%	1%	0%	0%	0%	1%	0%	2%

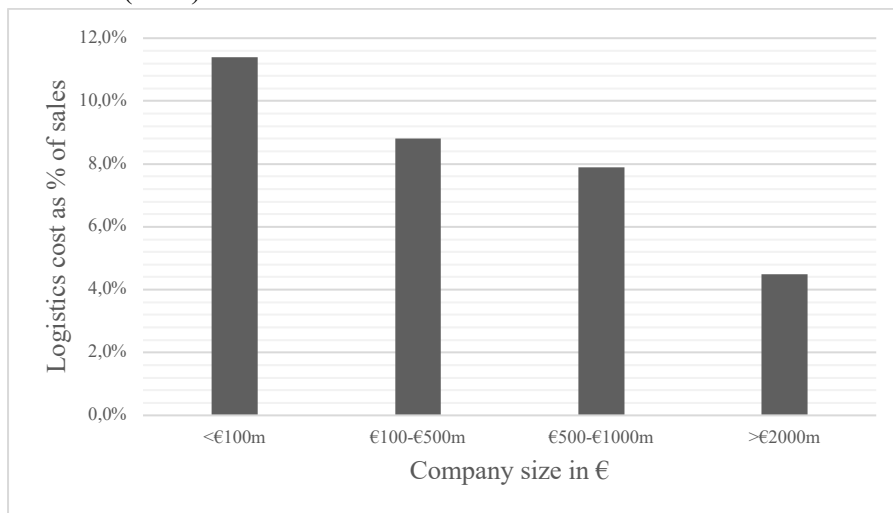
Parcel delivery market share in Europe adapted from Van de Bosche (2017).



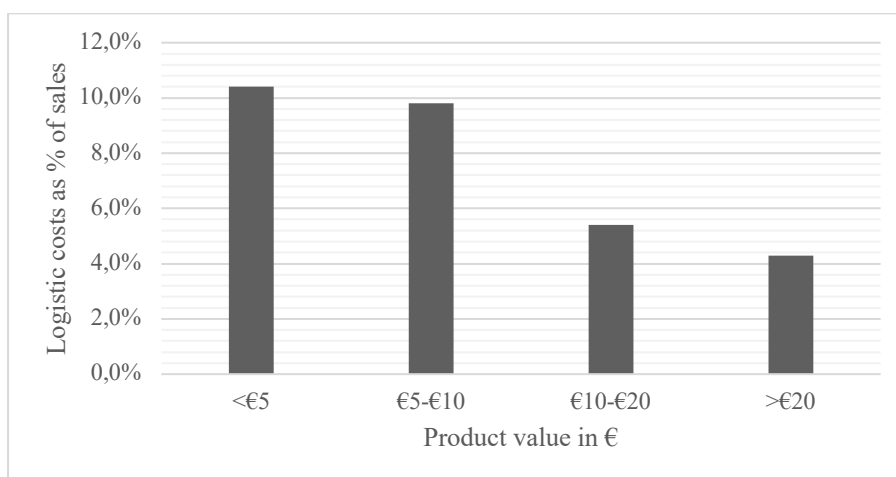
Division of logistical cost Dolan (2018)



Logistics cost as a percent of sales in comparison to company size, adapted from The Establish Davis Database (2016).



Logistics cost as a percent of sales in comparison to product value, adapted from The Establish Davis Database (2016)



Appendix C

Questionnaire e-tailers

- What is your role in the company?

Theme: Distribution

- How does information handling differ across Europe? Standards?
- How does your set-up look like? Do you only have e-commerce customers and how do you differentiate between customers?
- How do you evaluate your distribution systems and how do you follow up?
 - Key metrics?
- Do you have requirements on the transportation vehicles?
- What functionalities do you wish the transportation vehicles had?
- What type of information do you think that end customer requires?
- Postnord argues for that e-tailers have troubles to get goods out in time and that the problem with transport often is within warehouse activities. What could you do in order to facilitate this?

Theme: Information

- How do you track your distribution?
- Do you have integrated distribution systems with other actors in the chain?
- What kind of information in the distribution chain is important to you?

Theme: Last Mile

- How are you handling reverse logistics?
- In terms of quick, medium and slow flows, which actor should handle this integration?
- In terms of transport service, what could you do to increasing customer experience?
- What is your view on sustainability, what is possible to do from your point of view?
- How do you think that e-commerce will look in the future?

Questionnaire last mile operator

- What is your role in the company?
- Are you only active in e-commerce distribution?

Theme: Distribution

- Could you describe you service, what type of partner are you?
 - How do you handle orders, how do they enter your system?
- What alternative modes of delivery do you have?
- How do you evaluate your service?
- What requirements do you have on your transports?
- Why have you decided not to have your own fleet?
- Do you control what vehicles are used in the deliveries?
 - What are your requirements on the vehicles?
 - What functionalities do you wish the transportation vehicles had?

Theme: Information

- What kind of information in the distribution chain is important to you?
RFID
- How do you track your distribution?
 - How would you like to track your distribution?
- What do you believe the customers would want to have in terms of information?
- Do you have integrated distribution systems with other transport actors in the chain?

Theme: Last Mile

- How do you think the customers would like to have their goods delivered?
- What is the cost of the last mile operations in relation to the other parts of distribution?

- How much do you believe the customers are willing to pay for last mile deliveries?
- How are you handling reverse logistics?
- What are your future thoughts of your role in the distribution chain? (with the threat of amazon entering).
- Do you work with increasing service towards customers?

Questionnaire heavy truck manufacturer

- What is your role in the company?

Theme: Trends

- How does carrier requirements differ on the European market?
- From your point of view, what differs an e-commerce transport from a regular transport?
- Which actor in distributing chain sets requirement on trucks?

Theme: Communication

- What information do Volvo think that end customers/e-tailers/carriers are interested in?
- Which communication systems do you believe to be important in order to be a relevant actor?
- Are there any systems present today that customers are not aware of but could increase the offering for end customer?
- How shall heavy truck manufacturer adopt their offering to other actors that perform Last mile delivery?

Theme: Requirements on body

- What type of requirements are crucial for flows that include, clothing, electronics and food?
- In what way could Volvo increase end customer experience in terms of service?

Theme: Sustainability

- Are you aware of any specific regulations that arise for e-commerce and inner-city transport?
- In what way does Volvo differ towards their competitors in sustainability? Is there any other actor that distinguish in this area?
- How do you think that e-commerce will look in the future?

Questionnaire Carrier

- What is your role in the company?
- Does your strategy differ between regular or e-commerce actors?

Theme: Distribution

- What type of transport involvement is most common with ecommerce actors? (e.g. 3PL deals)
- What alternatives for distribution do you have for e-commerce?
- How do you evaluate your services?
- How many trucks do you have, and how are they used today?
- What are your requirements on the transportation vehicles?
- What functionalities do you wish the transportation vehicles had?

Theme: Information

- What kind of information in the distribution chain is important to you?
RFID
- How do you track your distribution?
 - How would you like to track the distribution?
- What do you think your customers would like to have in terms of information?
- Do you have integrated distribution systems with other transport actors in the chain?

Theme: Last Mile

- How do you handle last-mile deliveries, what is your role in this chain?
- What mode of delivery do you believe the customers want?
- How much do you believe the customers are willing to pay for these deliveries?
- Do you handle reverse logistics?
 - If yes, how?
- What are your future thoughts of your role in the distribution chain? (with the threat of amazon entering).
- Do you work with increasing service towards customers?

Questionnaire external stakeholder

- What is your role in the company?
- How will the urban infrastructure of today affect e-commerce and its operations in urban areas?
- How will the urban infrastructure in the future (10 years) affect e-commerce and its operations in urban areas?
- What is the societal view on last mile deliveries?
- What is the societal view on reverse logistics?
- What are the possibilities for storing and warehousing in urban environments?
- What are the societal requirements on transport operations today?
- What are the societal requirements on transport operations in the future (10 years)?
- What modes of delivery exist today that are viable from a societal and sustainable perspective?
- What modes of delivery will exist in the future (10 years) that are viable from a societal and sustainable perspective?
 - Who are the drivers for sustainable transports in the future?
- What information is of interest for the society that can be obtained from transport operations?
 - Who are the drivers of communication between different actors?

What role do you believe trucks will have in the future e-commerce distribution?