Securing Successful Omni-Channel Logistics

An Investigation of Competencies Required to Adapt to the Trends and Challenges of the Retail Industry

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Abstract

Omni-channel retailing, the concept of offering consumers a seamless experience by integrating physical stores and online channels, is growing within the retail industry. This transformation has forced entire organizations to rethink their logistics network and fulfillment operations, which has resulted in an endeavor to work more cross-functionally in businesses. This shift makes the competence requirements for operating omni-channel logistics more complex and intertwined. No previous research has focused on the intersection of competencies and omni-channel logistics.

Therefore, the purpose of this thesis was to explore what competencies will be required within the retail industry, in connection to omni-channel logistics, to cater to the changing customer demand and other trends within the industry. The purpose was addressed through an exploratory, qualitative interview study, involving seven leading Swedish retailers and three supporting, or competing, industry experts.

The analysis included a mapping of challenges affecting omni-channel logistics and prominent trends in the industry. Further, competence requirements to overcome these challenges were specified and consolidated into five personas critical for retailers to recruit and develop internally. Answering what competencies will be required to enable successful omni-channel logistics is not as easy as diving into a set of specific competencies. We concluded that the key is often in the connection between competencies, and it is not easy to precisely pinpoint which competencies contribute to what output. Critical competencies no longer only relate to specific supply chain and logistics competencies. Instead, they include soft values and competencies related to dynamic consciousness in business landscapes, like collaboration, agile methods, and stakeholder management.

Considering theoretical contribution, the challenges identified in this thesis provide areas for academics to further focus on going forward. Additionally, we provide one puzzle piece to the solution by identifying the competencies and omni-channel logistics personas required to cater to the new omni-channel retailing landscape. Given the strategic focus of this thesis, it would be complementary for further research to dive deeper into the more operational aspect of competencies, looking into blue-collar jobs and how these roles will be impacted by automation and other emerging technologies.

Keywords: *Omni-channel retailing, Omni-channel logistics, Omni-channel strategy, Competencies, Competence framework, Supply Chain Management, Personas*

Sammanfattning

Detaljhandel genom omnikanal innebär att erbjuda en enhetlig och sömlös kundupplevelse på alla plattformar till alla kunder genom att integrera fysiska butiker och online-kanaler. Detta är ett växande koncept i detaljhandelsbranschen. Denna transformation har tvingat organisationer att omvärdera sina logistiknätverk och hur de ska tillgodogöra kundorder, vilket har resulterat i en strävan efter att arbeta mer tvärfunktionellt inom företag. Detta skifte har lett till mer komplexa och sammanflätade kompetensbehov för detaljhandlare med omnikanal-logistik. Ingen tidigare forskning har fokuserat på gränssnittet mellan kompetenser och omnikanal-logistik.

Syftet med detta examensarbete var därför att utforska vilka kompetenser som kommer att behövas inom detaljhandeln, kopplat till omnikanal-logistik, för att tillgodose den förändrade kundefterfrågan och andra trender inom branschen. Detta adresserades genom en explorativ, kvalitativ intervjustudie som involverade sju ledande svenska detaljhandlare och tre stödjande, eller konkurrerande, branschexperter.

Analysen inkluderade en kartläggning av utmaningar som påverkar omnikanal-logistik och framträdande marknadstrender inom branschen. Kompetenskraven för att övervinna dessa utmaningar specificerades och konsoliderades till fem ”personas” som kommer att vara kritiska för detaljhandlare att rekrytera och utveckla internt. Att svara på vilka kompetenser som krävs för framgångsrik omnikanal-logistik är mer komplicerat än att ange en uppsättning specifika kompetenser. Vi konkluderade att det kritiska ofta finns i kopplingen mellan olika kompetenser och att det inte är enkelt att precisera vilka kompetenser som leder till vilken prestation. Kritiska kompetenser innefattar inte längre enbart kunskap inom logistik och försörjningskedjor. Mjukare värden och kompetenser relaterade till dynamisk medvetenhet, exempelvis samarbete, agila metoder och hantering av intressenter, blir allt viktigare.

Angående teoretiskt bidrag har detta examensarbete identifierat utmaningar inom omnikanal-detaljhandel som vidare forskning kan fokusera på. Vidare har vi bidragit med en pusselbit till lösningen genom att identifiera kritiska kompetenser och ”personas” att rekrytera eller utveckla för framgångsrik omnikanal-logistik. Givet detta examensarbetes strategiska fokus skulle det vara kompletterande för vidare forskning att djupare utreda mer operationella kompetens-aspekter och undersöka hur dessa roller kommer att påverkas av lagerautomation och andra växande teknologier.

Sökord: *Omnikanal-detaljhandel, Omnikanal-logistik, Omnikanal-strategi, Kompetenser, Kompetensramverk, Logistik i försörjningskedjor, Personas*

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Abbreviations

3PL	Third (3)-Party-Logistics
AGV	Automated Guided Vehicles
AI	Artificial Intelligence
AR	Augmented Reality
AS/RS	Automated Storage and Retrieval System
CDCs	Customer Distribution Centers
CEP	Courier, Express and Parcel Services
CPUs	Customer Parcel Units
DC	Distribution Center
ERP	Enterprise Resource Planning
HMW	How Might We
IoT	Internet of Things
IS	Information Systems
IT	Information Technology
LSP	Logistics Service Provider
ML	Machine Learning
OFC	Order Fulfillment Center
RBV	Resource-Based View
RFID	Radio Frequency Identification
RO	Research Objective
RQ	Research Question
SCM	Supply Chain Management
SKU	Stock Keeping Unit

1 Introduction

This chapter will present the background of this thesis, describe the problem at hand, and explain the purpose of this thesis. Further, the research question to be answered and the research objectives to be addressed will be introduced. Finally, the focus and delimitations will be described and motivated and the structure of the thesis will be explained.

1.1 Background: The growing focus on omni-channel retailing

In recent years, the landscape for retail has been challenged by increasing customer expectations and ever-growing competition (Cao, 2014; Davis-Sramek et al., 2020). Simultaneously, accelerating technology development has provided unprecedented data on consumers (Aversa et al., 2021), enabling further customization of customer journeys. These developments have translated into companies having to progress their value propositions beyond just price to, for instance, facilitating a seamless customer experience and leveraging big data and multiple channels for a competitive advantage (Aversa et al., 2021; Wallace et al., 2009). With the growing importance of being present online, traditional retailers who previously only had physical stores now need to tend to more demanding customers in multiple channels (Hübner, Holzapfel, et al., 2016). Customers expect a unified buying experience regardless of which channel they use for different steps in the buying process (Cao, 2014). This is referred to as omni-channel retailing, the concept of creating a seamless customer offering by integrating physical stores and online channels, which is rapidly growing within the industry (Bernon et al., 2016; Kembro et al., 2018). Omni-channel retailing should enable a customer to go through multiple channels, consistently receiving the same information and services in terms of price, assortment, delivery and return options, and customer service. (Beck & Rygl, 2015).

The other aspect needed to move seamlessly between channels is a physical flow that supports this experience. The customer should be able to freely pick up products, return products and interact with the company wherever and whenever desired. To offer this to their customers, companies have to organize their back-end logistics to enable integration (Eriksson, 2019). This concerns all aspects of fulfillment, ranging from network configuration and warehouse operations to last-mile delivery and returns management (Hübner et al., 2015). Configuring these processes to manage the different channels interchangeably and support the customer offering will be referred to as omni-channel logistics. The increase in the number of channels further complicates the logistics processes, and the flow of goods is no longer linear (Hübner, Holzapfel, et al., 2016). This puts pressure on the organizations wanting to implement an omni-channel strategy in terms of capabilities and competencies needed to succeed with the strategy. The demands that the new omni-channel landscape put on existing roles and organizations challenge the competence-base and guide what initiatives organizations need to start concerning competence development and recruitment.

No previous research has investigated and explored what logistics-related competencies will be needed in the new era of omni-channel retailing. To understand that and bridge this gap in research, we need to explore the trends and challenges that will dictate the retailing industry's coming years. In this research, we want to understand what competencies, in connection to omni-channel logistics, companies need to truly stay competitive and thus capture larger market shares and leverage the new technologies.

1.2 Problem description

With the growth of omni-channel, new services requiring new competencies and capabilities within logistics have emerged (Bernon et al., 2016; Ishfaq et al., 2016; Oh et al., 2012; Wallace et al., 2009). The emergence of Industry 4.0 and technology game-changers such as Artificial Intelligence (AI) and Internet of Things (IoT) will disrupt supply chain design, and how well companies reorganize to cope with these changes, to a large extent, depends on creative and collaborative capabilities (Goldsby et al., 2019). Hoberg et al. (2020) argue that the rise of automation will eliminate blue-collar jobs within warehousing and transportation, and that the introduction of machine learning (ML), IoT and other technologies will further impact white-collar jobs such as supply chain planning. This will naturally impact the organizational requirements and the roles needed within logistics in the future, for example, creating an increased need for tech-savvy experts to manage a more complex system (Hoberg et al., 2020). Therefore, they call for further research on "what competencies should be considered when attempting to hire, train and retain the best people for managing complex supply chains?" (Hoberg et al., 2020, p. 153). When looking to 2030, Goldsby et al. (2019) further argue that supply chain academics can support shaping this transformation, partly by identifying the capabilities and competencies required concerning emerging technologies and other trends. Galipoğlu et al. (2018) support this statement by claiming that future research within omni-channel retailing needs to focus more on logistics and supply chain-related issues, as most of the research within omni-channel so far has focused on the marketing and strategy aspect.

In 2019, retail e-commerce sales worldwide amounted to 3.53 trillion US dollars, an 18 % increase from the previous year (Statista, 2020). This number is projected to grow to 6.54 trillion US dollars in 2022 (Statista, 2020), a customer behavior change that has been further accelerated by the outbreak of covid-19 (Morgan, 2020). An increasing share of consumers are purchasing products online rather than traveling to a physical shop, forcing retailers to adapt and re-think the role of the physical store (Alexander & Blazquez Cano, 2020). E-commerce is characterized by tough competition on price and customers demanding free deliveries, why one third of Sweden's largest e-commerce retailers were non-profitable in 2018 (Karlöf, 2018b). Karlöf (2018b) argue that better logistics is one part of the cure to this profitability problem and that competencies within, for example, supply chain design, forecasting, and warehousing are lacking. New competencies, both in terms of in-house resources and collaboration with external parties such as logistics service providers (LSPs) and software suppliers, are required to meet this change in market dynamics and the impact of digitalization.

1.3 Purpose

The purpose of this thesis is to explore what competencies will be required within the retail industry, in connection to omni-channel logistics, to cater to the changing customer demand and other trends within the industry.

Intending to determine the competencies required for omni-channel retailers to operate omni-channel logistics, we first need to understand the context in which retailers operate today. Therefore, this thesis will aim to investigate omni-channel retailing largely and describe omni-channel logistics processes in detail. Moreover, we must investigate prominent market trends and challenges currently impacting or posing a future threat for omni-channel retailers. Consequently, we can understand what competencies and capabilities will be needed to respond to these macro factors. Also, competencies currently employed and future ambitions will be investigated both with the help of omni-channel retailers and supporting actors in the industry.

Finally, this information will be used to determine what competencies are critical for omni-channel retailers to possess in connection to omni-channel logistics.

1.4 Research question and research objectives

The purpose of this thesis is to explore what competencies will be required within the retail industry, in connection to omni-channel logistics, to cater to the changing customer demand and other trends within the industry. Thereby, we aim to answer the following research question:

RQ1. What competencies will be required for successful omni-channel logistics, considering changing customer demand and other market trends?

To answer this question, as described in the purpose, an exhaustive mapping of the current retail landscape and its context is required. This mapping aims to satisfy the following research objectives:

RO1. Map how omni-channel retailers configure their back-end logistics to provide a seamless customer offering and what challenges they see concerning this.

By conducting a literature review and an interview study with omni-channel retailers and supporting actors, we will be able to understand how they currently configure their logistics to cater to the changing customer demand. This will enable us to outline what challenges individual retailers see concerning omni-channel retailing.

RO2. Map what market trends and logistical challenges will dictate the omni-channel landscape for retailers in the coming years.

Following the first research objective, the aim is to outline the logistical challenges retailers experience and the trends affecting the industry by consolidating the results from all interviews and comparing to literature.

RO3. Determine what competencies will be required, in connection to omni-channel logistics, to respond to trends and challenges and remain competitive in the omni-channel landscape.

When consolidating results from this study, we will be able to map what prominent trends and challenges omni-channel retailers face and, thereby, analyze the implications on competence requirements. This will allow us to answer the research question and determine the competencies required for successful omni-channel logistics.

1.5 Focus and delimitations

Although the research aims to be widely applicable, its limited time frame justifies a couple of delimitations. Firstly, this thesis focuses on retail organizations operating both physical retail stores and an online channel and their relevant departments working with associated supply chain processes. The thesis is of strategic focus, which means we will mainly cover competencies related to white-collar works. Although it is important to understand the marketing aspect and the customer offering in omni-channel retailing, the purpose is primarily to explore competencies connected to omni-channel logistics. Therefore, interviews conducted as part of the data collection will be performed with company representatives in logistics and supply chain related roles. Given the focus on white-collar workers, managers and heads of

departments will be our main interviewees. However, given the purpose of exploring competence requirements within the industry, LSPs and supporting actors such as consultancy firms will be included in the interview study, since this contributes to the understanding of competencies involved in the entire supply chain and what choices retailers make regarding outsourcing of competencies.

Grocery retailing is excluded from this study as that industry has specific product requirements and different demand patterns compared to the rest of the retail industry. Although the aim is for this thesis to explore and be applicable to the entire non-food omni-channel retailing industry, not all relevant product segments will be covered by the interview study given the time limitations. The thesis will be conducted with companies whose presence is not necessarily limited to Sweden or The Nordics. Still, this market will be used as a frame of reference throughout the study.

1.6 Structure of thesis

Now, we will present the structure of this thesis. **Chapter 1 Introduction** has covered the background of the thesis and described the problem at hand and the research question to be answered. Figure 1.1 below presents the structure of the coming chapters in this thesis along with the main output of each research phase.

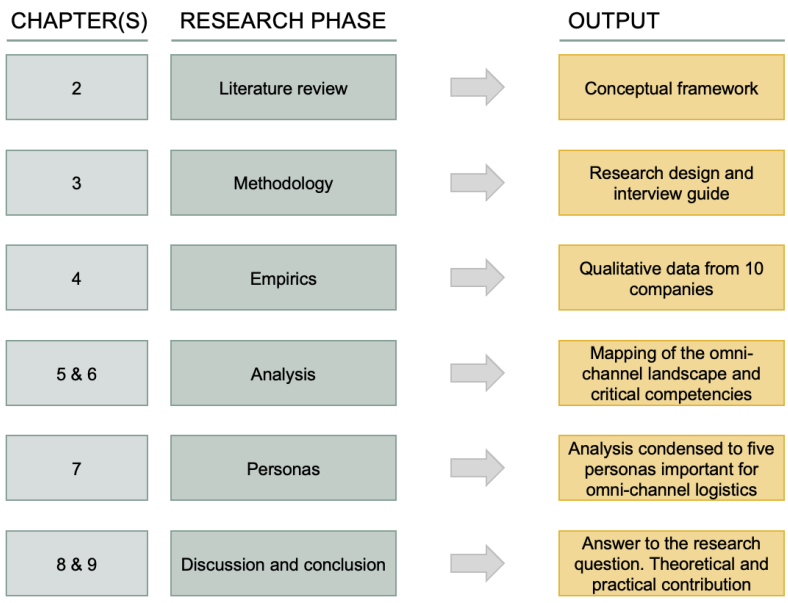


Figure 1.1 *Structure of the thesis and output from each research phase*

In **Chapter 2 Literature Review**, theoretical findings related to the research area, the research question, and the research objectives are presented. The literature review will clarify concepts and definitions relevant to the research topic. The literature review is divided into omni-channel retailing, omni-channel logistics, and competencies. The findings will be summarized in a conceptual framework for competencies in omni-channel logistics.

In **Chapter 3 Methodology**, the research process and the methodological choices made to answer the research question and fulfill the research objectives are described. The research strategy, research design, and the chosen unit of analysis will be presented. In addition, the

research design covers key references from the literature review, motivation and explanation of our case selections, a description of how our data was collected, and the structuring and analysis of our collected data will be discussed. Lastly, the research quality and measures taken to strengthen it will be presented.

In **Chapter 4 Empirics**, the results of the data collection are presented. Firstly, the participating companies will be introduced by a short description of their omni-channel work. Secondly, data collected during the interviews will be presented, highlighting similarities and differences across the case companies. The structure will follow the literature review and the conceptual framework.

In **Chapter 5 Analysis of trends and challenges in the omni-channel landscape**, the prominent trends and major challenges affecting the omni-channel landscape are identified and analyzed. For each trend and challenge, a couple of key actions to ensure successful omni-channel logistics are identified.

In **Chapter 6 Analysis of competence requirements for omni-channel retailers**, the implications on competence requirements following the mapping of the omni-channel landscape will be analyzed. As a result, the competencies considered critical for succeeding with omni-channel logistics within each competence area will be presented and discussed.

In **Chapter 7 Omni-channel logistics personas and their required competencies**, the competencies highlighted as especially important will be condensed into five different personas that we believe will be important in future omni-channel logistics. Each persona will consist of a set of competencies that complement each other.

In **Chapter 8 Discussion and implications**, we will take a step back and discuss the general implications of the study. The competencies and personas identified and their role in future omni-channel retail organizations will be outlined. This chapter will also highlight how the retailers' different conditions regarding product characteristics and technological maturity impact their competence situation.

In **Chapter 9 Conclusion**, we will conclude the thesis by summarizing the key findings, addressing the research objectives, and answering the research question. The practical and theoretical contributions will also be discussed. Then, the limitations of this study will be outlined, and suggestions for future research related to the area will be presented. Lastly, we will shortly reflect on the process of conducting this study.

2 Literature review

This chapter presents the theoretical findings related to the research area, the research question, and the research objectives. The literature review will clarify concepts and definitions relevant for the research topic. In line with this, the literature review is divided into omni-channel retailing, omni-channel logistics and competencies, see Figure 2.1. Finally, the findings will be summarized in a conceptual framework for competencies in omni-channel logistics.

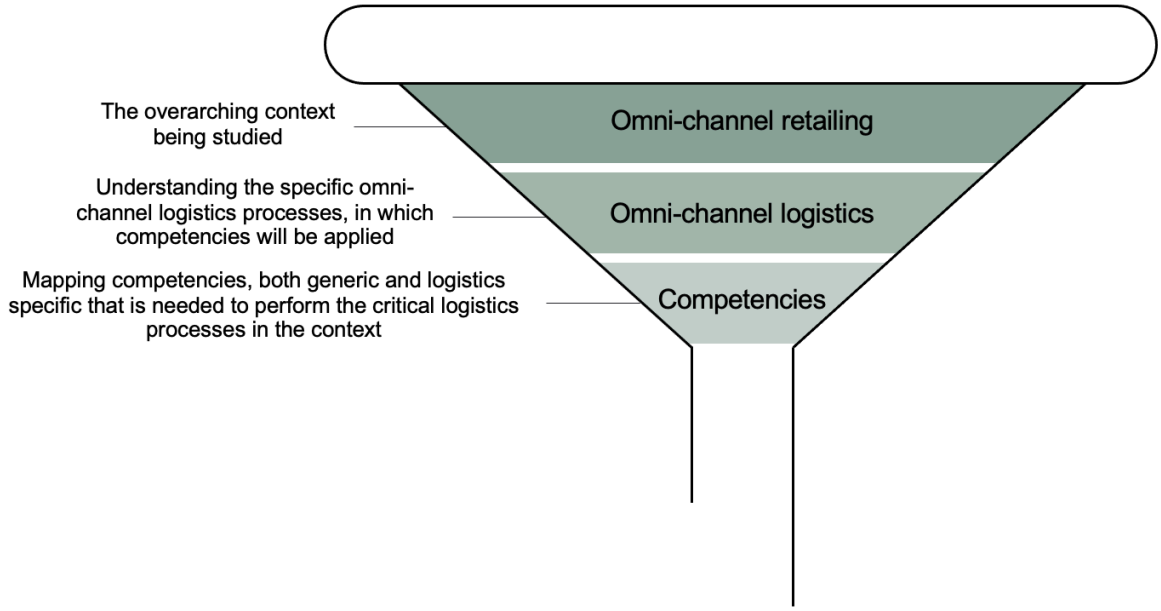


Figure 2.1 *Frame of reference*

To fully comprehend the need of competencies in omni-channel logistics, the context of omni-channel retailing needs to be investigated. The theoretical findings on this context, including the customer offerings that defines omni-channel retailers and the benefits and challenges with omni-channel retailing are presented in chapter 2.1. The following chapter covering omni-channel logistics, will discuss the five logistics processes mainly affected by operating integrated channels along with the enabling role of information technology (IT) and information systems (IS). Focus will be on what choices retailers can make regarding configuring these processes to support the customer offering and the challenges of omni-channel logistics. Lastly, literature on generic competencies and logistics-related competencies that will be needed to perform the critical omni-channel logistics processes will be presented. This chapter, 2.3, will be concluded with the presentation of a conceptual framework, see chapter 2.4, where relevant competence areas are presented in relation to critical omni-channel logistics processes and the overarching context of omni-channel retailing.

2.1 Omni-channel retailing

This chapter aims to provide the reader with an overview of the concept of omni-channel retailing. Much literature concerns sales through multiple channels, while the concept of omni-channel is relatively new. As mentioned already in chapter 1.1, omni-channel retailing is referred to as "the concept of creating a seamless customer offering by integrating physical stores and online channels" (e.g. Cao, 2014). This chapter will start by describing the development towards omni-channel, followed by a presentation of the customer offering in an omni-channel context. Lastly, the benefits and challenges of omni-channel retailing, as discussed in the literature, will be outlined.

2.1.1 Development to omni-channel

Although retailers have been selling through multiple channels for hundreds of years, by combining traditional store sales with mail-order sales, the rise of online channels with the internet gave entirely new relevance to multi-channel systems and induced many bricks-and-mortar retailers, retailers originating from physical stores, to establish an online business model. When retailers distribute using multiple channels, they have to decide whether to keep these channels separated or align them to create a uniform customer experience (Cao, 2014). The concept of seamlessly integrating these channels is referred to as omni-channel retailing (Cao, 2014; Kembro et al., 2018; Verhoef et al., 2015). Beck and Rygl (2015) categorize retailers operating multiple channels based on development in two parameters, the retailer's perception of integration and the customer's viewpoint of interaction across the channels. When at least one of these parameters is deemed fully developed, the retailer is considered an omni-channel retailer (Beck & Rygl, 2015).

Multi-channel was the big retailing trend in the last decade (Verhoef et al., 2015). Between 2010 and 2011, the number of retailers aligning their brand, product offering, and marketing message across channels increased from 26 % to 50 % (Cao, 2014) and has only continued to increase since (Galipoğlu et al., 2018), indicating the increased focus on omni-channel retailing. It is beyond doubt that the number of retailers adopting omni-channel operations are continuously increasing and will continue to do so over the coming years, much supported by the fast growth of e-commerce compared to traditional retailing (Karlöf, 2018a; Kembro & Norrman, 2019a). This is equally true within the Swedish retail industry, where more actors are using physical stores for operations such as customer pick-ups and returns management (Karlöf, 2018a), a way of incorporating omni-channel logistics.

Historically, retailers have operated single channels to achieve maximal efficiency and scale (Zhang et al., 2020). As consumers became more accustomed to the online shopping experience and traditional bricks-and-mortar retailers started to operate online channels to a larger extent, they initially operated them independently of the physical channels (Davis-Sramek et al., 2020; Gao & Su, 2016; Zhang et al., 2020). This resulted in higher costs, duplicated efforts, low margins due to bad inventory management, and lost sales resulting from customer dissatisfaction (Cao, 2014; Davis-Sramek et al., 2020). For an illustrative overview of the development from single-channel to omni-channel retailing, see Figure 2.2.

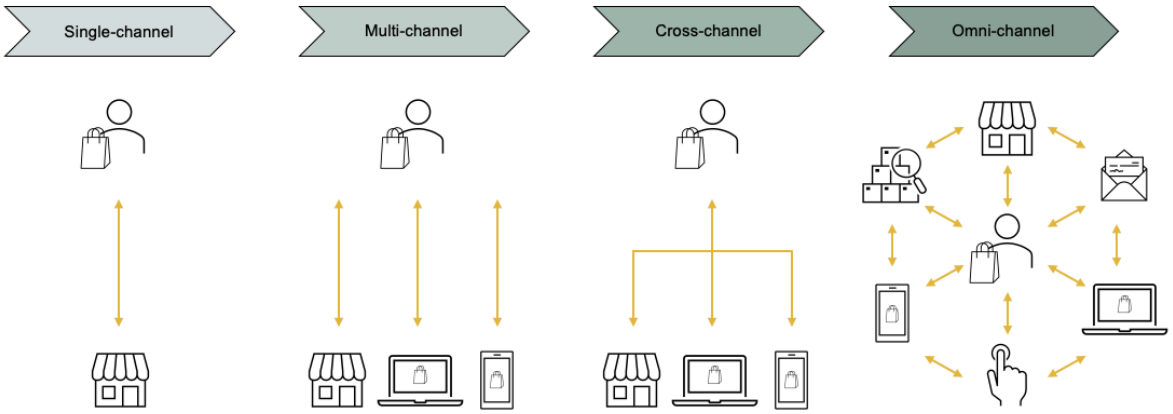


Figure 2.2 *The development from single-channel to omni-channel retailing*

Contemporaneous retailers have, to a large extent, realized the need to integrate their channels to enhance and refine their value proposition and increase operational efficiency (Gao & Su, 2016; Zhang et al., 2020). This forces the retailers to strategically transform their operations and supply chains, and the concept of omni-channel retailing dawns (Davis-Sramek et al., 2020; Gao & Su, 2016; Ishfaq et al., 2016; Zhang et al., 2020). The alignment of retailers' physical and online channels requires redesign and coordination of several vital and long-standing processes, for example order management, order fulfillment, and other logistics processes (Davis-Sramek et al., 2020; Ishfaq et al., 2016). Restructuring supply chain processes like these is a complex project, demanding rigorous planning, designing, and execution (Ishfaq et al., 2016).

For example, one aspect highly affecting the warehouse operations is the difference in order profile of online orders from customers and replenishment orders to stores. The online orders are generally small in both size and quantity per order. They are to be distributed to many scattered locations within a variety of urgent to less urgent time frames and therefore demands multiple departures from outbound. These characteristics are dissimilar from the store replenishment orders, with relatively huge quantities being shipped to one location, and hence disrupts the warehouse operations. The smaller orders require labor-intensive pick-and-pack order fulfillment operations that challenge the retailers' financial performance. If retailers, however, do succeed in integrating their channels, there are a lot of benefits to be reaped. (Hübner et al., 2015; Ishfaq et al., 2016; Kembro et al., 2018)

Ashworth et al. (2006) were among the first to develop a holistic framework for the transformation from being a pure single-channel retailer to operating a sustainable omni-channel organization. The idea behind the framework is that it showcases an evolutionary approach in five stages. Each stage represents a competence gap that the organization needs to close to move further in the transformation (Ashworth et al., 2006).

As depicted in Figure 2.3 below, Ashworth et al. (2006) have described the transition in the five steps; web presence, information competence, value integration, enhanced integration, and leverage experience, learning and knowledge to maximize profits. Hübner, Wollenburg, et al. (2016) used this framework as a foundation for their research and noted that although logistics design was not the main focus of the model, it does play an important role in the last two stages. According to Ashworth et al. (2006), it is vital to optimize processes across the channels and to redesign logistics structures in these later stages to achieve an integrated omni-channel

business. However, to even arrive at the later stages, the organization faces challenging and important competence gaps to close.

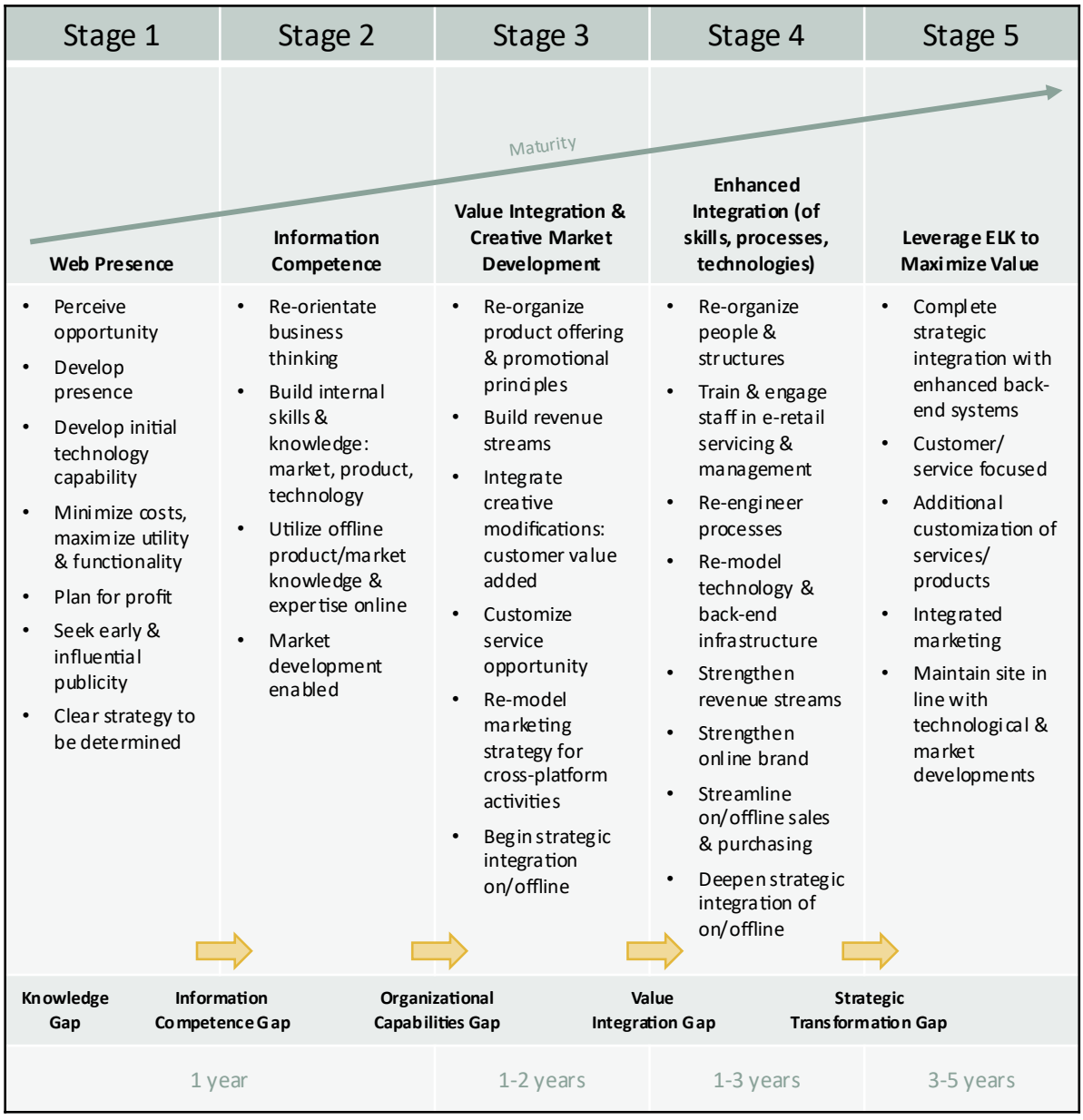


Figure 2.3 *The 5-stage evolutionary approach for moving to omni-channel. Adapted from Ashworth et al. (2006)*

In stage 1, the organization just started to be present online and needs to understand and tap into its value. The focus is to develop their online presence, build initial technological capabilities and plan for profits to move onto stage 2. This requires building of internal information technology competencies as well as skills and knowledge connected to the online market. This will support customers' new buying patterns, facilitate customer touchpoints, and increase repeated purchases. Having the technological competencies in-house is key to minimize maintenance costs and increase control and flexibility. All of these aspects are crucial to retailers fighting ever-decreasing margins. (Ashworth et al., 2006)

In moving to stage 3, value integration, the organization needs to close the organizational capabilities gap consisting of the processes and product knowledge mentioned. There needs to

be an organizational transformation from pure inside-out thinking to an outside-in strategy. At this point, the organization should rethink its product offerings and promotion principles and start the strategic integration of online and offline channels. Customers should experience customized service and improved functionality in the online channel, supported by the organization's technological development. To reach the next stage, the value integration gap needs to be closed. (Ashworth et al., 2006)

Once that is done, the organization has arrived at stage 4, enhanced integration of skills, processes, and technologies. Now the organization is quite mature and has an integrated strategy. It has minimized its costs and integrated back-end systems. Processes are being re-engineered, staff and structures are re-organized, the revenue streams are strengthened, purchases and sales are streamlined across channels, and the strategic integration of channels is deepened. Staff is trained in retail services in online channels. In addition, expenditure is being spread within the organization and, therefore, also the risk. To move onto the last stage, the organization needs to bridge the strategic transformation gap. (Ashworth et al., 2006)

Arriving at the last stage, where the focus is to leverage experience, learning and knowledge to maximize value, the company has acquired competencies to support strategic transformations. The company has completed strategic integration with back-end systems and all learnings are consolidated to maximize synergies within the organization. The organization is customer- and service-centric and aspires to strengthen customer loyalty. Further, it is critical to maintain the online channels in line with development both in the market and in technology. In summary, this move is perceived as imperative for continued business survival and success with notable benefits accumulated. (Ashworth et al., 2006)

In summary, the technological development in the industry and the maturity of customer's shopping behavior has pushed retailers to become omni-channel retailers, operating integrated channels. This challenges their previous single-channel strategy with high efficiency and economies of scale and give rise to a multitude of challenges. Huge efforts need to be invested to become and remain competitive in the omni-channel landscape and bridging a set of competence gaps are fundamental in this process.

2.1.2 The omni-channel customer offering

Before understanding what competence gaps to bridge, it is vital to understand what customer offerings are needed to operate omni-channel retailing. With the ultimate integration of physical and online channels, retailers are now offering a multitude of services across channels in their customer offering. Customers can order through one channel, pick up or receive the order through a second and return through a third (Brynjolfsson et al., 2013; J. Kembro et al., 2018). Examples of such offerings are "order in store, deliver to home", "click & collect" and "order online, return to store", allowing customers to utilize multiple channels at their convenience (Cao, 2014; Galipoğlu et al., 2018). This increasingly complex flow of goods give rise to many logistical challenges, for example, an increasing need for efficient returns management (Bernon et al., 2016) and a challenging physical distribution process, including the costly last-mile delivery to customers' homes (Ishfaq et al., 2016; Wallace et al., 2009).

Pick-up services are either click & collect or click & reserve (Hübner, Holzapfel, et al., 2016). According to Hübner, Wollenburg, et al. (2016), click & collect means that the customer purchases an item online, and if they want to pick it up in-store, it is shipped from the warehouse to the store. With click & reserve, the company can leverage the inventory in-store and offer it for online orders where a customer can reserve an item in-store and then visit the

store to purchase it. This service increases overall availability for the company. While 70 % of retailers surveyed by Hübner, Wollenburg, et al. (2016) said that they offer click & collect, only 25 % offer click & reserve, which implies that channels are not fully integrated yet. However, 58 % either offer or intend to offer click & reserve, showing the potential of that customer offering. 81 % considered it critical to offer these services for free. The availability of various pick-up services increases with a larger footprint (presence and volume of stores and/or warehouses) since more sales points are leveraged for the online channel. (Hübner, Wollenburg, et al., 2016)

The integration of online and physical channels in terms of ordering while in-store can either be done by using your own smartphone or self-service technology, such as tablets, provided by the retailer (Piotrowicz & Cuthbertson, 2014). Piotrowicz and Cuthbertson (2014) claim there is an increasing role of technologies in-store. Technologies for customers could be "magic mirrors", augmented reality (AR), and interactive screens or tablets (Piotrowicz & Cuthbertson, 2014). The employees could also have tablets to facilitate order placement and other online services for customers (Piotrowicz & Cuthbertson, 2014). The important aspect though, is that all technologies have to be integrated across channels back-end (Piotrowicz & Cuthbertson, 2014). If they are, it increases the perceived integration of channels in the customer's viewpoint, a way to strengthen your position as an omni-channel retailer (Beck & Rygl, 2015). Having interactive screens can support the concept of "showrooming", where the customer can view, touch and experience the products in-store and then order it online (Piotrowicz & Cuthbertson, 2014).

If the technology solutions stay simple, it will not be a big challenge to include them in the store environment. However, if the store is compressed and the layout optimized for maximal product focus, there might be a need for redesign of the store layout. It is critical to remember that not all customers desire the same level of interaction with technology. Some might prefer traditional touchpoints, face-to-face. Therefore, there needs to be choices of interaction and free customer selection in connection to channels. All technologies added in-store must not hinder the simplest customer journey, but rather extend and add to the experience. Also, the integration should optimally drive online customers to visit the physical stores and receive service face-to-face. (Piotrowicz & Cuthbertson, 2014)

According to (Hübner, Wollenburg, et al., 2016), the free choice of return node across channels is mandatory for omni-channel retailers, which is also confirmed by a clear majority of the surveyed retailers in their research. Only 77 % of the retailers expressing the importance of channel-independent and seamless returns offer it as a service. The option to offer this or not is profoundly tied to product and industry characteristics, warehouse and store footprint, and company size. Two-thirds of retailers process in-store returns by adding them to the store inventory, while the last third transfers goods to some return center or distribution center. Forwarding goods and transshipments incur more transportation and handling costs that do not add value to the customer and cannot be transferred to them. (Hübner, Wollenburg, et al., 2016)

2.1.3 Benefits of omni-channel

The benefits of integrating your channels as a retailer are multitude, if you succeed in realizing organizational and supply chain synergies. Generally, succeeding in channel integration has advantages in terms of inventory reduction, customer service, and profit (Hübner et al., 2015), and many factors are influencing these advantages.

In a study conducted by Hübner, Wollenburg, et al. (2016), more than half of the surveyed retailers operated or had plans to operate integrated inventories for all channels. This allows for an overall inventory reduction and facilitates demand-driven inventory allocation, which is more flexible than keeping separate inventories. Also, pooling inventories across channels enables higher utilization. Further, a clear majority claimed that having an integrated picking zone makes the warehouse more efficient, although a prerequisite for achieving high efficiency fast is previous experience of fulfilling multiple channels (Hübner, Wollenburg, et al., 2016). (Marchet et al., 2018)

Having online channels complement physical channels counteracts the constraint in shelving space in stores through the almost endless possibility of introducing new products online. Whereas the store space is limited and expensive, the warehouse constraint is relatively loose since it is much bigger, and the storage space is cheaper. The relative investment of introducing another stock-keeping unit (SKU) online is not comparable with that of the physical channel. All these conditions allow retailers who operate an omni-channel strategy to offer a larger assortment. Over 80 % of the surveyed retailers in Hübner, Wollenburg, et al. (2016) research stated that the ability to offer a larger online assortment was both a goal and an asset in an omni-channel strategy. (Hübner, Wollenburg, et al., 2016)

Further strengthening customer service, most respondents in Hübner, Wollenburg, et al. (2016) research believe that shortening delivery time to customers is an opportunity to increase their competitive advantage. However, 90 % of respondents believe that one cannot transfer this effort's cost to the customers altogether. According to the respondents, most customers do not expect same-day delivery for non-food items. The expected delivery velocity is instead between one and two days, where next-day delivery is sufficient from the customer's point of view. Operating an omni-channel strategy makes it easier to respond to this demand since it is possible to fulfill from stores and other nodes in the network. (Hübner, Wollenburg, et al., 2016)

Lastly, the possibility to push promotions and products in the physical channel that the customer has interacted and showed interest for in the online channel is a prominent advantage that omni-channel retailers should capture. This has been shown to increase sales and strengthen the brand image (Blom et al., 2017).

Ashworth et al. (2006) summarized the perceived benefits of an omni-channel strategy in 14 categories, which we clustered into three separate areas and one overarching benefit, presented in Figure 2.4 below. Benefits connected to internal efficiency and growth and effectiveness have to some extent been discussed above, but one aspect not highlighted yet is risk mitigation. By operating an omni-channel, one can argue that risk is spread since you have both the online and the offline channel and are not dependent on either one. Should stores have to be closed due to, for instance, a pandemic, there a still online channels to serve customers and vice versa. (Ashworth et al., 2006)

Figure 2.4 *Perceived benefits of an omni-channel strategy. Adapted from Ashworth et al. (2006)*

2.1.4 Challenges in moving from multi-channel to omni-channel

Online sales are growing significantly faster than the sales in physical stores, which is explained both by the market entry of traditional bricks-and-mortar retailers and increasing sales in available online channels (Hübner et al., 2015). As of 2015, more than 50 % of today's top retailers are operating multiple channels (Hübner et al., 2015). This forces the retailers to the challenging task of restructuring and creating new supply chains and operating models (Hübner et al., 2015). A further challenge is the consumers new shopping behaviors and their higher expectations in delivery time, terms, and service (Hübner et al., 2015). Likewise, technology-savvy consumers expect to obtain pre-sales information, services during the sale, and after-sales support, all through a conveniently customized channel (Oh et al., 2012). Thus, retailers who effectively integrate their service operations and have the capabilities to manage them interchangeably are deemed more proficient in tending to the consumers' demands (Oh et al., 2012).

Although literature (Cao, 2014; Hübner, Kuhn, et al., 2016) suggests that omni-channel retailers should integrate all channels, many retailers still rely on channel-specific IS architectures (Zhang et al., 2020). Consequently, they depend on demand forecasting, inventory management, and pricing optimization methods limited to one channel at a time, largely neglecting the potential efficiency of omni-channel retailing (Zhang et al., 2020). This was a challenge already in 2012, emphasized by Oh et al. (2012), who explain that most multi-channel retailers at the time had siloed capabilities and systems, which resulted in incoherent marketing and operations across the channels. This is a problem since, in competitive landscapes, it is imperative to integrate resources into bundles of competencies, conferring organizations with exceptional performance and competencies that are hard to imitate (Oh et al., 2012).

In summary, the big challenges facing omni-channel retailers are restructuring and creating new supply chains and operating models, increased customer demands, expectations, and requirements, having capabilities to manage customers interchangeably across channels and integrating IS architecture.

2.2 Omni-channel logistics

This chapter will aim to outline the major impacts that the omni-channel transformation has for retailers' logistics processes. There is much literature on generic supply chain management (SCM) and logistics processes, but some aspects are more important when considering how to adapt logistics operations to operating multiple integrated channels. Channels can be managed and operated separately and with different processes, but Hübner, Wollenburg, et al. (2016) found that retailers and experts agree that both channels can be managed more efficiently if logistics is managed and handled by the same organizational unit, through so called integrated channels.

Cooper et al. (1997) identified eight key business processes that constitute the core of SCM: customer relationship management, customer service management, demand management, order fulfillment, manufacturing flow management, supplier relationship management, product development and commercialization and, lastly, returns management. When looking at omni-channel retailing specifically, there is no direct consensus on what the most critical logistics considerations are, but there are a lot of common themes in the related publications. Galipoğlu et al. (2018) conducted a comprehensive literature review on omni-channel retailing and identified six key areas within the research theme of omni-channel retail logistics: fulfillment and transportation, inventory management, capacity planning and allocation, returns management, supply chain processes and environmental issues. Hübner et al. (2015) stated that network configuration, inventory management, warehouse operations and capacity management are the four main omni-channel operations planning areas. While network configuration is a strategic consideration, warehousing and capacity management are more tactical and operational areas with shorter planning horizons (Hübner et al., 2015). Many authors highlight the criticality of returns management in an omni-channel context, especially with the growing online sales (Bernon et al., 2016; Hübner, Holzapfel, et al., 2016; Marchet et al., 2018). Besides returns management, Marchet et al. (2018) describes distribution network design, inventory management and last-mile delivery as the main logistics issues and considerations arising from omni-channel retailing. When comparing omni-channel literature to the framework proposed by Cooper et al. (1997), the two processes that are mainly affected are order fulfillment and returns management. The order fulfillment process can be broken down into several components or process steps, of which warehousing and physical distribution are two key components (Croxton et al., 2001).

Based on the common themes in literature mentioned above, five logistics processes have been identified as critical in omni-channel retailing: *network configuration, warehouse operations, resource and capacity management, last-mile delivery,* and *returns management*. Each of these key omni-channel logistics processes and their implications for omni-channel retailers will now be discussed in detail in chapter 2.2.1 through 2.2.5, followed by a discussion on how IT and IS support these processes in chapter 2.2.6. IT and IS are critical enablers for integrating activities and offerings across channels (Oh et al., 2012; Hübner, Wollenburg, et al., 2016), why it will be discussed in connection to omni-channel logistics in this chapter. See Figure 2.5 below for a schematic of the mentioned processes.

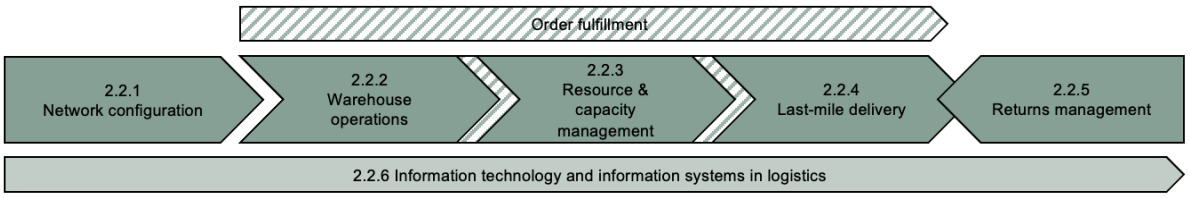


Figure 2.5 *Critical omni-channel logistics processes*

2.2.1 Network configuration

When fulfilling orders for multiple channels, the first decision retailers must take is how to configure their network to support both channels and returns from customers. The design of a warehouse network regarding geographical location and number and types of facilities is the foundation for the order fulfillment process (Hübner, Wollenburg, et al., 2016). For omni-channel retailers, network configuration also concerns the additional aspect of whether distribution centers (DCs) should be integrated to fulfill the demand of both physical and online channels or whether to separate DCs depending on the channel (Hübner et al., 2015; Hübner, Kuhn, et al., 2016; Ishfaq et al., 2016; Marchet et al., 2018), see Figure 2.6. All operational planning areas depend on and are affected by the strategic choices made regarding how to configure the network of material handling nodes (Hübner et al., 2015).

Integrated network structures enable pooling of inventory, while separate network structures simplify the picking process (Hübner et al., 2015). The picking aspect will be discussed in detail in chapter 2.2.2 covering warehouse operations. While retailers tend to use a separate structure as a starting point when transitioning to omni-channel, an integrated structure is a more advanced solution that mature retailers adopt to leverage synergies between channels (Hübner et al., 2015). Integrating online warehouses (DCs only handling e-commerce orders) and offline warehouses (DCs only handling store replenishments) is, however, a task requiring extensive process-reengineering (Hübner et al., 2015). Marchet et al. (2018), on the other hand, argues that the efficiency of an integrated solution decreases as the number of online orders increases. In the case of high-volume online orders, separate fulfillment centers might be the more suitable option to simplify operations and increase efficiency at individual nodes. Besides integrating or separating by channel, retailers can choose to separate inventories by, for example, operating separate DCs for different product categories (Hübner et al., 2015). For omni-channel retailers, the physical stores also play a critical role in the network. Retail stores can act as online fulfillment centers (OFCs) for customer orders, where e-commerce orders are picked in the store either for customer pick-up or for home delivery (Wollenburg et al., 2018).

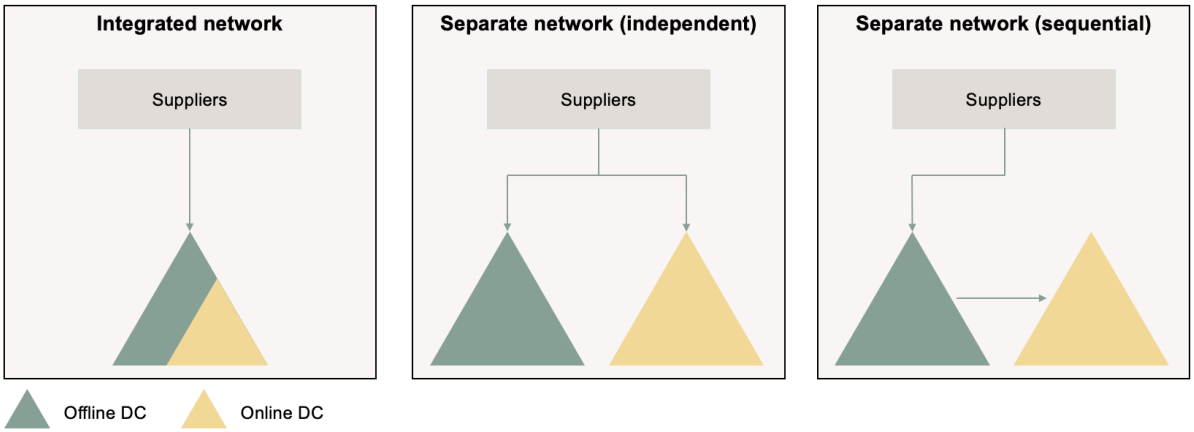


Figure 2.6 *Network configurations for omni-channel retailing. Adapted from Hübner et al. (2015)*

Besides affecting order fulfillment, network configuration also plays a considerable role in managing return flows, as customer accessibility to return points is a fundamental component of successful returns management. Large retailers with many stores utilize the "return-to-store" option, while retailers with limited coverage rely on partnering. An example of that would be using a specialist third-party store-based parcel service or the post office (Bernon et al., 2016). Returns management will be discussed in detail in chapter 2.2.5. Following, literature on integrated and separate network structures will be discussed along with the centralization degree of retailers' networks.

Integrated networks

Integrated networks have joint warehouses for both the online and the offline channel (Hübner et al., 2015). Studies find that the majority of omni-channel retailers operate integrated warehouses for their online and offline businesses as well as integrated inventory (the same inventory is allocated to both channels) on these locations (Hübner et al., 2015; Marchet et al., 2018). However, this network structure can be operated in many different ways. One way is to have a central warehouse for all channels and product categories, and another is to have one central warehouse that supplies regional warehouses, which in turn fulfill customer orders and store replenishments (Hübner et al., 2015). Moreover, the warehouses can be integrated by channel and simultaneously separated by product category or by region (Hübner et al., 2015).

With an integrated network, retailers have the opportunity to pool inventory, meaning that a single stock of inventory can serve multiple markets (Hübner et al., 2015). This allows for dynamic, demand-oriented allocation of store and online orders, which can be an advantage since online sales are difficult to forecast due to high dynamics and the growth of e-commerce (Hübner et al., 2015; Hübner, Holzapfel, et al., 2016; Marchet et al., 2018). Moreover, dynamic allocation of orders reduce the risk of stock-outs and sales losses (Marchet et al., 2018). Integrated inventory also reduce inventory levels and thereby frees up storage space and reduces overhead costs, mainly by decreasing the amount of safety stock required to deal with demand variation (Marchet et al., 2018). Another benefit is higher product availability and thereby higher service levels. With an integrated network, there is additionally no need for transshipments between warehouses. The integrated network configuration does, however, require extensive infrastructure, resources and know-how (Hübner et al., 2015).

Separate networks
In a separate network, e-commerce orders are fulfilled from a separate online warehouse, an OFC. There are two types of separate networks. Some organize their online and offline businesses *independently*, while others organize them *sequentially*, see Figure 2.6. In independent, separated networks, the flow of online and offline goods is completely separated, from supplier to customer. Sequential, separated networks rely on a central warehouse for bricks-and-mortar-businesses that manage inbound operations and subsequently ship to an online warehouse. A sequential set-up is primarily deployed by fashion retailers and the online warehouse can be seen just as another outlet, besides stores, getting replenishments from the central warehouse in this network. (Hübner et al., 2015)

It is common for retailers to choose a separate network because they are lacking know-how, resources and other prerequisites for integration (Hübner et al., 2015). The solution is then often to outsource the non-original channel due to the lack of experience (Hübner et al., 2015). Besides reducing the risk of managing another channel, separation also simplifies processes such as warehouse operations (Hübner et al., 2015; Marchet et al., 2018). A more streamlined picking process along with the placement of OFCs close to customers, to enable fast delivery, are the arguments Marchet et al. (2018) use to support the choice of a separate network. However, this relies on large enough volumes through the online channel (Marchet et al., 2018). On the other hand, a separate fulfillment center for online orders naturally comes with a high fixed cost for set-up (Hübner, Kuhn, et al., 2016). However, a separate network structure could result in a potential inventory surplus in one channel while the other is out-of-stock (Hübner et al., 2015), resulting in lost sales.

Centralization vs. decentralization of DCs
Another aspect of the network configuration of DCs is the degree of centralization, how large areas each DC should be responsible for supplying stores and customers in. Regional DCs are only responsible for a specific area of customers or stores, while centralized DCs (or central warehouses) cover larger areas. As customers expect short lead times, the placement of DCs is an important factor in network configuration. However, the main enabler of next-day delivery is, according to Hübner, Holzapfel, et al. (2016) not proximity to customers, but rather distance to Courier, Express and Parcel Services (CEP) hubs since this allows for later cut-off times and thereby overnight shipments to customers. Therefore, decentralization and use of regional DCs is not the way to improve lead times for next-day delivery, although it generally lowers average transportation distance and thereby allows for shorter lead times in many cases. (Hübner, Holzapfel, et al., 2016)

2.2.2 Warehouse operations

When a given network configuration, whether that is integrated or separated, retailers still need to design processes at individual warehouses to secure effective and efficient inbound and outbound processes. Bartholdi and Hackman (2014) divide the material flow in a warehouse into inbound processes (receiving and put-away) and outbound processes (order-picking, packing, and shipping), see Figure 2.7. Order-picking is the largest cost driver of warehouse operations, normally accounting for about 55 % of warehouse operating costs (Bartholdi & Hackman, 2014).

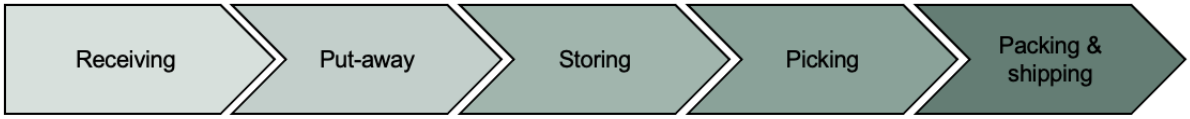


Figure 2.7 *Warehouse operations processes*

There are many different types of warehouses, for example DCs, OFCs that handle e-commerce orders and ship direct to customers, and forward fulfillment centers, which are retail stores used as logistics hubs closer to the customer. Increasing requirements on short lead times and flexibility along with increasing competition, drives retailers to cut logistics and warehousing costs, contributing to the growing strategic importance of warehouses. (Kembro et al., 2018)

Warehouse operations are largely dependent on the network configuration (Hübner et al., 2015). When a separate network structure (see chapter 2.2.1) is used, warehouse operations are by nature also separated, since store orders and online orders cannot be picked and shipped together (Marchet et al., 2018). However, if a retailer operates integrated DCs for physical stores and online channels, considerations on how and to what extent store orders and online orders should be integrated have to be made. In such an environment, handling and coordinating a wide range of incoming and outgoing flows (large store replenishment orders and small online consumer orders) efficiently implicates a big challenge for warehousing operations (Kembro et al., 2018).

Picking systems are very different for online orders and store replenishments. While online orders are characterized by picking for many customers at once and then sorting and packing by customer, replenishment orders are store-specific and often handled in full pallet loads (Hübner et al., 2015). Retailers originating from bricks-and-mortar retailing have processes and warehouse lay-outs optimized for traditional retailing, further complicating the task (Hübner et al., 2015). Picking costs in bricks-and-mortar retailing are generally lower than in online retailing given the higher volume per order line and shorter total picking distances (Hübner et al., 2015). When pooling inventory and thereby storing it together, picking is often separated by channel since it is challenging to manage integrated picking efficiently (Hübner et al., 2015). A mix of picking and sorting methods that are adapted to the requirements of each channel might have to be used when pooling inventories (Kembro et al., 2018). Picking of online and offline orders can therefore be separated by either using dedicated staff for each channel or by assigning separate time slots for picking orders for the different channels (Hübner et al., 2015; Marchet et al., 2018).

Integrated picking does, despite the increased complexity, have advantages in terms of economies of scale and increased flexibility in short-term capacity allocation (Kembro et al., 2018). Integrated picking zones save travelling distance (Hübner et al., 2015), an activity that make up 55 % of order-picking time (Bartholdi & Hackman, 2014). However, integrated picking requires supporting infrastructure and know-how of how to handle both store replenishments and single parcel volumes (Kembro et al., 2018). One way of coping with the difference in picking volumes is by differentiating between initial stocking of seasonal products in stores and the replenishment orders. This enables easier integration of picking of store replenishments and online orders, since volumes are more similar (Hübner et al., 2015). Generally, more similarities between the channels make integration a less difficult task (Kembro et al., 2018). Order-picking can also be conducted in-store (Marchet et al., 2018), on the other hand, retail stores are not designed for order picking (Wollenburg et al., 2018). This makes automation hard to introduce in the store picking operations (Marchet et al., 2018).

One way of handling the increased complexity that picking for two channels creates is automation solutions. Hübner et al. (2015) outlines that automation is mainly used for inbound processes and storage in high racks as well as in sorting and outbound. Automation is one potential solution to increase efficiency in the warehouse and cater to customer demands on shorter lead times (Kembro et al., 2018). As picking accounts for a large share of warehousing costs, large gains in efficiency can be reached by introducing automation to the picking process, especially in piece pick operations (Kembro & Norrman, 2019b). Moreover, Kembro et al. (2018) argues that the complexity of sorting operations is increasing given different time slots for deliveries and the wide array of delivery options available when operating omni-channel, which could be a reason to introduce for example conveyor belts in sorting (Kembro et al., 2018). A more sophisticated WMS is an enabler of these types of solutions (Kembro et al., 2018).

2.2.3 Resource and capacity management

The retail sector has historically to a large extent been promotion and campaign-driven, challenging resource and capacity management at individual nodes. With the growth of volatile e-commerce orders (Hübner et al., 2015; Hübner, Holzapfel, et al., 2016; Marchet et al., 2018) and the different seasonality patterns between channels, additional measures have to be taken to ensure staff, inventory, equipment and other resources are utilized efficiently. While physical stores have a limited amount of space and thereby can only carry a limited assortment, the addition of an online channel gives retailers the possibility to offer customers an extended, virtually limitless, assortment online (Hübner, Wollenburg, et al., 2016; Melacini et al., 2018). Melacini et al. (2018) argue that retailers carry popular items in both channels. The online channel can be utilized to showcase highly specialized products or products with high carrying costs and cannot be profitably offered in stores (Melacini et al., 2018).

Retailers also need to decide between dedicated and shared, pooled inventory in integrated set-ups, as described in chapter 2.2.1 (Hübner et al., 2015; Melacini et al., 2018). If a dynamic allocation is used, customers should have visibility on the overall stock available in the network (Marchet et al., 2018). This puts requirements on robust IT systems to support integrated inventory management (Melacini et al., 2018). Marchet et al. (2018) point out that integration of inventory and storage is vital for capacity, eliminating multiple separate stock positions for e-commerce and store replenishments in one warehouse. As online sales grow, they tend to cannibalize bricks-and-mortar sales, another reason why integration can help achieve constant capacity utilization (Hübner et al., 2015).

Further, retail sales are highly seasonal, which influences warehouse capacity management. Online and bricks-and-mortar sales experience the same patterns of annual seasonality, with decreasing sales during holiday periods and increasing sales before Christmas (Hübner et al., 2015). Every week sales experience peaks during weekends, which results in peak loads for logistics at the beginning of the week. This results from warehouses opening after the weekend, and online orders needing to be shipped and stores needing to be refilled (Hübner et al., 2015). A complicating factor is that online sales are highly volatile given the high growth in online business (Hübner et al., 2015; Marchet et al., 2018). Hence, retailers can operate fixed delivery patterns and allocate capacity for store orders but need to adapt capacity dynamically for online orders. The seasonality patterns naturally depend on the specific industry, collection cycles and promotions (Hübner et al., 2015).

Different approaches can be undertaken to manage capacity during peaks. Marketing measures such as promotions or seasonal discounts can balance capacity and steer demand to periods with fewer orders. Leveling strategies such as postponement of picking and shipping can also be utilized, shifting orders forward or backward in time. A third option is to balance peaks through capacity adaption through, for example, the use of overtime or additional employees. If none of these measures are suitable, retailers can outsource peak volumes to LSPs. (Hübner et al., 2015)

The long-term perspective on capacity management has not been investigated sufficiently in literature, as Kembro et al. (2018, p. 900) argue: "the literature has mostly focused on workforce planning, largely neglecting infrastructure and physical capacity issues such as storage area and equipment.

2.2.4 Last-mile delivery

With traditional bricks-and-mortar retailing, retailers only needed to manage deliveries from DCs to the physical stores. With the rise of e-commerce and the multitude of delivery options available to customers (Ishfaq et al., 2016), distribution has become an increasingly important process for retailers to excel in to stay competitive. Last-mile delivery refers to the final leg of distribution, whether to a personal residence, a parcel station, or a retail store (Hübner, Kuhn, et al., 2016). One of the most relevant trends impacting omni-channel logistics and SCM is the increase of home-deliveries and, with that, the growing importance of last-mile deliveries (Ericsson, 2018; Galipoğlu et al., 2018). Home-deliveries add another layer of complexity to the already costly last-mile delivery and challenge logistics structures, and freight flows further, especially in the cities (Galipoğlu et al., 2018). This change is estimated to increase logistics costs for American actors by 20 % and has led to an increase in last-mile distributors (Ericsson, 2018). Another trend within distribution is increasing dropshipments where suppliers deliver directly to the consumer (Kembro & Norrman, 2019a).

With a given network configuration, retailers must choose how to use the network to fulfill customer orders. Traditional store-based retailers have historically organized their distribution process around large volumes and a linear distribution flow from central warehouses and DCs to stores (Ishfaq et al., 2016). The introduction of online orders, which have a significantly smaller transaction size, has added complexity and cost to this flow (Ishfaq et al., 2016). Customers have high expectations of home deliveries, and the last-mile delivery can account for up to 50 % of the total supply chain cost (Hübner, Kuhn, et al., 2016). Free and fast deliveries have become what customers expect from retailers today. However, delivery options can vary in terms of both speed and destination (Ishfaq et al., 2016; Melacini et al., 2018).

The physical distribution process is characterized by the distribution source and the destination, see Figure 2.8. In terms of delivery destination, there are two main alternatives, delivery to store and home delivery (Melacini & Tappia, 2018). Offering the customer to pick up from store allows retailers to utilize their existing distribution set-up and ship goods together with routine store replenishments. These orders are typically fulfilled directly from the supplier or from the retailer's DCs (Ishfaq et al., 2016). Since this option does not incur any extra cost for the retailer, they can offer customers free delivery. Hübner, Holzapfel, et al. (2016) stated that 70 % of retailers with multiple channels have already adopted the option to offer customers store pick-up of online orders, referred to as click & collect. (Hübner, Holzapfel, et al., 2016)

Home delivery includes delivery to the customer's home and delivery to an alternative pick-up location, such as a nearby parcel station. Offering home delivery triggers the need for last-mile

delivery, inducing extra cost and complexity, why retailers often either charge this option or require a minimum payment amount to offer it without additional charge (Hübner, Holzapfel, et al., 2016). Ishfaq et al. (2016) argue that last-mile delivery is a crucial component of retailers' omni-channel fulfillment strategy but emphasized that it requires support from pick-and-pack operations.

In addition to click & collect, store pick-up can also be served by the option of click & reserve, where online orders are fulfilled directly from store inventory (Ishfaq et al., 2016). This requires real-time access to inventory data and in-store picking capabilities (Hübner, Kuhn, et al., 2016), which will be discussed in more detail later in the thesis. On the other hand, home deliveries can be fulfilled in several different ways, delivery from DC, dropshipments, or shipments from store (Hübner, Holzapfel, et al., 2016; Ishfaq et al., 2016; Melacini & Tappia, 2018). According to Ishfaq et al. (2016), dropshipments, where customers are served directly from suppliers, can improve supply chain and inventory efficiency. Dropshipments are mainly used for products that cannot be stored at the retailer's DCs due to specific storage requirements or physical characteristics of the products. Less than 20 % of retailers surveyed by Hübner, Holzapfel, et al. (2016) deployed the strategy. Kembro et al. (2018) highlight that many large, branded retailers have started to sell through marketplaces like Amazon, resulting in dropshipment scenarios where a retailer delivers to another e-tailer's customers. Using stores or outlets for direct-to-customer shipments is another less widespread strategy, mainly used by retailers in sectors with bulky goods. These retailers already deliver items bought at the store to customers, for example, do-it-yourself actors and home appliances in consumer electronics (Hübner, Holzapfel, et al., 2016).

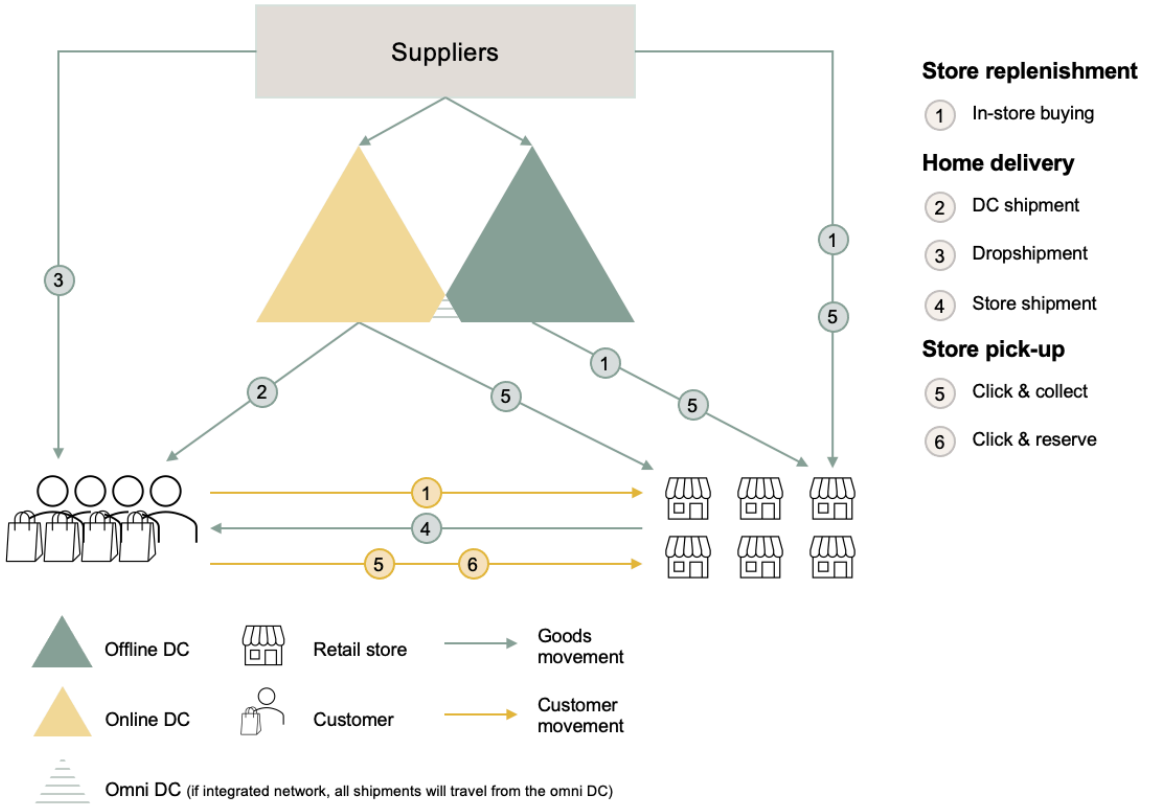


Figure 2.8 *Omni-channel distribution and last-mile delivery options. Adapted from Hübner, Holzapfel, et al. (2016)*

The various omni-channel distribution options have different advantages. While home delivery increases customer convenience, it constitutes challenges in terms of, for example, picking costs, lead times, and shipping fees. Store pick-up also increases customer convenience compared to traditional in-store buying and reduces the risk of product returns compared to home deliveries. Moreover, it utilizes the virtual shelf extension but requires omni-channel IT capabilities. In-store buying has the apparent advantage of direct customer contact and higher efficiency in DC operations. (Hübner, Holzapfel, et al., 2016)

2.2.5 Returns management

Returns are a natural and inevitable component of any retailers' operations. However, the increasing use of online channels makes the product selection phase riskier, and customers are less familiar with the products before purchasing through those channels, resulting in a higher return flow (Bernon et al., 2016; Brusch & Stüber, 2013; Galipoğlu et al., 2018; Ofek et al., 2010). Several factors impact the return rates, such as the product category, the dependence of fit (essential for fashion/clothing), the potential return cost and the demographic of customers (Bernon et al., 2016). Moreover, returns can arise from malfunctioning or damaged goods (Ofek et al., 2010). The fashion sector experience among the highest return flows (Galipoğlu et al., 2018), and for online sales, the return levels for those products are, on average, double those for retail stores (Bernon et al., 2016).

Ofek et al. (2010) state that overall customer returns are estimated at 8.7 % of retail sales, while the equivalent number for e-commerce retailers ranges from 18 % to 35 %. For UK clothing retailers, Bernon et al. (2016) found that clothing retail stores experienced on average 10 % product return rates as a proportion of sales, while the online equivalent was 20 %. Home-products experienced the same relationship between store and online return levels (Bernon et al., 2016). On the other hand, the electrical/tech product sector experienced return levels of closer to 8 %, with only minor differences between retail stores and online channels (Bernon et al., 2016). Electronics are less dependent on fit and are moreover more considered purchases, why the introduction of an online channel has less of an impact on returns for this product category (Bernon et al., 2016). Returns do impose substantial handling costs for retailers (Ofek et al., 2010), up to ten times the cost of shipping the product (Bartholdi & Hackman, 2014). With the rise of e-commerce and increased return levels across the retailing industry today, it is therefore very important for retailers to offer customers a seamless and easy return process while at the same time making it efficient to minimize the associated costs.

The processing of returns varies depending on the return points and the return options available to customers. Common is that the return management processes should be arranged to efficiently manage the reverse product flow, reduce unwanted returns and maximize re-sale revenue of products. Bernon et al. (2016) found two main challenges associated with managing omni-channel returns: processing speed and process integration. Processing speed considers the time required to give the customer credit for the returned product and the speed with which products can be directed for re-sale or disposed via the appropriate channel. One example of processing speed challenges could be a customer that is returning a product on a Thursday, but the return cannot be processed until it arrives at the return center on the following Monday. The return process then takes another couple of days, and for the customer, the process appears to be five to six days long. The second challenge is process integration of the back-end logistics processes required for managing the returns. Suppose a customer, for example, returns a product to a store. In that case, the retailer can choose whether to process the return at the store

and try to re-sell the product (which causes inventory imbalances) or to return it to a central processing point (which adds additional logistics cost). (Bernon et al., 2016)

The choice between processing a return in-store or via a return center depends on company-specific factors such as product sector, outlet density, and company size (Hübner, Wollenburg, et al., 2016). According to Hübner, Wollenburg, et al. (2016), the standard mode is returning the item via CEP, either to a DC or a specialized return center, see Figure 2.9. Although offering customers the option to return in-store is a critical component in an omni-channel strategy, many retailers still have not adopted this into their operations (Hübner, Wollenburg, et al., 2016; Marchet et al., 2018).

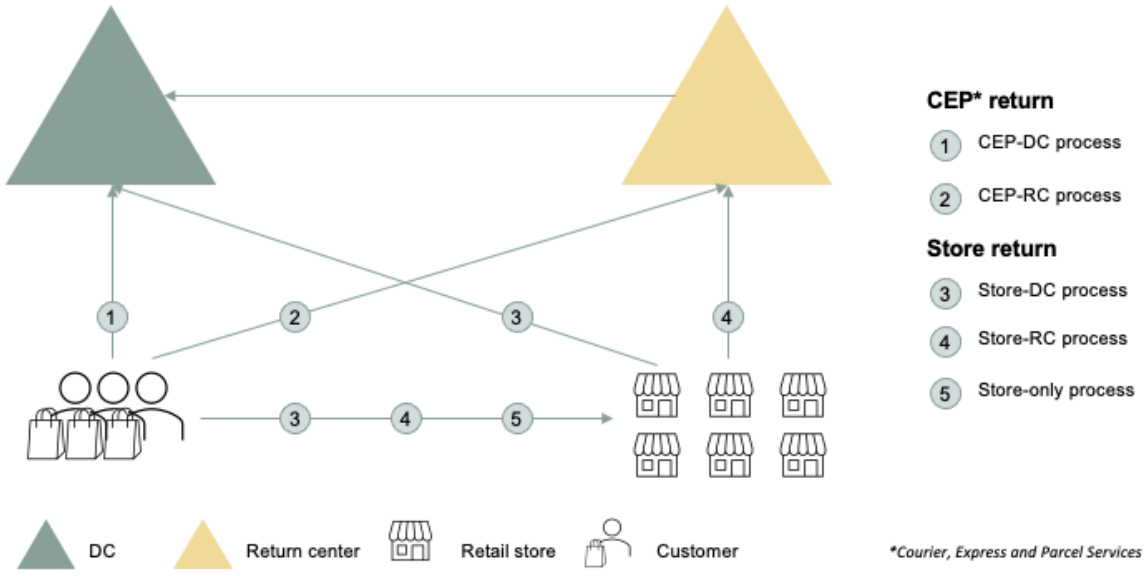


Figure 2.9 *Return processing options available to omni-channel retailers. Adapted from Hübner, Holzapfel, et al. (2016)*

2.2.6 Information technology and information systems in logistics

What has been found during the literature review so far is that integration of back-end logistics processes enabling the omni-channel customer offering often relies on integrated systems and technological capabilities. Wallace et al. (2009) states that IT is an enabler for supply chain integration and coordination which is vital in giving customers an omni-channel experience and the opportunity to learn about offerings, complete orders and obtain customer service across channels (Oh et al., 2012). Consistent information on customers, orders and inventory across channels is a necessary enabler of omni-channel operations and such integration can be achieved through efficient use of IT (Oh et al., 2012). Oh et al. (2012) further argues that channel integration through IT improves the efficiency of retail firms and contributes to overall better performance. Oh et al. (2012) identified six retail channel integration routines important for omni-channel shopping, which collectively form the IT-enabled retail channel integration capability; integrated promotion, transaction information management, product and pricing information management, information access, order fulfillment, and customer service.

On a network level, product and inventory information needs to be coordinated across material handling nodes (Kembro & Norrman, 2019a). To offer customers omni-channel visibility and,

for example, information on inventory, retailers need to operate channel-integrated enterprise resource planning (ERP) systems (Cao, 2014; Hübner, Wollenburg, et al., 2016). The ERP system has a range of functionalities, spanning from inventory information to financial matters, and can be used to share information within the supply chain but also with external partners such as suppliers (Kembro & Norrman, 2019a). Moreover, integrated systems should support allocation and decision-making in where and how to fulfill orders, which can improve service levels while decreasing total cost (Kembro et al., 2018). Further, the IS network must support functions such as reserving inventory, facilitating communication with customers and managing return flows (Kembro & Norrman, 2019a). These functionalities can be integrated with a distributed order management system (Napolitano, 2013). Although this integration of systems is necessary in supporting the omni-channel offering and omni-channel logistics, many retailers still operate channel-specific information systems (Zhang et al., 2020).

For the individual material handling node, multiple information systems are used. Besides ERP systems, which focus on long-term planning, a warehouse management system (WMS) is required to enable tracking of tasks, orders, and available inventory in the warehouse. Moreover, the WMS support decision making in terms of optimizing space utilization and proposing picking routes. Kembro & Norrman (2019a, p. 393) propose that "to meet customer requirements for information quality and inventory accuracy, omni-channel IS need to better support real-time updates and synchronization, not only in isolated WMS, but also between material handling nodes in the network". Another system, referred to as a warehouse control system, is used to control the flow of goods in automated solutions, for example conveyors. Consequently, new IS that support all nodes in the network, support automation and can integrate functionalities will be needed for omni-channel logistics. (Kembro & Norrman, 2019a)

The increasing e-commerce also calls for more extensive implementation of artificial AI, ML (Goldsby et al., 2019), and smart management of returns (Karlöf, 2018a). AI is, for example, critical for transport planning in last-mile delivery (Karlöf, 2018a) and for forecasting, an area which is increasingly critical due to the volatility of online sales (Pereira & Frazzon, 2021).

In conclusion, omni-channel requirements demand increasing support from IS and IT to facilitate a seamless, integrated customer offering and the order fulfillment process. This will require both new systems and increased integration and support for automation, so retailers need to develop this capability further.

2.3 Competencies

The aim of this chapter is to create a common terminology on competencies, both generic and logistics-specific, to support discussions on critical competencies in connection to omni-channel logistics. Firstly, the term competence and the building blocks of competencies will be presented. Following that, the resource-based view will be presented to provide a description of how competencies contribute to organizational capabilities. To this background, literature on logistics competencies will be examined in chapter 2.3 and condensed to a classification of competence areas that will function as input to the conceptual framework. Lastly, this chapter will outline how organizations outsource competencies in relation to omni-channel logistics.

2.3.1 Defining competencies, skills, and knowledge

When defining competence, the literature focuses on "the ability or capability, which will enable the satisfactory completion of some task(s)" (Hager & Gonczi, 2009, p. 15). This definition of competent performance is closely related to occupational competencies and terms such as skills and knowledge (Hager & Gonczi, 2009). Knowledge can be theoretical and practical and accumulated from education and experience, while skills refer to mastering a technique that may or may not require systematic knowledge (Brockmann et al., 2010; Méhaut & Winch, 2012). Another critical component of the know-how associated with occupational capacity is transversal abilities such as planning, coordinating, communicating, and evaluating. These are not discrete skills related to a specific task but instead manifests themselves in a wide range of activities (Méhaut & Winch, 2012). Therefore, a more holistic view of competence, including such generic tasks as planning and problem solving, will be adopted in this study instead of viewing competence requirements as a series of discrete tasks. Competence plays a crucial role in occupational abilities and signifies "an integrated ability, to use knowledge, skills and transversal abilities in order to manage projects in coordination with teams from within and beyond one's occupation" (Méhaut & Winch, 2012, p. 376).

The occupational capacity and thereby the competence of an individual also relies on personal competences, a combination of social competence and self-competence. Self-competence includes elements such as degree of autonomy, degree of responsibility and reflectiveness, while social competence refers to the social behavior required by an individual to contribute to successful projects through collaboration, for example leadership skills and communication (Méhaut & Winch, 2012). Table 2.1 below illustrates the components of competence as well as distinguishes between occupational and personal competence. However, it is hard to find common definitions on competencies and occupational capacity, and definitions of these concepts also vary between countries (Brockmann et al., 2010; Méhaut & Winch, 2012).

Table 2.1 *The building blocks of competencies. Adapted from Brockmann et al. (2010)*

Occupational competence			**Personal competence**	
Knowledge	**Know-how**		**Social competence**	**Self-competence**
Awareness of tools, equipment, materials	*Skills:* Manual, intellectual expertise	*Transversal abilities:* Planning, organizing, controlling, assessing	Team/leadership skills, involvement, and communication	Autonomy/responsibility, achieving results, reflectiveness and learning competence, taking responsibility

2.3.2 A resource-based view on organizational capabilities

The resource-based view (RBV) of a firm is a theoretical framework that conceptualizes firms as bundles of resources and is used for understanding how firms build and sustain competitive advantage (Barney, 1991; Eisenhardt & Martin, 2000). Firm resources can refer to all "assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness" (Barney, 1991, p. 101). These can be divided into physical capital resources, organizational capital resources, and human capital resources (Barney, 1991), of which the latter is the focus of this thesis. These include abilities or competencies such as skills in, for example, molecular biology or advertising. Altering the resource base by integrating, acquiring, or recombining resources and thereby generating new value-creating strategies is by Eisenhardt & Martin (2000) referred to as dynamic capabilities. These capabilities are critical in markets with rapid and unpredictable changes (Eisenhardt & Martin, 2000). Eisenhardt & Martin (2000, p. 1106) argue that "the dynamic capabilities, by which firm managers integrate, build and reconfigure internal and external competencies to address rapidly changing environments become the source of sustained competitive advantage". However, developing new capabilities is a complex task, which requires reorganization (Ishfaq et al., 2016).

An important distinction is the one between competencies and capabilities. While competencies refer to what specific individuals are capable of, capabilities will refer to an organizational level. When competencies are linked together by bonding mechanisms and organizational processes, a capability is formed (Ray & Ramakrishnan, 2006). Wallace et al. (2009, p. 874) define capabilities as "socially complex routines deeply embedded in the firm that combine with other resources in the firm and result in competitive advantage". For example, a combination of competencies within different firm functions such as R&D, manufacturing, and marketing may give rise to a new product development capability (Ray & Ramakrishnan, 2006). The focus of this thesis will consequently be to derive what competencies are required to perform specific tasks and thereby enable organization-wide capabilities. The RBV as a framework will not be used to analyze the results of this study, but rather as a means of defining competencies and understanding why certain competencies and human capital resources are important in enabling capabilities that are important for omni-channel retailers.

Wallace et al. (2009, p. 870) argue that "differential firm resources and capabilities play a key role in effective management of MCD (multi-channel distribution) and realization of potential gains from MCD". The complex tasks performed in an omni-channel setting require specific capabilities, which a firm can build through learning and acquiring "how-to" knowledge (Wallace et al., 2009). Oh et al. (2012) highlight that many omni-channel retailers have siloed capabilities, resulting in disjoint operations across channels, and found that IT plays a vital role in channel integration. They further highlight the complexity of integrating IT systems and human resources to achieve this (Oh et al., 2012).

2.3.3 Developing a framework for competencies within omni-channel logistics

The literature study will now discuss more detailed competencies to find a framework on which to base the study. Within companies and their respective logistics functions, decisions are made at a strategic, tactical, and operational level to support omni-channel logistics systems and processes. The strategic level concerns decisions regarding logistics network design, for example, facility location, production technology, and plant capacities. The tactical level concerns the medium time-horizon and aspects such as material flows, inventory levels, and lot sizes. Further, the operational level regards the scheduling of day-to-day operations to assure on-time, in-full delivery to customers (Schmidt & Wilhelm, 2000). The implications are that different competencies within logistics and SCM are required on different levels given the different tasks, activities, and decisions made.

Logistics and SCM competencies substantially impact business performance and financial competitiveness (Derwik et al., 2016). However, the role of logistics and supply chain managers and practitioners has changed dramatically with the globalization of supply chains, continued outsourcing, and widespread adoption of lean practices (Derwik et al., 2016; Gammelgaard & Larson, 2001). Several frameworks have been developed to classify skills, knowledge areas, and competencies required for logistics and supply chain professionals (APICS, 2014; Gammelgaard & Larson, 2001; Niine & Koppel, 2014). Derwik et al. (2016), for example, developed a framework of manager competencies in logistics and SCM, consisting of five competence areas: behavioral competence, business managerial competence, generic competence, functional competence, and SCM expertise.

In general, logistics competencies can be divided into foundational and profession-related competencies (APICS, 2014). Foundational competencies include inter- and intra-personal competencies, leadership and management, a foundation in supply chain fundamentals, and other academic competencies (APICS, 2014; Derwik et al., 2016; Gammelgaard & Larson, 2001). On the other hand, profession-related competencies, refer to functional competencies within technology and information systems and SCM expertise in, for example, order management, reverse logistics, and e-commerce (APICS, 2014; Derwik et al., 2016). They also include competencies bundled under the term dynamic awareness, which refers to cross-functional supporting viewpoints within, for example, commercial awareness, sustainability and the legal environment (Niine & Koppel, 2014).

Given the different frameworks discussed above, we have divided competencies into three different areas: *SCM competencies*, *foundational competencies* and *supporting functional competencies*. We decided to rename profession-related competencies to supporting functional competencies. We also separated SCM competencies from these supporting functional, since we believe these will be a substantial part of our analysis. Each of the competence areas have been further divided into two categories and examples of competencies within each area is outlined in Table 2.2 below. These competence areas will function as input to the conceptual framework (see chapter 2.4). As discussed in chapter 2.3.1, the competencies that concern specific tasks or activities, for example forecasting, include transversal abilities required to perform this task, to gain a more holistic perspective on competencies.

Table 2.2 *Examples of competencies within the chosen competence areas*

SCM competencies		**Foundational competencies**		**Supporting functional competencies**	
SCM knowledge areas	**Applied SCM analysis**	**Behavioral and generic competencies**	**Academic foundation**	**Dynamic awareness**	**Technological competencies**
• Supply chain management • Customer management • Sales and marketing management • E-commerce • Order management • Purchasing • Production • Inventory management • Warehousing • Transportation management • Product development • Quality and process improvement	• Forecasting • Production scheduling • Facilities location analysis • Route planning • Allocation	• Self-awareness • Self-management • Self-motivation • Empathy towards others • Social skills • Political skills • Leadership • Cross-functional collaboration • Information gathering and information sharing • Analysis • Problem-solving	• Supply chain fundamentals • Foundations of business management • Materials management fundamentals • Math, statistics, data analysis and analytical thinking	• Commercial awareness • Industrial experience • Company experience • Ethics and sustainability awareness • Strategic awareness • Law and regulations awareness • Technology awareness • Risk analysis • Performance evaluation • Decision-making skills • Execution skills • Stakeholder management	• Basic technical skills • Information systems • Modelling and optimization

2.3.4 Outsourcing of competencies

Logistics service providers

An increasing number of companies are outsourcing logistics services such as distribution, warehousing, and transportation operations to third parties referred to as LSPs or third party logistics (3PL) providers (Delfmann et al., 2002; Fabbe-Costes et al., 2009). Moreover, Ofek et al. (2010) highlight that the rise of omni-channel retailing has given birth to actors specializing in returns management and reverse logistics to support omni-channel actors and the role of LSPs and their logistics know-how has only increased in importance (Delfmann et al., 2002). Some LSPs are even included in the strategic design and management of their customers' supply chains and act as consultants in this sense (Fabbe-Costes et al., 2009; Fulconis et al., 2006). With an increased supply chain integration (Fabbe-Costes et al., 2009; Goldsby et al., 2019), retailers and LSPs are more co-dependent than ever before. The services retailers choose to outsource are of strategic and operational importance for successful omni-channel performance. However, Hübner, Holzapfel, et al. (2016) argue that retailers operating both an online channel and stores outsource their logistics to a lesser extent than pure e-tailers.

It is well known that retailers, and other companies for that matter, should focus on the core competencies which can give them a competitive advantage and entrust other firms with the execution and management of complementary activities (Arnold, 2000). The other rationale for outsourcing is to reduce transaction costs by not having to plan and manage the activity in-house (Rintala et al., 2021). When choosing to outsource, the relationship between buyer and

seller of logistics can be of different types, ranging from single transactions to integrated service agreements, see Figure 2.10 (Halldórsson & Skjøtt-Larsen, 2004). The company outsourcing an activity needs to maintain internal logistics competence concerning the outsourced activities to challenge actions, innovate the relationship, and not face a lock-in situation with the supplier (Halldórsson & Skjøtt-Larsen, 2004). Halldórsson & Skjøtt-Larsen (2004) argue that a joint logistics solution can benefit competence development through joint learning, another reason why maintaining internal logistics competence is important for the partnership.

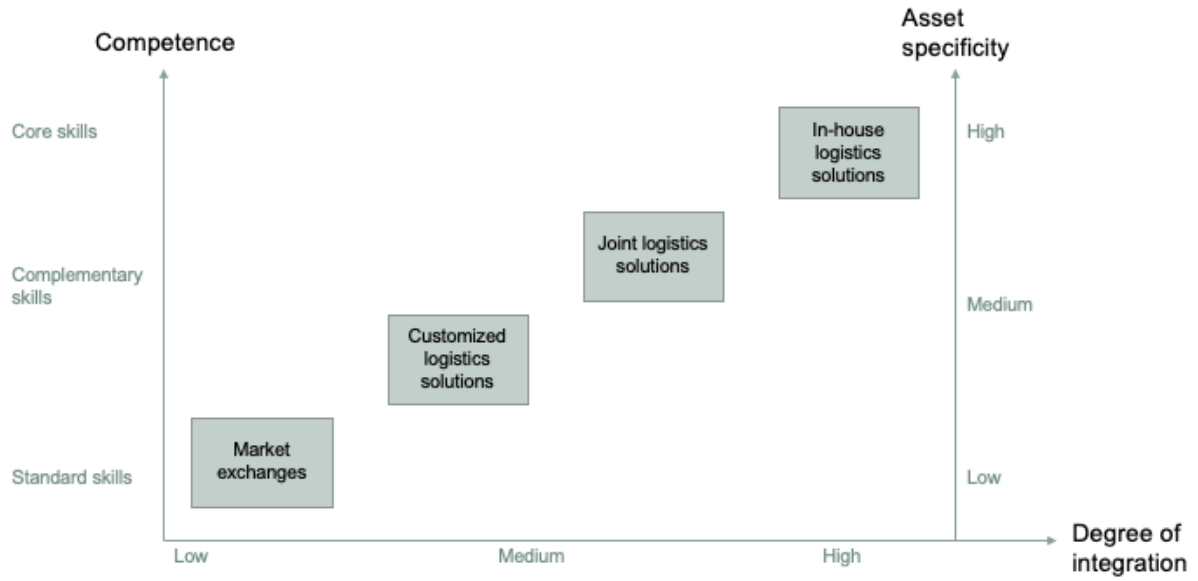


Figure 2.10 *Outsourcing solution in a competence and integration perspective. Adapted from Halldórsson & Skjøtt-Larsen (2004)*

Consultancy firms and other supporting actors

LSPs are not the only agents providing retailers with services related to omni-channel management. Many management consultancy firms provide strategic direction and implementation of strategies and operational solutions within the area (Amar et al., 2020; Cheris et al., 2021; Lyngaa Simonsen, 2017). Amar et al. (2020) argue that many companies fail to implement an omni-channel strategy and build a comprehensive and seamless customer experience. The specific logistics requirements created by e-commerce have created a large market for consultants and other service providers (Karlöf, 2018a). One potential solution to bridging a competence gap is by hiring a consultancy firm and thereby getting input from subject matter experts periodically instead of having to recruit or build that competence in-house.

Further, warehouse automation is becoming an increasingly critical aspect of meeting customer expectations in a cost-efficient way with the wide range of SKUs and increased touchpoints created through e-commerce (Amar et al., 2020; Kembro et al., 2018). Different types of products require different types of automation, why automation providers have an essential role to play in creating flexible and customized solutions for retailers (Amar et al., 2020).

2.4 Conceptual framework

Following the literature review on omni-channel retailing, omni-channel logistics and competencies, we have developed a conceptual framework consisting of the main building blocks of the different areas, see Figure 2.11. Omni-channel retailing, as presented in chapter 2.1, form the context which retailers operate in. The context, with its contextual factors, macro trends and challenges, puts pressure on the back-end logistics to fulfill an integrated and seamless customer offering. The five logistics processes defined as critical in chapter 2.2 are the core of our view on omni-channel logistics and where SCM competencies discussed under chapter 2.3 reside. The SCM competencies are divided into SCM knowledge areas and applied SCM analysis. SCM knowledge areas are specific expertise knowledge around specific processes and concepts, while applied SCM analysis refer to competence within analysis methods and processes like forecasting and network configuration analyses. The two remaining overarching competence areas, foundational competencies and supporting functional competencies, are not specifically linked to omni-channel logistics processes, but rather span over the entire supply chain. Foundational competencies are divided into behavioral and generic competencies and academic foundation. The behavioral and generic competencies are inter- and intra-personal skills like leadership and cognitive abilities like problem solving. The academic foundation competencies include SCM fundamentals and data analysis methods. The supporting functional competencies cover dynamic awareness competencies and technological competencies. Competencies related to dynamic awareness are cross-functional aspects like commercial awareness and sustainability, but also include experience within logistics, the industry, and the company. Finally, technological competencies include competencies within IT and IS in logistics. This framework will be used to structure the empirics and analysis of this thesis and will work as a framework for categorizing competencies and answer the research question at hand.

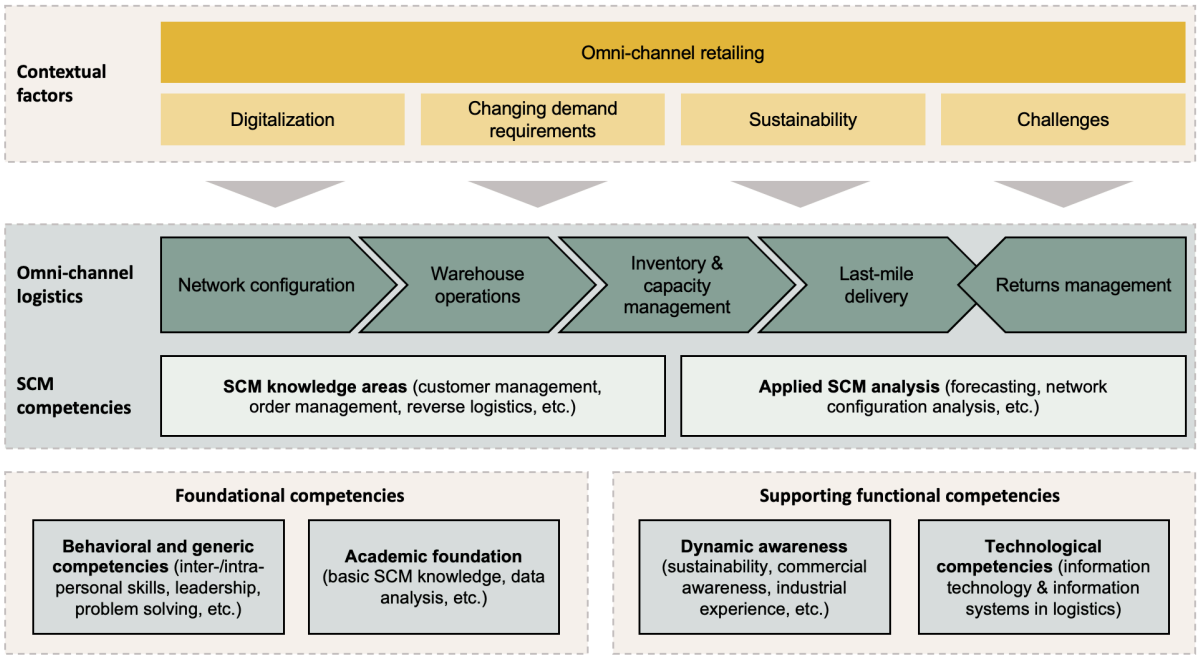


Figure 2.11 *Conceptual framework derived from the literature review*

3 Methodology

The following chapter describes the research process and the methodological choices made to answer the research question and fulfill the research objectives. The research strategy will be presented, where we argue for our choice of research methodology and investigate alternative methods. Thereafter, the research design will be outlined, including the chosen unit of analysis. In addition, the research design covers key references from the literature review, motivation and explanation of our case selections, a description of how our data was collected, and finally, the structuring and analysis of our collected data will be discussed. Lastly, the research quality and measures taken to strengthen it will be presented.

3.1 Research strategy

The research strategy should have a clear connection to the purpose of the thesis and different methods are therefore suitable for different types of research questions (Voss et al., 2002; Yin, 2009), see Table 3.1. The research question formulated for this thesis is a "what" question. However, it and the research objectives are of the exploratory type, highlighting RQ1 as an example: "what competencies will be required for successful omni-channel logistics, considering changing customer demand and other market trends?". This justifies an exploratory study, for which many different methods, such as a survey, an experiment or a case study, can be suitable (Yin, 2009). Voss et al. (2002) also claim a case study to be a good choice when conducting exploratory research. The stated purpose, to "explore what competencies will be required within the retail industry..." further indicates that the thesis is of an exploratory nature. Having an exploratory research strategy is a necessity given the low maturity of the research field. Moreover, the underdeveloped state of prior theory and research indicates that mainly qualitative data should be collected to answer the open-ended research questions (Edmondson & McManus, 2007). One way of doing this is through interviews (Edmondson & McManus, 2007). Rational methods such as optimization and statistical modeling are not suitable in this instance since the goal is not to test and verify existing theory (Meredith, 1998; Voss et al., 2002). Case studies are commonly used as a research method in various fields and are preferred when examining contemporary events (Yin, 2009), which is the focus of this thesis. Compared to a survey, which can be considered an equally suitable research method for the purpose of the thesis, the case study is chosen to use data collection methods such as the interview. This enables the researchers to understand the phenomenon through direct observations of the event in its natural setting (Meredith, 1998; Yin, 2009), and have exploratory discussions around themes adapted for each respondent. Therefore, the research question was answered through a multiple interview study inspired by a case study methodology.

Table 3.1 *Research strategies in connection to the purpose of the study*

Method	Research question	Advantage	Disadvantage
Experiment, Statistical modeling/ optimization	How, why?	Precision and reliability in tracking development or explaining how something changes over time, standard procedures, and testability (Meredith, 1998; Yin, 2009).	Sampling difficulties, trivial data, model-limited, variable restrictions, and thin results (Meredith, 1998).
Survey	Who, what, where, how many, how much?	Description of the prevalence of a phenomenon and prediction about certain outcomes (political attitudes) (Yin, 2009).	Sampling difficulties, participant access issues (Wright, 2005).
Case study	How, why?	Understanding, can explain quantitative findings, relevance, exploratory depth, unconstrained by rigid limits (Meredith, 1998; Yin, 2009).	Access and time, triangulation requirements to minimize bias, lack of controls, and unfamiliarity of procedures (Meredith, 1998).

The phenomenon explored was omni-channel retailing, and due to the limited research on competencies within this area, there is little to no theory to test or build on. Phenomenon-driven research was undertaken with the aim to contribute to knowledge creation within the field, rather than contributing to existing theory, by "identifying, capturing, documenting and conceptualizing a phenomenon of interest to facilitate knowledge creation and advancement" (Schwarz & Stensaker, 2014). Moreover, this approach is proven suitable for theory building within an unexplored area (von Krogh et al., 2012).

One of the disadvantages of a case study is that the researcher might allow biased views to influence the direction and the conclusions of the research (Yin, 2009), which will be discussed concerning research quality in chapter 3.3. Among other efforts, we performed an interview study involving multiple retail companies rather than conducting an in-depth study at one company to overcome this research quality barrier. The purpose of this approach was to extend transferability, and with the limited time frame, it was not possible to conduct in-depth studies at each sample company. Voss et al. (2002) recommend a multi-site case study when aiming to build theory. Given the objective of identifying variables, in this case, competencies, best-in-class case studies are encouraged (Voss et al., 2002). This implicated great efforts to strengthen the quality of our study, further discussed in chapter 3.3. To reach best-in-class case studies, retail companies that are mature within the omni-channel context were the starting point of the study. They were identified as companies at the forefront of omni-channel retailing through practitioner journals and secondary data.

The aim of this thesis was not to study one case company in-depth, but rather to investigate and explore the context of omni-channel and its implications on different retail organizations. Further the aim was to compare the situation, challenges, similarities, and differences across cases. With this multiple case study methodology, we hoped that our conclusions would be more generalizable or transferable and of more value to businesses industry-wide than those of a single-case study.

3.2 Research design

Once the research strategy was determined, the research design could be developed. Having a research design in place guided us in our study and facilitated the process of collecting and analyzing data to fulfill the purpose of the thesis (Yin, 2009). The research design of this thesis will be further elaborated on in the following chapters and is summarized in Figure 3.1 below.

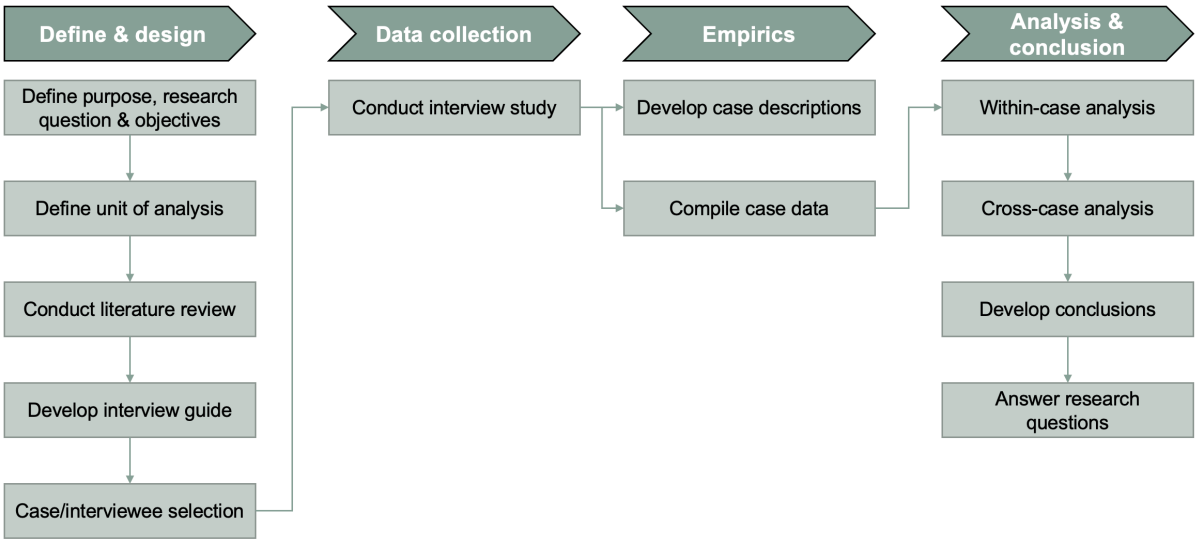


Figure 3.1 *The research design process visualized*

3.2.1 Unit of analysis

A well-formulated unit of analysis allows research to address the correct purpose and should guide the process of finding answers to research questions (Yin, 2009). The purpose of this thesis was to explore what competencies will be required within the retail industry, in connection to omni-channel logistics, to cater to the changing customer demand and other trends within the industry. Accordingly, the unit of analysis for this thesis was *the competencies related to omni-channel logistics processes within retail organizations*. Establishing this allowed us to motivate our selection of data collection and analysis methods throughout the work with this thesis.

3.2.2 Literature review

"Building your research on and relating it to existing knowledge is the building block of all academic research activities, regardless of discipline" (Snyder, 2019, p. 333). The first part of the literature review focused on understanding the customer offering in omni-channel retailing and its implications for logistics processes, why articles containing keywords such as *omni-channel retailing, multichannel retailing,* and *cross-channel retailing* were the focus (Beck & Rygl, 2015; Hübner, Wollenburg, et al., 2016; Zhang et al., 2020). To fulfill RO1: "map how omni-channel retailers configure their back-end logistics to provide a seamless customer offering and what challenges they see concerning this", we needed to establish an understanding for which logistics processes are critical concerning omni-channel retailing and

how one can set up their omni-channel logistics. The following key references can be highlighted as a foundation for this second part of the literature review:

- Hübner, A., Holzapfel, A., & Kuhn, H. (2015). Operations management in multi-channel retailing: An exploratory study. *Operations Management Research*, *8*.
- Hübner, A., Holzapfel, A., & Kuhn, H. (2016). Distribution systems in omni-channel retailing. *Business Research*, *9*(2), 255–296.
- Hübner, A., Wollenburg, J., & Holzapfel, A. (2016). Retail logistics in the transition from multi-channel to omni-channel. *International Journal of Physical Distribution & Logistics Management*, *46*(6/7), 562–583.
- Marchet, G., Melacini, M., Perotti, S., Rasini, M., & Tappia, E. (2018). Business logistics models in omni-channel: A classification framework and empirical analysis. *International Journal of Physical Distribution & Logistics Management*, *48*(4), 439–464.

The field of competencies and competence requirements within logistics related to omni-channel retailing is not covered by literature. However, various groups of researchers have studied the topic of competencies within diverse disciplines, why covering all articles within the topic was not feasible given the scope of this thesis (Snyder, 2019). Generic literature, found through keywords such as *competences* and *competencies* (e.g Hager & Gonczi, 2009), was studied to define the scope of the study before summarizing logistics specific competencies by including the keywords *logistics* and *supply chain management* to the competence searches (e.g APICS, 2014; Derwik et al., 2016).

3.2.3 Case and interviewee selection

Parallel with designing the literature review, the cases had to be selected. In this thesis, a case will refer to an organization, such as a retailer or a supporting actor. Ten companies participated in the study, of which seven were retailers, one was an LSP, one a consultancy firm, and one a leading e-commerce company, also called e-tailer. The case companies and interviewees are described in detail in chapter 4.1 and summarized in the next chapter, 3.2.4.

Different groups of case companies were used in an aim to cover the different viewpoints and perspectives on competencies within omni-channel retailing. Firstly, the main interviewee group was retailers with an omni-channel presence. To be qualified as an omni-channel retailer, the company had to operate physical stores and e-commerce through at least partly self-managed channels. Moreover, the customer offering or back-end logistics had to be integrated across the channels. Secondly, one LSP was interviewed, and lastly, a management consultancy firm supporting retailers in omni-channel transformations was interviewed as subject matter experts and supporting actors. These two groups were included to capture the aspect of the outsourcing of competencies within omni-channel logistics. Finally, the e-tailer was included since their customer value proposition drives the development in the industry and impacts the landscape for the entire logistics network for retailers. Building an understanding of the phenomenon based on viewpoints of the several different parties allowed for a more comprehensive picture of the unit of analysis being studied (Höst et al., 2006). This is called data triangulation (Höst et al., 2006) and was achieved by including several different companies from different retail segments and supporting actors.

In selecting the cases for the interview study, the delimitations of this thesis were used as guidance. Reiterating, we selected companies with omni-channel presence, who have some

logistics processes in-house, which we believed to be necessary to gain insight into the competence requirements. We made no delimitations on specific retail segments, besides excluding grocery and food retailers, to get comprehensive coverage. However, given the time frame and resources of this study, it was impossible to include cases covering all relevant product groups within the industry. Nevertheless, five different segments were included.

Considering what interviewees were selected to be part of the study, we had some inclusion criteria that they had to fulfill. First, the interviewee had to directly connect or associate with the omni-channel logistics processes outlined in chapter 2.2. Second, the interviewee had to have at least 12 months of experience within the company to make sure they had had time for reflections and deeper insights into the organization's competence challenges.

Relevant companies were identified in two ways. Firstly, through personal and professional networks. Secondly, using practitioner journals and secondary data to identify Swedish retailers at the forefront of omni-channel retailing. We contacted people with positions such as "logistics manager/head of logistics" or "supply chain manager/head of supply chain" at the identified companies, and if they did not consider themselves to be the most relevant person for our study, they referred us to that person within their organization. Through this methodology, the trustworthiness of the research was enhanced since relevant respondents at leading Swedish omni-channel retailers constituted the sample of our research.

Varying external factors, for example, attempting to get as good a coverage as possible in age, gender, position, and educational background of the interviewees allows for a more meaningful variation in viewpoints of the phenomenon (Höst et al., 2006). Unfortunately, our sample was relatively homogenous in terms of gender and educational background. This can likely be explained by our desire to interview people in similar positions in the same industry.

3.2.4 Data collection

The choice of a case study methodology motivated using multiple methods for data collection (Meredith, 1998). Using different data collection methods, we also attempted to further triangulate the results of this thesis (Höst et al., 2006). Generally, data collected in a case study is mainly qualitative, which was also the case for our study (Höst et al., 2006).

The primary source of data collection for this thesis was the research interview, which is one of the most important qualitative data collection methods according to Qu and Dumay (2011). The research interview is often classified based on its degree of structure (Qu & Dumay, 2011). While structured interviews can minimize researcher bias and increase the generalizability of the findings, unstructured interviews allow a more detailed analysis of the phenomenon and better mirror reality (Qu & Dumay, 2011). This thesis used a semi-structured approach, deciding on focus areas and developing an interview guide beforehand, but formulating follow-up questions based on the respondent's answers. The interviews were organized around the three main themes *omni-channel retailing, omni-channel logistics,* and *competence requirements* (see appendix A for interview guide). By adopting a semi-structured approach, the relevant topics and issues could be covered by guiding the respondent while simultaneously allowing more elaborate responses (Qu & Dumay, 2011). Moreover, the semi-structured interview has proven to be flexible and capable of revealing important and hidden information on human and organizational behavior, for example, a managers' perception of their jobs and environment (Qu & Dumay, 2011). This characteristic was important for our study to unveil all aspects of our unit of analysis. The interviews worked to validate critical logistics processes

and mapping the associated competencies which retailers possess to deliver on their omni-channel customer offering today.

The second type of data collection method was collecting secondary data such as annual reports and industry magazines. This was used to identify and analyze trends and validate findings and conclusions. According to Höst et al. (2006), data collection and analysis are more integrated for qualitative methods and can be performed iteratively. To formulate findings and validate those, we had to start analyzing the data collected through interviews before being finished with data collection altogether, so an iterative approach was adopted. This can be exemplified through conducting follow-up interviews with respondents after synthesizing the data from the initial interview.

We aimed towards having at least 90 minutes of combined interview time with each interviewee, which was not possible in all cases given the busy schedules of the respondents and the limited time frame of the study. Moreover, if all relevant aspects were covered and the subject had been exhausted, this was not required. In line with this aspect, it could be considered interesting to include more case companies. However, we could see similarities in the subjects discussed and convergence of opinions already after half of the scheduled interviews. The time frame did limit the number of cases investigated, but there was no need to continue collecting data once the answers started to converge and data triangulation was achieved. Each interview was transcribed and sent to the respondent for approval before including the data in the report. All quotes were also approved by the interviewees, thereby strengthening the credibility of the data.

A predecessor to conducting the interviews was to perform a literature review on the given topic of omni-channel logistics in the context of retail to understand the impacting market trends and challenges. Further, we studied competence theory and logistics processes in connection to this. Once we had a solid theoretical foundation, the next step was to develop an interview guide (see appendix A) to support the data collection through interviews. The guide was developed based on question technique and questionnaire construction theory from Lekvall et al. (2001).

Table 3.2 summarizes the interviews conducted during the data collection phase. The names of the companies that did not wish to be anonymous are displayed, while some company names are encrypted. Also, the retail segment or role in the industry for each company is specified, combined with each respondents' role.

Table 3.2 *Interviewee summary*

Company	Segment	Role	First interview	Second interview
Alpha	Fashion	Supply Chain Developer	60 min (2021-03-02)	30 min (2021-03-02)
IKEA	Ready-to-assemble furniture, homeware	Project lead	60 min (2021-03-03)	30 min (2021-03-17)
Beta	Pharmacy	Head of logistics development	60 min (2021-03-05)	
Cervera	Interior decoration, kitchenware	Head of development and operations	60 min (2021-03-08)	60 min (2021-03-09)
Elgiganten	Home electronics	Logistics director	60 min (2021-03-12)	
Gamma	Fashion	Supply chain strategist	90 min (2021-03-15)	60 min (2021-03-23)
Delta	Home electronics	Head of logistics	90 min (2021-03-16)	
Epsilon	e-commerce	Supply chain manager	60 min (2021-03-08)	
Implement Consulting Group	Management consultancy	Senior partner and management consultant	30 min (2021-03-09)	
PostNord	LSP	Head of direct parcel distribution	45 min (2021-03-10)	

In summary, we interviewed seven retailers from five different retail segments: fashion, furniture, pharmacy, interior decoration and kitchenware, and home electronics. The roles ranged from project lead and supply chain developer to logistics director and head of logistics or logistics development. All in all, the roles are strategic and managerial in most cases. At the e-tailer, we interviewed a supply chain manager and at the consultancy firm, we interviewed a senior partner and management consultant. Finally, we interviewed the head of direct parcel distribution at the LSP.

3.2.5 Data analysis

Eisenhardt (1989) states that analyzing data is the most challenging part of the case study process, partly due to the large volumes of data generated (Voss et al., 2002). When describing and explaining a phenomenon, a researcher moves through several steps of analysis to condense the data and end up with an explanatory framework (Miles & Huberman, 1994). This process can be summarized in the following steps (Miles & Huberman, 1994):

1. **Summarizing the data:** Creating a text to work on and trying out coding categories to find a set that fits.
2. **Repackaging and aggregating the data**: Identify themes and trends in the data overall.
3. **Developing and testing propositions to construct an explanatory framework**: Testing hypotheses, reducing the bulk of the data to analyze trends on it, and delineating the deep structure.

Two key activities are identified for analyzing data from multiple cases, within-case analysis and cross-case analysis (Eisenhardt, 1989). The purpose of within case-analysis is for researchers to become familiar with each case and generate preliminary theory, which in turn will accelerate cross-case comparison (Eisenhardt, 1989). This phase will allow researchers to identify unique patterns of each case before trying to generalize across cases. However, information bias tends to get researchers to jump to premature and sometimes false conclusions

(Eisenhardt, 1989). Therefore, the cross-case pattern search is applied as a second step, which forces investigators to look beyond initial impressions by investigating the data in many ways. The activities performed in each of these steps will be outlined in the coming two paragraphs.

Within-case analysis

Proper data display is required to analyze the data collected from interviews and answer the research questions at hand (Miles & Huberman, 1994). The first step towards this is to summarize and package the data by reconstructing interview tapes as written notes and coding the data to identify relevant categories (Miles & Huberman, 1994). The coding is performed by identifying key statements in the interview and connecting those to a particular theme or area (Höst et al., 2006). In our study, the first step towards proper data display was to summarize interviews and highlight potential key quotes. This filled the additional purpose of creating material that respondents could approve before including it in the report. As a second step, central themes were built with the conceptual framework and the RQ and ROs as a foundation. Highlights from each interview were categorized into the different themes in an Excel file, with a sheet for each theme, a column for each aspect of the theme, and a row for each case company. Therefore, the primary types of data display used in the thesis were matrices and tables built around the conceptual framework elements, see Figure 2.11. This step allowed us to move from unstructured interview data to a display of key themes and variables for each case, which later on could be compared across cases (Miles & Huberman, 1994).

Cross-case analysis

The within-case analysis, structured according to the conceptual framework, worked as input for this second phase of the analysis. The cross-case analysis can be categorized as either case-oriented, where the focus lies on comparing cases to highlight similarities and differences, or variable-oriented, which aims to identify common themes and trends (Miles & Huberman, 1994). Differences and similarities between the case companies in terms of product categories offered, company size, market presence, and other factors are key to understand choices regarding logistics set-up or why specific market trends will have a larger impact, why this was the starting point of the analysis. Such aspects must be kept in mind when later on conducting the variable-oriented analysis. Höst et al. (2006) also emphasize the importance of similarities between cases, which can influence the validity of results. For example, the fact that three out of ten respondents reply to a question in a certain way might not lead to any conclusions in itself, but it could be interesting to study further if these three cases share some common characteristic (Höst et al., 2006). When performing variable-oriented analysis, the aim was to both highlight common themes and understand differences related to the research themes and questions.

Answering the research question

To understand and answer our RQ1: "What competencies will be required for successful omni-channel logistics, considering changing customer demand and other market trends?" we needed a guided process to end up with a well-worked out answer. We found that the "double diamond framework" with two iterations of diverging and converging thought models (Jilka, 2019) was an excellent fit for our research question, see Figure 3.2.

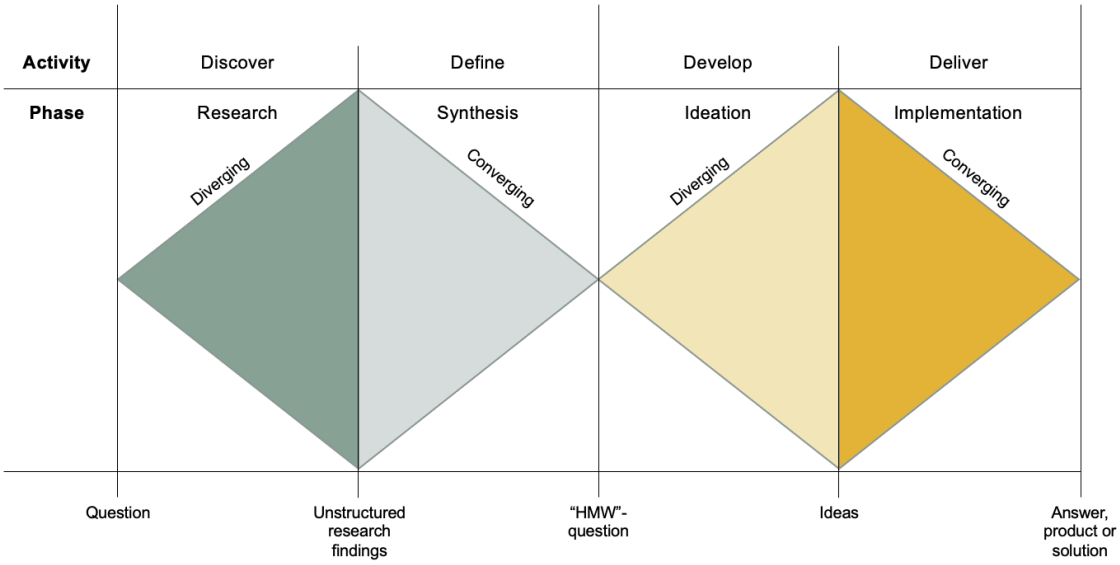


Figure 3.2 *Double-diamond framework guiding the data analysis. Adapted from Jilka (2019)*

The framework consists of four phases; *research, synthesis, ideation,* and *implementation*. In the first two phases, research and synthesis, the activities are to discover and define. One starts with a question, in our case our RQ, and starts to conduct wide *research*, thinking divergently and ending up with unstructured research findings. Then, the task is to define these findings convergently and *synthesize* insights to end up with some "How might we" (HMW)-questions for the next iteration of the framework. In our study, the first phase represented going wide through researching literature and interviewing retailers to understand omni-channel logistics and what trends and challenges are impacting retailers in their omni-channel logistics work. The challenges retailers face in back-end fulfillment of their multiple channels are inherently connected to their logistics capabilities and the competencies constituting those capabilities. Logistical challenges are often driven by market trends such as digitalization, changing consumer behavior, or sustainability, why it was important for the interviews to cover what retailers considered prominent market trends. The identified trends and challenges are presented in chapter 5.1 and 5.2 respectively of the analysis. The cross-case analysis supported finding the root cause for these challenges. In the second phase, we defined key actions for retailers to stay competitive in the omni-channel landscape, given our research findings from literature and the interviews, which are summarized in chapter 5.3. Our "HMW"-question was "how might we, as retailers, respond to these key actions". This was the input going into the second iteration of the "double diamond framework".

In the second iteration, the two phases are *ideation* and *implementation*. In the *ideation* phase, the activity is to develop an answer to the "HMW"-question. This phase is creative and seeks to create ideas divergently to later implement as a solution. Finally, in the *implementation* phase, the task is to deliver concrete answers and solutions to the original question at hand. Our

study went wide again, and ideated competence implications given the identified trends, challenges, and key actions. The output from the ideation phase was many ideas for what competencies could be vital to answering the question. The unique competence implications arising from this analysis are presented in chapter 6.1. Lastly, connected to the converging phase, we categorized the identified competencies according to our conceptual framework and compared them against the competencies identified in the empirics, presented in chapters 6.2 through 6.4. The result was a list of competencies which we finally summarized into five personas that retailers should develop or employ. The five personas are found in chapter 7.

3.3 Research quality

There are many ways in which to assure quality in one's research. The traditional criteria of research quality are internal validity, external validity, reliability, and objectivity (Yin, 2009). These are particularly relevant in a more structured case study research involving quantitative analysis. When there was a gradual movement towards more qualitative research in logistics management, Halldórsson & Aastrup (2003) stated that the research quality criteria had to reflect this change. They challenged the traditional criteria stated above by accentuating corresponding criteria in qualitative research literature; credibility, transferability, dependability, and confirmability (Halldórsson & Aastrup, 2003). Since this thesis will be an interview study inspired by a case study methodology but mainly analyzing qualitative data, the criteria illuminated by Halldórsson & Aastrup (2003) will continuously ensure quality in our research. Keeping these criteria in mind and actively working with them will strengthen the trustworthiness of this thesis. The four criteria will be further elaborated below, and we will present in what ways we worked with them throughout the thesis work, summarized in Table 3.2.

Table 3.3 *Methodological choices and how they contribute to research quality in the study*

Quality criterion	Purpose	Methodological choices
Credibility	Measures how well the researchers' attempt at representing the respondent's construction of their reality correlates with the respondent's perception of it	Approved interview summaries, follow-up interviews, validation interviews
Transferability	Reflects the extent to which it is possible to transfer the research findings into general statements or descriptions about the world	Multiple case study methodology, multiple populations (retailers and supporting actors), follow-up interviews, rigorous case descriptions
Dependability	Communication of the logic of method decisions and securing that one can follow the researchers' process towards the results	Methodology chapter including interview guide
Confirmability	Presenting results free of bias and prejudice, partly through making data trackable so that conclusions can be traced back to their sources	Semi-structured interviews, approved interview summaries, follow-up interviews, methodology chapter including interview guide, rigorous case descriptions, presented data analysis, validation inteviews

Credibility

The criterion credibility is parallel to internal validity in the traditional approach. However, credibility is based on the idea that there exists no single objective reality. Instead, all respondents will have different perceptions of reality influenced by their respective contexts. Thereby, credibility is measured through how well the researchers' attempt at representing the

respondent's construction of their reality correlates with the respondent's perception of it (Halldórsson & Aastrup, 2003). Credibility was strengthened through providing the respondents with a summary of the researchers' representation of their interviews. The respondents were offered to approve it before incorporating the findings in the thesis to make sure the material was presented the way the respondent intended it. This procedure strengthens credibility since the researchers cannot subjectively interpret the results. Another effort that was taken to improve credibility was that after the finalization of this thesis and its presentation, we offered to have validation interviews with all participating case companies, to get their input on our results and conclusions.

Transferability

The second criterion of trustworthiness is transferability, which could be compared to the traditional term external validity. It reflects the extent to which it is possible to transfer the research findings into general statements or descriptions about the world, the generalizability. However, Halldórsson & Aastrup (2003) argue that no perfect generalization is possible, but rather that the degree of similarities in the sending and receiving context determine the level of transferability. Therefore, it will be important to develop rigorous descriptions of the different contexts being studied: the environment in which the companies operate and the company's preconditions. Meredith (1998) argues that generalizability can be increased both through the depth of observation and triangulation. Depth of observation was created by conducting follow-up interviews with respondents. Data triangulation was achieved through multiple cases and multiple populations (both retailers, LSPs, and other supporting actors).

Dependability

Dependability relates to the stability of data over time, conventionally termed reliability. Reliability is determined through the replicability of research results and is naturally an important part of quantitative research. However, in qualitative data analysis, dependability is a better measure that is not focused on stability. Instead, dependability is achieved through communicating the logic of method decisions and securing that one can follow the researchers' process towards the results. Therefore, trackability and transparency are important efforts in dependable research (Halldórsson & Aastrup, 2003). The methodology, research strategy, and design are clearly outlined in chapter 3 of this thesis to increase dependability.

Confirmability

The final criterion of trustworthiness is confirmability, which parallels the traditional term objectivity: aiming to present results free of bias and prejudice. However, Halldórsson & Aastrup (2003) argue that research methodology can never fully be separated from the researchers and that objectivity is an illusion. They further describe that all data needs to be trackable so that conclusions can be traced back to their sources. Allowing an external party to affirm the results is one way of strengthening confirmability (Halldórsson & Aastrup, 2003). This thesis will present the interview guide used to collect data, provide thorough descriptions of the case companies, and describe what data has been used to reach what conclusions. Moreover, a semi-structured interview approach generates less researcher bias than a structured one (Qu & Dumay, 2011). Follow-up interviews were also used to validate findings and minimize potential bias from the first set of interviews. Finally, validation interviews were conducted when the thesis was finalized to validate our conclusions.

4 Empirics

The following chapter will present the results of the data collection. Firstly, the participating companies will be introduced by shortly describing their omni-channel work. Secondly, data collected during the interviews will be presented, highlighting similarities and differences across the case companies. The structure will follow the literature review and the conceptual framework, starting with the context of omni-channel retailing, presenting the customer offering, market trends, and the role of the physical store. Then, how the case companies structure their back-end logistics to support this will be presented. The empirics will be concluded with results on competencies needed in the omni-channel logistics work, categorized according to the six competence areas developed in the conceptual framework.

4.1 Case descriptions

This chapter will outline the participating companies, summarized in Table 4.1. Following is a case description for each company, outlining the general background, their omni-channel work, current logistics set-up enabling the omni-channel offering, and finally, information on the respondent from each company. Appendix B provides a quick overview of the case companies, to support the reader through the empirics chapter.

Table 4.1 *Case company information*

Company	Segment	Turnover, total MEUR (% online)	# of employees	Origin channel (year)	Online channel since	# of physical stores (# markets)	# of online markets
Alpha	Fashion	300-600 (*)	4 000-5000	Physical (*)	2006	300-500 (18)	33
IKEA	Ready-to-assemble furniture, homeware	41 300 (*)	166 350	Physical (1953)	*	442 + 18 small stores (57)	57
Beta	Pharmacy	1 000-1 500 (6 –7 %)	3 000-4 000	Physical (2010)	2014	300-400 (1)	1
Cervera	Interior decoration, kitchenware	93 (25–50 %)	600	Physical (1987)	2012	75 (1)	2
Elgiganten (numbers for Elkjøp Nordic)	Home electronics	4 140 (*)	3 000-4 000	Physical (1962)	2002	414 (4)	4
Gamma	Fashion	20 000-25 000 (*)	180 000	Physical (1947)	1998	5 000-6 000 (74)	52
Delta	Home electronics	100-200 (15 %)	1 000-2 000	Physical (1988)	1999	100-200 (2)	2
Epsilon	E-commerce	*	*	*	*	*	*
Implement Consulting Group	Management consultancy	168 (N/A)	900	N/A	N/A	N/A	N/A
PostNord	LSP	3 810 (N/A)	28 000	N/A	N/A	N/A	N/A

* Confidential

Throughout the thesis, it might be relevant to keep in mind that we interviewed one respondent from each company, why discrepancy in their answers, and the actual situation at the company

could occur. Also, nothing in this chapter is our own insights or analyses. If there are some statements that seem to be a bit analytic it is because the respondent mentioned the aspect and we thought it would add value to include it. Finally, we had to anonymize some statements based on the wishes of the respondents.

4.1.1 Alpha

This company wanted to be anonymous and will therefore henceforward be referred to as "Alpha". Alpha is one of Europe's leading fashion retailers, founded and headquartered in Sweden and has been on the market for more than 60 years. They have about 3 000-5 000 employees and have been operating an online channel since 2006. Their footprint consists of around 300-500 stores, of which they own 90 %, in 18 markets. Further, they offer online shopping in 33 markets and worldwide sales online through third-party marketplaces.

Alpha has, to some degree, worked with omni-channel retailing before they had knowledge of it as a concept. Since the start of their online channel, the customer has been able to pick up its order in the stores. They were also early in integrating their channels through involving store employees in order placement. The common perception of omni-channel at Alpha is that the customer should identify with the brand as much wherever the customer meets the brand; when they visit the online store or receive their online order, as they walk into their stores or visit the brand via social media. Alpha has worked with omni-channel development actively for a long time and won a prize for their achievements a couple of years ago. Their long-term strategy is to grow a lot in e-commerce and simultaneously sustain most of the stores as they believe they complement the online channel, both through showrooming and as a pick-up and return node. They also have the ambition to perform picking in stores but must secure a sustainable and reliable way of visualizing inventory levels in real-time to go forward with that. They are looking into radio frequency identification (RFID) technology to increase efficiency in goods flow and to support that development.

Alpha has one big DC in Sweden operated in-house and one outsourced warehouse for a small percentage of their products (~1 %) that are delivered on hangers and need to go through a steaming tunnel to be steamed. Currently, Alpha also operates an in-house OFC, mainly because they outgrew their DC and had to relocate the e-commerce volume. The OFC is replenished from the DC, which in turn never fulfills e-commerce orders. Their current DC was built in 2007 when the focus was the physical stores and is therefore very store oriented. Alpha has outsourced all transports and offers various last-mile delivery options, pick-up in-store, home delivery and delivery to a parcel station. Lastly, they offer free returns in their stores and receive 70 % of all returns through that channel.

We interviewed a supply chain developer at Alpha, which is a development role within their logistics organization. The interviewee leads development projects within all aspects of their value chain and is currently leading a project regarding a new omni-channel DC. Further, the respondent has been with the company for 20+ years and has extensive knowledge about many parts of the organization, such as distribution, e-commerce, allocation, IT, and sales optimization. The interviewee is a mechanical engineer and has a Licentiate degree within distribution.

4.1.2 IKEA

In 2020, IKEA was the fourth most valuable retailer globally and the most valuable furniture retail brand (Statista, 2021). IKEA operates 442 stores and has 50 e-commerce markets. The company's main business is designing, manufacturing, and selling furniture. IKEA was founded in 1943 by Ingvar Kamprad and today has over 160 000 employees. IKEA stores are typically located in the outskirts of cities.

When defining omni-channel, the respondent emphasized the importance of a seamless customer experience independent of which channel the customer chooses. However, there is no common definition of the term omni-channel at IKEA. Instead, there is a common vision of making their products available to more people, which rests on the three pillars *accessible*, *affordable, and sustainable.* IKEA aims to offer customers this omni-channel experience through providing a wide array of services such as click & collect and home deliveries. On the other hand, large furniture is a product that cannot always be delivered to parcel stations. In the last couple of years, IKEA has also invested in small stores in several large cities around Europe, where the assortment is smaller and more specialized than in the classic stores.

Generally, IKEA operates one network which serves both the online and offline channel. They have warehouses responsible for serving and replenishing both the physical stores and their customer fulfillment units. Two types of customer fulfillment units exist, customer distribution centers (CDCs) that handle large and bulky products and customer parcel units (CPUs) that handle smaller units. Some stores are also used to fulfill e-commerce orders. During the covid-19 pandemic, about 150 stores were closed, out of which some were reconfigured to fulfillment centers for e-commerce. IKEA has seen an increasing amount of customer fulfillment units and investments focused on strengthening that capability. IKEA believes that flexibility in the supply chain is critical as the borders between the physical and the online channel are erased and sees a big challenge in keeping the entire process cost-efficient in the future.

We interviewed a project lead with extensive logistics experience at IKEA. The interviewee has worked within process development since 2010, has 25+ years of experience within IKEA, and is currently leading a project within inventory optimization.

4.1.3 Beta

This company wanted to be anonymous and will therefore henceforward be referred to as "Beta". Beta is a Swedish leading pharmacy chain and was established with the de-monopolization of pharmaceutical retail in 2010. The online channel, which has been operated since 2014, stands for around 6–7 % of the company's total revenue. The company has over 390 physical stores and over 3 000 employees.

Beta believes that they can achieve more and offer a better customer experience through omni-channel than if their channels were operated separately. Their vision on omni-channel is "to be able to meet the customer everywhere and cater to their needs". Their customer offering differs slightly from city to city. They offer click & collect (1-2 days delivery time) and click & express (a delivery option where you can pick up your item at the retail store within two hours) in their stores, parcel station pick-up, and home deliveries.

In late 2020, Beta implemented an automation solution in their warehouse. The warehouse is divided into two areas, one for store replenishments and one for e-commerce. Given the many regulations in the industry, they could not automate the e-commerce part, which is today

restocked three times a day from the automated part of the warehouse. The reason for implementing an automated warehouse solution was to introduce more articles into their assortment, and they are currently focusing on increasing productivity and reaching the desired key performance indicators. Beta has outsourced the operations of the warehouse as well as transportation to an LSP.

We interviewed the head of logistics development at Beta, who has 13+ years of logistics-related experience and manages different projects and initiatives focused on continuous improvement within the areas of logistics and product supply.

4.1.4 Cervera

Cervera was founded in 1987 and is a large Swedish premium kitchenware and interior decoration retailer. They have 74 physical stores and 600 employees. Cervera delivers online orders to two markets since the launch in Norway in the spring of 2018, and today, 25–50 % of their revenue comes from the online channel.

Omni-channel has been a key focus for Cervera ever since launching their online channel in 2012. For Cervera, the first level of omni-channel is to make products available to customers independent of channel if the product is in stock somewhere in Cervera's network. However, extending beyond logistics, Cervera believes omni-channel should consider the information flow as well. The customer offering and experience in terms of pricing, club membership offers, and customer service should be coherent, and the customer should, for example, be able to follow up on a customer service matter started online in-store. Cervera's omni-channel package consists of many offerings, click & collect (both for items stocked in-store and in their central warehouse), online orders in stores for products not in stock, home deliveries, and deliveries to parcel stations. If a product is out of stock in their DC and a store, they pick and ship it from another store that has access to a dock, a concept which they call "omni 3".

Cervera outsources all warehouse operations to an LSP, and the warehouse is designed based on the activity-based costing model. According to the interviewee, they have a long-term vision of bringing the warehouse operations in-house to secure ownership and responsibility for the customer experience. In the DC, inventory is integrated, but e-commerce orders are prioritized to offer a high service level. They are also planning to implement an automation solution in the DC to enable piece picking, which is currently not possible. Finally, Cervera outsources all transportation operations.

We interviewed the head of development and operations at Cervera. Andrew is responsible for the areas of IT, business development, and supply chain. The supply chain team, the largest of the three, manages the inventory at Cerveras DC in Arlanda and replenishment of the retail stores.

4.1.5 Elgiganten

Elgiganten is one of the largest home electronics retailers in the Nordics, with 174 stores spread out across Sweden. The company is a part of Norwegian Elkjøp, which in turn is owned by Dixons Carphone – one of the largest home electronics retailers in Europe.

Independent of where the customer chooses to purchase Eliganten's products, they aim to offer an omni-channel experience by providing the same price, the same products (the entire

assortment), the same services and the same price on services. Services are a crucial part of the customer offering when it comes to home appliances such as refrigerators. Elgiganten offers home delivery with added options like carrying inside the home, assembly, and installation of such products. Furthermore, they offer omni-channel services such as click & collect, click & reserve, and buy-online-return-in-store.

Home electronics and home appliances are stored and handled at their distribution center in Jönköping, while a warehouse in the Czech Republic manages all kitchen systems. The Jönköping DC is an integrated warehouse, where both consumer orders and store replenishments are handled. The challenge with this is to balance the flows, especially with the constantly increasing share of e-commerce. Before corona, the split between offline/online was maybe 80/20 %, which has changed drastically to around 65/35 % today and even up to 50/50 % during some periods. This requires increased flexibility in both equipment and staff. All home deliveries go through one of their 60–70 fulfillment hubs. Both warehouses are operated by Elgiganten's staff, while most of the hubs are outsourced to an LSP.

We interviewed the Logistics Director and Managing Director of Elgiganten Logistik AB. Previously, he was a project manager at Maersk Logistics. He has worked in various roles related to logistics during his 15 years at Elgiganten. During his time at Elgiganten, he has been responsible for two expansions of their DC in Jönköping. The first one implemented a semi-automation, and the second expansion, the most significant investment in Elgiganten's history, was a more comprehensive automation solution with a multi-level automated storage and retrieval system (AS/RS), with shuttles for the handling of smaller products such as microwaves, cameras, and mobile phones.

4.1.6 Gamma

Gamma is a world-leading fashion retailer with a turnover of around 250 BSEK as of 2019 and almost 180 000 employees. Founded and headquartered in Sweden, the company has been in business for more than 70 years. Gamma, including all its brands, has a footprint of around 5000 stores in 70+ markets and online sales in 50+.

Gamma has launched several services and has many initiatives on the way that characterize them as an omni-channel retailer. They have made the customer's smartphones an integral part of enabling the complete customer experience. Through the Gamma app, customers can use the scan & buy function to scan a store product's QR code and find the right size and color to order online. The app also has an in-store mode allowing customers to access the current product availability in the store that they visit. Gamma offers free online returns in stores and click & collect in more markets, and they offer digital receipts in their app. Finally, Gamma facilitates the customer's journey from inspiration to purchase with their visual search function in the app through image recognition.

Supporting the long-term strategy of integrating channels and creating a seamless journey for the customer, Gamma realized they needed to make accurate inventory levels available to the customer. To facilitate that development, Gamma has introduced RFID in 18 markets, with more being added. Generally, Gamma prototypes omni-channel concepts in certain chosen markets, and if the response and results are satisfactory, they standardize it globally.

In Sweden, Gamma has one big online DC in the southwest of Sweden supporting the Nordic markets and one store DC in the southeast. The online DC has been automated with a pocket sorter and a multi-level AS/RS. They have various degrees of automation in a couple of

warehouses globally. In a warehouse in the US, they have just introduced automated guided vehicles (AGV) in a goods-to-person solution with mobile storage units. In the last years, they have introduced two omni DCs, one in the UK and the one with AGVs in the US, which means they fulfill both store and online orders from one warehouse. The stock is in the same physical building but separated both in terms of storage space and picking. However, their IS allow flexibility and theoretical transfers of stock. Naturally, it is not desirable to make transfers at all. Nevertheless, given the rapid moves in the industry and the volatile demand that the pandemic has reinforced, it is advantageous to have the possibility. Through this, they realize the benefits of inventory pooling, a prevalent theoretical advantage of omni-channel retailing. In China, they have rolled out the functionality to pick online orders from store stocks. Gamma has outsourced all transports.

We were referred to the person we interviewed by two separate initial contacts at Gamma. He is currently a supply chain strategist in the recently started department, Supply Chain Center of Excellence, where he drives cross-functional corporate supply chain projects and strategic initiatives. He has been with Gamma for more than nine years and has been the project manager for ERP and WMS implementations in London and New York. Therefore, he has extensive knowledge and understanding of several markets globally and many parts of the supply chain. The interviewee has an academic background in logistics from the University of Gothenburg.

4.1.7 Delta

Starting as a small family business in 1988, Delta today has close to 1 000 employees. They operate 107 physical stores in Sweden and 21 in Norway, a market which they entered in 2015. Home electronics and appliances is their main product group and in 2019 Delta generated a revenue of 1.79 BSEK. Their central warehouse and headquarters are in Malmö, Sweden.

Delta has undergone a large digital journey in recent years, has left their physical product catalog behind them, and invested in a new e-commerce platform that will support their omni-channel work. Besides offering generic services such as click & collect, click & reserve, and buy-online-return-in-store, a significant focus for Delta's omni-channel experience is customer service. In 2020, they launched a concept where customers can have one-on-one video conversations with a salesperson through their smartphone. Another related service they are currently developing is the possibility to follow up on customer service errands created through the online chat in the physical store, a concept they call "Known Customer". In addition to one-on-one video conversations, Delta has developed the corona-specific delivery option "curbside delivery", a click & collect option where the customer can pick up the product outside the store. Besides merely offering the same products independent of channel, the company focuses on providing the same, or even better, service independent of channel.

The central warehouse in Malmö serves both 130 stores and most of the e-commerce customers. SKUs are picked from the same location independent of channel, although they aim to operate dedicated workforces for picking operations for the different channels. In 2013, they invested in six paternoster lifts and later added six, which enabled them to decrease their warehouse space by 90 % within one of the three picking zones. Moreover, Delta utilizes their retail stores as logistics-/delivery hubs, enabling them to offer customers delivery of products that are out of stock in the central warehouse and same-day delivery in some cases. Today, they can serve 70 % of the Swedish market through same-day delivery. Further, Delta partners with an LSP which receives and manages all goods imported from China.

We interviewed the Head of Logistics at Delta. The interviewee has made an internal career journey within Delta, starting as a salesperson in 2004. Thereafter, the interviewee went on to work as a store manager for two different stores and as a warehouse manager for their Malmö warehouse before transitioning into their current role as head of logistics. Given their large experience of serving customers first-hand in combination with their logistics expertise, the interviewee has a deep understanding of what is required from back-end logistics for front-end offerings to be realized.

4.1.8 Epsilon

Epsilon is a leading multi-national retailer with quite a small physical footprint worldwide but prominent in e-commerce. Hence their footprint consists primarily of logistics hubs such as fulfillment centers, sort centers, distribution centers, and delivery stations. The company has been on the market for more than 20 years.

The perception of omni-channel at Epsilon is varying. The company's ambition is to offer last-mile delivery methods that are so flexible, fast, and reliable that customers do not have to visit any physical store. They believe that there is no need for a physical store, at least as a delivery point, if one can deliver to the customer quickly and at the time and place the customer wishes. However, Epsilon has started some concept stores to showroom their products and the top products bought online in that geographical area. Epsilon only owns approximately 50% of their assortment, and the rest consists of third parties that want to sell their products through Epsilon. There is also a proportion of the assortment that is delivered through dropshipments. Since they offer free returns, they have not felt any urge to expand their showroom footprint. They use machine learning and AI to predict what products will be returned and try to find the root cause of returns and act upon it. For instance, they found that some products were more likely to be damaged in transportation. Then they increased packaging measures to make sure Epsilon delivered the product without defects.

At Epsilon, we interviewed a Supply Chain Manager. The interviewee has an academic background within supply chain and has worked with consumer and market knowledge and business development within logistics at other companies before.

4.1.9 Implement Consulting Group

Implement Consulting Group is a Nordic management consultancy firm with eight offices in five countries; Denmark, Sweden, Norway, Germany, and Switzerland. Founded in 1996, they currently have around 900 employees and work with clients all over the world.

Implement Consulting Group has supported several Nordic retailers in defining and implementing omni-channel strategies and moving from single-channel to multi-channel to seamless cross-channel to unified commerce (omni). According to the interviewee, the first perspective on omni-channel is the ability to serve any customer in any channel at any time in any format, which implies that the customer should be able to start the journey in one channel and move seamlessly into another without problems.

While companies go through more significant transformations such as the transition to omni-channel, maybe once every five to ten years, consultants have an advantage in being involved in maybe five to ten such projects a year. This provides them with valuable experience and a better understanding of how to get from intent into design and what works in this process.

Implement Consulting Group specifically provides an understanding of the commercial, operational, and digital engine room, a capability which not all consultancies have.

We interviewed a senior partner who leads the B2C industry focusing on retail, consumer packaged goods and fast-moving consumer goods at Implement Consulting Group. The interviewee has 15+ years of experience in the consulting industry and has supported many retailers in their omni-channel work.

4.1.10 PostNord

PostNord is the leading supplier of communication and logistics solutions to, from, and within the Nordics. They are also responsible for postal services to private persons and businesses in Sweden and Denmark. In 2019, they had sales of 38.3 BSEK, over 28 000 employees, and delivered 179 million packages.

Transporting parcels from a central fulfillment center to businesses and consumers is the service that PostNord most commonly supplies to retailers. The service includes pick-up of goods, sorting, and distribution to so-called in-points (e.g., collection point, business address, consumer home). Typically, companies want to focus on optimizing their storage, picking, and packing operations and the overall efficiency of the fulfillment centers, why they often outsource the delivery part to LSPs. Scale advantages are required to have in-house distribution. PostNord also provides services within warehousing and fulfillment, mainly for unit-load warehouses rather than e-commerce fulfillment. With the continuous growth of e-commerce, this might become a more frequently provided service.

One of PostNord's service offerings is called omni-channel distribution. They define omni-channel as going through more than one channel to consumers, which can be physical channels and online channels or something in-between. One of the most significant challenges PostNord experience with this service is when retailers want to use stock in retail outlets for e-commerce/consumer fulfillment. Picking up a small parcel at a retail store and delivering it to a customer is very costly.

We interviewed the head of direct parcel distribution in the Nordics. The interviewee has worked at PostNord for two years and has 20+ years of experience in supply chain and logistics-related roles in various industries. He has extensive experience in manufacturing, fulfillment, distribution, and inventory planning.

4.2 Omni-channel retailing

Having introduced the case companies and interviewees, we will now present the results consolidated from all interviews. We have used the structure from the literature review and our conceptual framework to present the result, with the three main pillars omni-channel retailing, omni-channel logistics, and competencies within omni-channel logistics. We have adapted the structure within these pillars to fit what relevant aspects the interviewees brought up. In this chapter, we first present what customer offerings the retailers offer, summarize the market trends perceived by the respondents, and finally present the respondents' thoughts about the changing role of the physical retail store in the omni-channel transition.

4.2.1 The omni-channel customer offering

As one retailer mentioned, a seamless customer offering must include "the same assortment, the same prices and the same services independent of channel" in an omni-channel setting. Below, Table 4.2 summarizes the interviewed companies' omni-channel offerings and related services. For all tables in chapter 4, colors will indicate to what extent retailers perform the given services or configuration choices. Green will be used to highlight that the retailer is fully engaging in the service or configuration. If the retailer has implemented the service or aspect to some extent, the yellow color will be used. For instance, this could be when self-service technology is implemented but only in some concept stores. No color indicates that the retailer does not engage in the service or configuration. Based on literature, click & collect is defined as an online order that the customer picks up in-store, which is shipped to the store from a DC. Click & reserve, on the other hand, is defined as an online order that the customer picks up in-store, which is fulfilled from store inventory instead of being shipped from a central node. These definitions are followed in Table 4.2 below. However, the interviewed retailers do not necessarily define it this way, with many referring to click & reserve as just another way of fulfilling click & collect orders and vice versa. From a customer viewpoint, it makes no difference whether the order is shipped from a DC to the store or whether the order is picked in the store, given that the lead time requirements meet the customer expectations. What makes a difference for the customer is whether the payment is made online when ordering and the customer pick up an already packaged parcel in-store or whether products are merely reserved and paid for in-store. What different retailers offer regarding allowing customers to pick up online orders in-store and reserving store inventory will be presented in this chapter, while chapter 4.3 will focus on how these orders are fulfilled in the back-end logistics.

Although all retailers do not utilize store inventory to fulfill customer orders, all retailers show available stock balances for products on their webpage. The three last parameters investigated in Table 4.2 indicate the physical store's role in supporting customers with additional services. First, the utilization of the physical store as a return node for online orders. Second, the service of being assisted in placing online orders in-store, either for home delivery or pick-up in store. And finally, to what extent technology is used to access the online assortment when in the physical store. For example, displays or tablets used for placing online orders.

Table 4.2 *Channel services offered by the interviewed retailers*

	Click & collect	Click & reserve	Stock balance online	Order online, return in-store	Order in-store, deliver to home/store	Self-service technology in-store
Alpha	Yes – since introduction of online channel in 2006	No – do not utilize store inventory for online orders	Availability for different sizes (both in-store and online)	Yes	Yes – personnel help customers place online orders in-store	Displays in selected concept stores
IKEA	No online orders picked in CPUs/ CDCs and then shipped to store	"Click & collect drive-thru" – ready-to-pick-up parcels fulfilled from store inventory	Yes – number of items in stock in-store available	Yes	For selected product categories (e.g., kitchen solutions)	No
Beta	Yes	Order available for pick-up in two hours ("click & express")	Yes – both store and online stock levels available	Yes	No	No
Cervera	Yes – picks the order where the product has been stored for the longest time (DC or store)		Yes – both store and online stock levels available	Yes	Yes – personnel help customers place online orders in-store	No
Elgiganten	Yes	Order ready for pick-up in one hour	Yes – both store and online stock levels available	Yes	Yes – for heavy/ bulky products such as TVs	No
Gamma	Yes – although not for all stores	In one market, needs new systems to develop	Availability for different sizes (both in store and online)	Yes	Scan function in app ("find in-store")	Displays + contactless checkout + find in-store
Delta	Yes – also offer curbside delivery	Order ready for pick-up in 15 minutes	Yes – both store and online stock levels available	Yes	Yes – personnel help customers place online orders in-store	No

As Table 4.2 shows, six of seven retailers offer click & collect, although not necessarily for all stores in all markets. The retailer that does not offer click & collect according to literature's definition, IKEA, still allows customers to pick up orders in-store, although this is only possible if the entire order is in stock in-store. They refer to this as "click & collect drive-thru", further underlining the discrepancy between literature definitions and practice. Moreover, five out of seven retailers leverage their store inventory to enable click & reserve. It is to be noted that both retailers that do not offer this service are fashion retailers. All retailers provide customers with the opportunity to check stock balances in-store through their webpage, although to different extents. In some cases, the webpage states if the product exists in store or not, while some retailers offer more detailed information such as an exact number of pieces available in-store. However, several respondents highlight that the inventory information given to customers is not always accurate since it relies on access to real-time data and is dependent on

the frequency of stocktaking. Sometimes the stock balance might be a couple of days old, and the item requested can either be stolen, not unpacked, or in a fitting room at the time of the request. This is mentioned as one barrier to fulfillment from store. According to three retailers from different segments, another barrier to both click & collect and click & reserve is the physical space constraint for parcels in-store.

Beta has launched a click & reserve offering they refer to as click & express in their pharmacies, where the order is ready for pick-up in the pharmacy within 2 hours after the online order is placed. Moreover, they are looking into stocking online top-selling products in pharmacies to expand their click & reserve business growth further. When customers choose click & reserve at Delta, they send out a confirmation that the order is ready for pick-up 15 minutes after reservation. The order is not packed, and the customer will not pay for the product until arriving at the store to pick it up. Both Delta and Cervera point out that click & reserve constitutes a large share of their e-commerce. Respondents from these two retailers argue that this is a more desirable option than click & collect for them since it offers the opportunity to interact with the customer in-store and potentially sell more products on the same receipt instead of just acting as a parcel station.

All retailers offer the option to return online orders in-store. Alpha, Beta, Cervera, and Delta all highlight that this is the most common return option for their customers. The e-tailer, Epsilon, also offer customers to return their products in pick-up stations and delivery boxes, a contactless return option. Returns management will be discussed further related to logistics in chapter 4.3.5.

Three retailers use sales personnel to assist their customers in online order placement in-store, either for home delivery or pick-up in-store. The respondent from Alpha mentions that they have offered this ever since introducing their online channel in 2006. Cervera mentions that this offering can amount to 10 % of the revenue for certain stores. They have the ambition to increase these numbers further going forward. Gamma leverages technology and offers a solution similar to order-in-store through their app. When in-store, the customer can scan an item and immediately place an order in the app if, for example, the desired size or color is not available in-store. Moreover, both Gamma and Alpha, the two fashion retailers, have implemented self-service technology in some selected concept stores to further integrate the online and offline channel in the customer offering. Only a limited assortment is available for showrooming in these stores, while the rest of the assortment can be reached and ordered through screens or tablets in-store. Gamma has also implemented contactless self-checkouts in some stores.

Another important aspect highlighted during the interviews was the need for integrated customer service to make the entire customer journey seamless. Both Delta and Cervera launched one-to-one calls during 2021, a service also offered by Elgiganten. This enables customers to video chat with a salesperson that has relevant expertise for their errand. Besides being an omni-channel customer service offering, it utilizes idle sales personnel in-store. Delta is also in the process of implementing a service called “known customer” that allows them to track customer service errands as customers move between channels, through for example scanning QR codes when customers enter a store. Cervera also highlights the importance of seamless customer service, although they cannot track customer service errands across channels currently. Besides customer service, home deliveries that include assembly and installation of products are necessary for some retail segments. These services are offered by Elgiganten (for products over 35 kg) and by IKEA.

With the covid-19 pandemic, the respondent from Alpha argues that customers choose home delivery instead of click & collect to a larger extent. Delta has introduced curbside delivery as an offering during the pandemic, where customers can get their ordered products delivered to them and pay outside of the store. This offering was, among other things, made possible through innovative payment solutions that allowed the customers to pay outside the store through their smartphones or portable payment stations.

In summary, all retailers offer customers to pick up online orders in-store in one way or another, checking the stock balance online and returning online orders in-store. Regarding utilizing store inventory for click & reserve, assisting customers in order placement in-store, and using self-service technology in-store, the results are scattered among the retailers. The two retailers not offering click & reserve are the fashion retailers, but at the same time, they are the only retailers to offer self-service technology. There is no apparent pattern among the retailers that help with order placement in-store. However, in what way the retailers occupy their store personnel differ. Some focus on occupying them with online order picking, while some focus on assisted order placement and general customer service.

4.2.2 Market trends

During the conducted interviews, respondents were asked to highlight prominent market trends affecting the landscape of omni-channel retailing. Three central market trends were identified: *digitalization, changing demand requirements* and *sustainability,* see Figure 4.1.

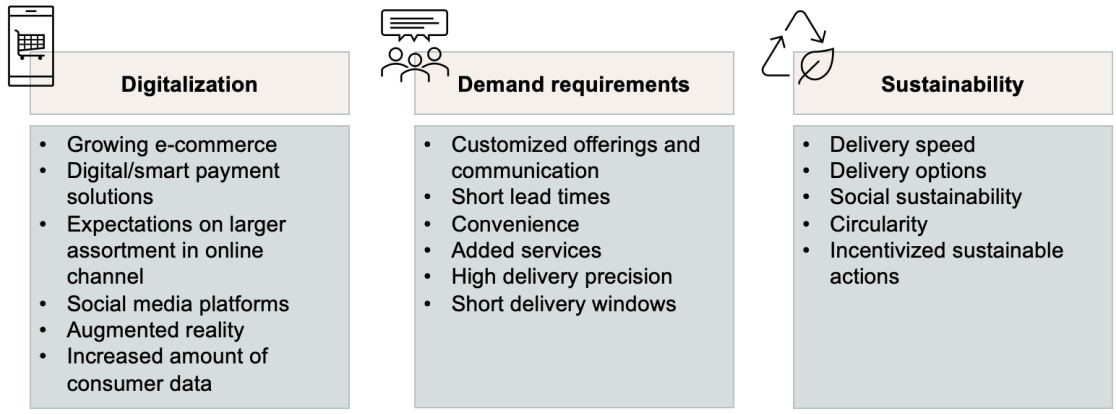


Figure 4.1 *Prominent market trends in omni-channel retailing*

Digitalization

In this chapter, we will discuss the aspects of digitalization that the respondents resonated around. The aspects are summarized in a bullet point list in Figure 4.1 above. Digitalization is a broad and unspecific term. However, we will consider it to contain all impacts that the introduction of the online channel has had, from new digital services to the increasing importance of data analysis within companies.

“One trend, which is almost not a trend anymore, is the growing e-commerce”, as one respondent formulates it. This growth has only been accelerated by covid-19. The respondent from Gamma points out that approximately 85 % of a market’s revenue came from store sales before the pandemic, while only 15 % was generated through e-commerce. However, even

though they have been forced to close almost all stores in some markets, they can still experience the same revenue, although now exclusively through online sales, view the shift in Figure 4.2 below. Other retailers experienced a similar development. The respondent from Elgiganten highlights that what was previously an 80/20 % split between store and online is today rather a 65/35 % split and even 50/50 % in some periods, also visualized in Figure 4.2. This is not representative for the entire pandemic for either of the two companies, but rather an illustration of the shift in certain periods of the pandemic. These Further, one respondent explains that this puts pressure on retailers to have advanced e-commerce platforms with integrated smart payment solutions. Another respondent also highlights that consumers from additional demographic profiles, mainly older generations, have found their way to the online channels during the last year. The introduction and growth of the online channel have also contributed to the trend of larger assortments, something that Elgiganten and Beta mention.

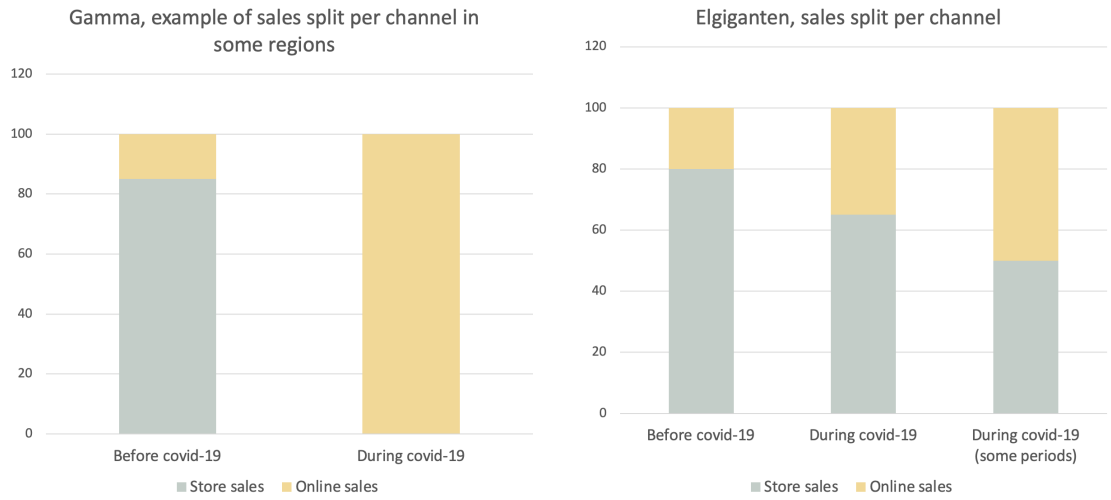


Figure 4.2 *Snapshots of sales split per channel for Gamma and Elgiganten before and during covid-19*

Another aspect of digitalization, which two respondents mention, is the use of social media platforms for marketing. The smartphone plays an increasingly important role in the integration of channels, as discussed in section 2.1.3. IKEA uses AR in their app, allowing customers to place furniture in the room and evaluate it before ordering. According to the respondent, this solution will evolve towards viewing complete kitchen solutions and closet systems, providing customers with an even more seamless experience. Gamma also integrates the smartphone in the seamless customer journey with image recognition of garments and QR scanning functions. Epsilon, the e-tailer, is very mature in its digitalization work. They are currently focusing on removing the interface between customer and screen. Examples of this are ordering by voice through a smart device and using cameras to locate when a product runs out in customer homes, and then placing automatic orders. Another digital solution developed by Epsilon, which supports their e-commerce offering, is an integrated door lock and camera system that enables couriers to deliver products into customers' homes without them being present.

In summary, the evident growth of e-commerce bundled with the new digital services provide an unprecedented amount of data on consumers. This fact allows the retailers to engage in predictive analytics and utilize the data to serve the consumer better and create new capitalizing services. The respondent from Implement claims that digitalization has dictated the context of and conditions to drive strategy and growth and will continue to do so.

Demand requirements

According to several respondents, different customers demand different things today. As one put it, "for some it is important with speed, for others sustainability, for the third price and for the fourth a certain service". One-size does not fit all in an omni-channel context. The communication and customer offering must be more adapted and individualized than ever before. One retailer highlight that they actively work with different customer personas to customize the communication. Moreover, different markets have different requirements. While five retailers highlight that customers demand short lead times and fast deliveries for e-commerce orders, one respondent argues that customer expectations on speed are lower in Sweden than in, for instance, the UK. Another retailer supports that speed is especially important in larger cities. Epsilon argues that customers surely do demand shorter lead times, but that this shift is also driven internally since faster deliveries will result in capturing more market shares.

Another common theme discussed during the interviews is that customers demand more convenience than ever before. Instead of using their own time, customers are willing to pay for added services that ease their shopping experience, such as home delivery and installation. Customers also have higher expectations on the customer offering in general, and real-time stock balances, a variety of delivery options, and similar services are necessary for retailers not to lose customers to competitors. Moreover, one respondent highlights that home deliveries have increased in popularity compared to click & collect orders since the covid-19 breakout. Regarding deliveries to their homes, customers demand increased delivery precision and shorter delivery windows in addition to the already short lead times expected, which puts new and tougher requirements on retailers' fulfillment operations.

In summary, changing and intensified demand requirements are putting increasingly more significant pressure on retail organizations. Customers demand faster, more sustainable, cheaper, and better deliveries and services. Further, all customers do not want the same services, why the organizations need to customize and individualize their customer offering to a far larger extent than before, while simultaneously offering all services demanded by customers.

Sustainability

Five out of seven retailers mention sustainability as a prominent market trend that companies must consider when planning their operations. As one retailer put it: "sustainability is no longer a nice-to-have, but a need-to-have". With many home deliveries and small order sizes, e-commerce is not that environmentally friendly, why retailers continuously must work with their sustainability goals given the growth of online sales. For example, Beta has a goal of being fossil-free by 2030.

This trend is somewhat contradictory to consumers demanding shorter lead times and more convenience in delivery options. One respondent also points out that few customers are willing to pay for less environmental impact. Beta and Delta try to nudge customers towards more environmentally friendly delivery options by putting "climate-friendly choice"-indications on specific delivery options. Another example is IKEA's and Epsilon's use of electrified vehicles in the last-mile delivery. As the respondent from Alpha points out, customers do not only demand environmentally friendly products with less plastic in packaging, but also sustainability in logistics services such as transports. This is also a question of social sustainability, where retailers must ensure that, for example, long-haul truckers have good working conditions and that suppliers follow certain CSR regulations.

Following this trend, several retailers are launching circular initiatives. Alpha is piloting secondhand sales of certain product categories and IKEA is buying back old products from customers with the purpose of refurbishing, recycling, and reusing in an initiative they call buy-back Friday. Gamma has a points program in place for consumers purchasing sustainable garments to encourage this. Moreover, they recently issued a sustainability-linked bond to incentivize sustainable actions. The bond is coupled to the company meeting several defined sustainability targets, for example, to increase the share of recycled materials used to 30 %. Some retailers also talk about internal motivation, and of sustainability as a means of employer branding.

In summary, there is a strong consensus around the importance of this trend. Consumers demand more transparency in retailers' supply chains and a more responsible sustainability agenda. However, few are willing to pay for increased sustainability. Several efforts and initiatives are underway, and retailers seem to have realized and acted upon the importance of this trend.

4.2.3 The role of the physical store

Six out of seven respondents mention that the role of the physical store has changed and will continue to change with the growth of omni-channel. The dynamics of the business are changing, and restructuring is required. Today, personnel must pick e-commerce orders and assist customers in placing online orders in the store. Both Cervera and IKEA discuss the store's role as more of a fulfillment center than a classical retail store. This is primarily attributed to the growing e-commerce. IKEA supports this by stating that offline sales previously amounted to 97 – 98 % of their entire revenue.

Moreover, several retailers highlight that they have had to close stores during covid-19. IKEA closed 150 out of their 430 stores but reconfigured some of these stores to function as OFCs instead. Alpha and Gamma (in most of its markets) did not have either systems or capabilities in place for a reconfiguration like this. Beta is another retailer that considers whether to reconfigure some of their larger pharmacies to dark stores. Nevertheless, most respondents believe that physical stores will continue to play an important role and complement the online channel.

Three retailers discussed a barrier to click & reserve and other omni-channel initiatives that demand action from the store, which is the skew in incentives. Traditionally, stores are largely motivated, driven, and rewarded based on sales goals. With increased omni-channel retailing, the accounting of sales gets more complex. The respondent from Cervera mentions that the party which charges the customer gets the sale, which means that stores do not get credit for a click & collect sale. However, they still need to handle and store the order and service the customer in-store when they pick it up. This incentive issue needs to be resolved as the role of the physical store continues to change.

In summary, there is an evident shift in role for the physical stores, and the entire dynamic of the business is changing. These changes demand restructuring, and retailers are facing difficult strategic decisions. Warehouses are recognized as more efficient than retail stores, why retailers might have to spend more money on logistics than the retail stores. The store personnel are experiencing changed tasks and some retailers endeavor reconfiguring stores into dark stores and OFCs. In the end, there is a consensus around the fact that the role of the physical store is changing, but this complicates current incentive structures. There will have to be efforts in aligning incentives to stimulate further growth.

4.3 Omni-channel logistics

With the retailer's customer offerings, opinions on market trends, and the role of the physical store presented, we will now cover what this means for logistics. Firstly, this chapter presents how the interviewed retailers configure their logistics to provide the omni-channel customer offering discussed. The five processes identified as critical for omni-channel logistics are network configuration, warehouse operations, resource and capacity management, last-mile delivery, and returns management. In addition, this chapter will outline how IS and IT support the logistics configuration and enables integration of processes. Lastly, the challenges connected to omni-channel logistics will be discussed.

4.3.1 Network configuration

Table 4.3 presents how the interviewed retailers configure their network of DCs, both in terms of integration and centralization. Again, colors indicate to what extent retailers incorporate the aspects in the columns; green indicates fully, yellow to some extent, and no color means not at all.

Alpha, IKEA, and Beta operate separate, sequential network structures. Alpha established a separate e-commerce or online DC when they outgrew their central DC, established initially to cater to the physical channel. Alpha's online DC is replenished from the central DC, as is the case for IKEAs two types of customer fulfillment units, CDCs and CPUs, why they are categorized as sequential. IKEA has also discussed whether to set up a separate supply chain for the online channel, a so-called separate and independent network structure. Beta has their inventory for all channels in the same physical building, although separated by a wall due to regulations for the pharmaceutical industry. Their online part of the warehouse is replenished from the offline automated part, why it is sequential.

Gamma has recently opened two omni DCs in two different markets, why they are partially integrated. However, they operate independent supply chains for online and offline in all other markets. This is primarily due to large volumes and large geographical presence. Gamma has two different types of warehouses for serving the physical retail stores, DCs that ship both pull and push orders to the stores and replenishment warehouses that strictly ship pull orders.

Cervera, Elgiganten and Delta operate a purely integrated structure, with one central warehouse fulfilling store replenishments and e-commerce orders. However, even though Elgiganten operates an integrated structure in terms of channels with one central warehouse, they also have 70 fulfillment hubs where e-commerce orders are consolidated and sorted after being shipped from the DC. Moreover, Elgiganten separates their network based on product category. Home electronics and home appliances are handled in their Swedish DC, while kitchen systems are handled by a DC in the Czech Republic. One respondent argues that an integrated solution enables better capacity utilization of personnel and other resources.

One retailer previously had regional warehouses in eastern Europe, established to decrease customer lead times. Customer service increased with the decentralization, but the flexibility was compromised. According to the retailer, it can be hard to optimally distribute products between DCs, which can render a shortage of products, why localization is a trade-off between lead times and flexibility.

Table 4.3 *Network configuration of the interviewed retailers*

	Integration degree			**Centralization degree**	
	Integrated	**Separate (independent)**	**Separate (sequential)**	**Centralized**	**Decentralized**
Alpha	No	No	Traditional offline DC that serves stores and online DC	One offline DC and one online DC serving all markets	No
IKEA	No	No	Traditional offline DCs that serve stores and online DCs. Two types of OFCs: CDCs (large and heavy products) & CPUs (weight and measurement limited parcels)	No	Decentralized structure given the large number of markets served
Beta	No	No	Online and offline warehouse in same building – separated due to regulations	One facility (offline DC + online DC) responsible for serving the Swedish market	No
Cervera	One integrated, outsourced DC for store replenishments and e-commerce	No	No	One DC that serves both markets	No
Elgiganten	Integrated warehouse for home electronics and home appliances	Separated by product category – one DC in Czech Republic for kitchen systems	No	One central DC and 70 decentralized fulfillment hubs (for consolidating e-commerce orders)	
Gamma	Two omni DCs	Purchases separately for the two channels. Pure offline DCs that supply stores (both push and pull) and pure online DCs	No	Different structures deployed depending on market	
Delta	One integrated DC fulfills stores and majority of online orders (some fulfilled from store)	No	No	One DC that serves both markets	

Epsilon, the e-tailer, configure their network in a more decentralized manner than many of the retailers. After initial DC transport, orders are sorted at sort centers relatively near a customer's region. As a final step, products are transported from sort centers to delivery stations placed even closer to customers, where orders are packed and sorted on postal code level before final last-mile delivery to the end customer. In comparison, Epsilon utilizes more types of material handling nodes focusing on proximity to the end customer. On the other hand, the respondent highlights that they do not have physical stores that can assist in the fulfillment process as a part of their network.

The respondent from PostNord argues that their biggest challenge in connection to logistics is when a retailer wants to use the stock in their retail stores as inventory for order fulfillment since this easily becomes extremely costly. The inefficiency comes from picking up small parcels at scattered locations and delivering them to a customer, why this service does not make sense for PostNord to offer. In contrast, the retailers want to implement it to become an omni-channel retailer, not understanding the complexity and the inherent cost of such operations. From the retailers' point of view, it is an excellent way of utilizing idle store employees. The respondent emphasizes that it could be a good idea. However, there must be a plan for scaling up when it becomes 10 – 20 % of the revenue.

In summary, there is quite an even split between retailers operating integrated and separated network structures. It can be highlighted that the retailers choosing a separate structure either have a significant geographical presence or do it due to regulations. The ones operating integrated structures are mainly smaller with a presence limited to Sweden or the Nordics, although Gamma has established a couple of integrated DCs despite their size. Where retailers choose to place their nodes is a trade-off between flexibility and lead times. A clear majority of the retailers have a centralized network, where central DCs either serve all channels or replenish an online DC and the physical stores. The physical stores are an important part of omni-channel retailers' networks, but as PostNord highlights, the cost and complexity of fulfilling from retail stores could be substantial.

4.3.2 Warehouse operations

Table 4.4 outlines the current warehouse operations of the participating retailers as well as implemented automation solutions. As outlined in the previous section, four retailers were operating at least partly integrated networks. For the retailers operating fully integrated warehouses, there are considerations regarding inventory pooling by using one picking location for each SKU and therefore integrating inventory. Another aspect is if the retailers pick in their stores and thereby leverage that inventory for online orders. Finally, there is a description of current automation solutions operated by the retailers.

The retailers that operate fully integrated warehouses pool their inventory, meaning that one SKU only has one picking location in the warehouse, independent of which channel it shall serve. As the respondent from Elgiganten mentions, inventory pooling improves flexibility, which is especially useful with the growing e-commerce during covid-19. Further, it enables higher utilization of equipment and staff. Both Cervera and Delta highlight that they deploy separate safety stock for e-commerce to ensure that the service levels are not compromised. Beta is, as previously mentioned, not able to integrate their inventory given regulations in the pharmaceutical industry, why the online warehouse is instead replenished by the automated offline part of the warehouse several times a day. For one of Gamma's two integrated "omni-channel DCs", they have an automation solution including AGVs that have a goods-to-person functionality. With this solution, it does not matter if the product is picked from an online or offline shelf since it is delivered to the picker, why it can be seen as a way of integrating inventory. In their second integrated warehouse, Gamma has separated storage areas and picking for the different channels. However, having the same ERP/WMS allows pickers to pick from different areas independent of channels. Gamma has reaped some of the benefits from inventory pooling without integrating their inventory through these theoretical transfers of stock.

Table 4.4 *Warehouse operations of the interviewed retailers*

	Integrated warehouse	Integrated inventory	Order picking in-store	Outsourcing	Automation solution
Alpha	No	No – not possible due to separate network structure	No – need to ensure correct stock levels	Warehousing of one product category outsourced	Cross-dock system, miniload AS/RS
IKEA	No	No – not possible due to separate network structure	Yes – stores are utilized for picking of e-commerce orders. Some stores have separate picking areas	Operations of some warehouses outsourced	Multi-level AS/RS, conveyor belts
Beta	No (but same physical building)	No – not possible due to separate network structure	Yes – personnel pick click & collect and express home deliveries in pharmacies	Offline warehouse outsourced	Schäfer's WAMAS
Cervera	Yes	Yes	Yes – also pick for shipping to other stores	All warehouse operations outsourced	Will build an AutoStore
Elgiganten	Yes	Yes	Yes	Only outsourcing of delivery hubs (some operated in-house)	Multi-level AS/RS
Gamma	Two omni DCs	In one warehouse	In one market, needs new systems to do it in more	Some warehouses in Europe and US outsourced	Multi-level AS/RS, AGVs, pocket sorter
Delta	Yes	Yes	Yes – especially for same-day home delivery	Outsourced to a 3PL for some import goods	Paternoster lifts

No retailer integrates picking in the sense that one picker picks orders for multiple channels simultaneously. Delta, one of the retailers deploying pooled inventory, has different picking staff picking orders for the different channels. The respondent argues that this contributes to a sense of ownership over the process, internal competence development, and a willingness to improve the processes. As discussed in the literature review, it is hard to integrate picking activities given the different order sizes and equipment requirements for the two channels, which several respondents also highlighted during the interviews. IKEA, which deploys a separate network, only handles full pallets or multi-packs in their central DCs, while CDCs and CPUs perform piece picking. Contrary to many other retailers, IKEA has large stores that they can utilize as warehouses and delivery hubs, in some cases replacing CDCs and CPUs. Some of the stores have separate picking areas, blurring the lines between store and warehouse.

Five of seven retailers pick online orders in-store, in the literature referred to as click & reserve. Some of these retailers use stores as OFCs, from where customer orders are picked and shipped directly to customer or for pick up at another store. Some retailers want to pick from stores to increase stock turnover, and some think it is a cumbersome but necessary process. Cervera picks online orders in-store instead of shipping the order from their DC if the product has been stocked in-store for a longer time than in the DC to increase stock turnover. The two fashion retailers do not yet have systems supporting this operation, at least on a large scale. The respondent from Alpha highlights that correct stock levels and real-time data need to be ensured

to pick in-store, requiring RFID or similar technology. Gamma, the other fashion retailer, has motivated RFID tags on goods down to a price point of 50 SEK. Accurate stock levels also rely on the process of stocktaking, as mentioned by two retailers.

All retailers have at least one warehouse outsourced. Many decide to outsource since there exist competent LSPs who can operate more efficiently. However, retailers are increasingly pressured to make logistics and SCM a core competence, which has never been a requirement to be a retailer. The respondent from Cervera explains that the advantage of outsourcing their central warehouse is that they avoid the problems and difficulties with warehouse operations. However, the disadvantage is that they have limited influence on decisions regarding packaging and other matters. This is a significant challenge when pursuing an omni-channel strategy since the objective is to give the customer the same experience in-store as online. When purchasing online, the only physical touchpoint the customer has with Cervera is opening the package. Then, the overall impression must be impeccable. It is challenging to make demands on these detailed packaging aspects when Cervera personnel are not working there. However, they have decided to build an AutoStore, a goods-to-person multi-level AS/RS, which is the only way going, forward according to the respondent. A significant advantage with this decision is individual goods picking, which is not possible today.

Six out of seven retailers have some automation solutions in their warehouses, with multi-level AS/RS being the most common. Automation is necessary for cost-efficient operations, especially with the increasing e-commerce and thereby piece picking operations. Being a fashion retailer, Gamma consequently experiences a relatively high return flow. Therefore, they have installed pocket sorters, a dynamic storing solution with hanging pockets fitting small and light SKUs, in some warehouses. One advantage of pocket sorters is that they make the put-away process of incoming returns, which usually is a cumbersome process, much more efficient. Beta explained that the implementation of their automation solution supported the introduction of more SKUs.

In summary, the online and offline channels have contrasting requirements in terms of warehouse operations. Although it is hard to integrate warehouse processes completely, integrated inventory is argued to increase flexibility and enable better capacity utilization of both equipment and staff and be one of the main benefits of operating omni-channel logistics. Automation solutions are often required to make these processes cost-efficient, which partly relies on accurate data. Real-time data is also an enabler of utilizing the physical store to pick online orders, something most retailers do today.

4.3.3 Resource and capacity management

Alpha, Beta, and Delta mention seasonality as a logistical challenge within omni-channel retailing. Besides significant variations over the year, many e-commerce orders are placed during the weekend. This results in peaks in picking operations at the start of the week since warehouse opening hours are often not adapted for e-commerce and are closed during weekends. Other seasonality includes much e-commerce during December and peaks from Black Friday/Black Week campaigns, especially for home appliance actors. Previously, e-commerce did not have an enormous impact, as the respondent from IKEA mentions. Today, however, a campaign on a popular product or category will create a demand peak, disrupt the capacity in the supply chain, and impact lead times. These demand peaks require a lot of resources and capacity.

The actors interviewed take different leveling measures to ensure sufficient capacity and not compromise service levels during such demand peaks. Alpha has outsourced warehousing for one product category that is highly seasonal to an LSP, eliminating the capacity issues from their operations. The same retailer uses temporary staff in operations, such as picking, to handle peaks during campaigns or other disruptions, such as covid-19. With an integrated warehouse, Delta utilizes a dynamic picking force, meaning that pickers can pick for both channels, not be reliant on temporary staff during peaks. Cross-functional work between purchasing, sales, and logistics is required to free up capacity and prepare for campaigns and other demand peaks. Such activities are often referred to as sales and operations planning (S&OP).

Several retailers mention that previously, order policies were more straightforward and manual than they are today. Store managers either created manual orders or used a simple order policy with a reorder point for replenishment, often resulting in late replenishments. Many retailers mention that they today have automated this process with sophisticated forecasting tools that replenish more proactively. With growing e-commerce, accurate forecasting is more complex and crucial than ever to achieve short lead times. The respondent from Gamma mentions that with the increased e-commerce during the pandemic, they experienced up to 20 days lead time for some customer orders. As one respondent puts it: “more sales channels and many markets put large requirements on planning and allocation, which has to be increasingly driven by data analysis mitigate risks”.

In summary, sales within the retail sector are primarily driven by campaigns and promotions. In combination with the growing and uncertain online sales, this constitutes a challenge for retailers in the omni-channel context. Measures for forecasting and handling demand peaks to ensure availability for customers without compromising lead times or internal efficiency need to be in place.

4.3.4 Last-mile delivery

Table 4.5 depicts the fulfillment options currently utilized by the interviewed retailers. Retail store as the source of distribution refers to whether an order can be picked in the store and shipped to the customer (parcel station, box delivery, or home delivery). Retail store as a destination refers to whether click & collect orders are shipped from DC to retail store for pick-up. DC and OFC are not included as a distribution source in the table since all retailers naturally ship from those nodes. Supplier as a distribution source refers to dropshipments, where customer orders are fulfilled directly by suppliers and shipped to the customer’s chosen destination.

Table 4.5 *Sources and destinations of distribution for the interviewed retailers*

	Distribution source		**Destination source**			
	Retail store	**Supplier**	**Parcel station**	**Box delivery**	**Home delivery**	**Retail store**
Alpha	No	No	Yes	Yes	Yes	Yes
IKEA	Yes – to various extents depending on store	For specific product categories (custom-made countertops, posters, etc.)	Not for all products (heavy/bulky items)	Not for all products (heavy/bulky) and regions	Yes – to curb, to door, inside home, etc. Express option exists	No – pick-up at store only fulfilled from store inventory
Beta	Yes – especially used for same-day home deliveries	No	Yes	Yes	Yes – to mailbox and to door. Express option exists	Yes
Cervera	Yes	Yes – with selected suppliers. Plan to add another 20 suppliers to this option	Yes	Yes – boxes in around ten of their own stores	Yes	Yes
Elgiganten	Yes – small amount of e-commerce orders shipped from store	Yes – with several suppliers	Not for all products (heavy/bulky items)	No	Yes – inside home-delivery for products > 35 kg and installation. Express option exists	Yes
Gamma	No	No	Yes	Yes	Yes – express option exists	Yes
Delta	Yes – especially used for same-day home deliveries	No	Yes	Yes	Yes	Yes

As mentioned, all retailers ship from their DCs, and five retailers, IKEA, Beta, Cervera, Elgiganten, and Delta, can ship online orders from store inventory. Cervera and Elgiganten both use dropshipments as a means of widening their assortment without carrying the products in-house. IKEA uses this for certain product categories, for example custom-made countertops. Several other retailers also highlight that they are looking into this solution for the future. One of the retailers mentions that this is especially interesting for capital-intensive products. In this collaboration, the retailer must send sales forecasts to the supplier and the supplier inventory levels to the retailer. Several retailers claim that one should only use dropshipments with trusted suppliers, where data quality and accuracy on inventory levels are high. Otherwise, there is a risk of expensive lost sales for the retailer. One of Cervera's challenges with dropshipments is that they cannot use branded boxes and tape on the parcels sent from the supplier, hindering the seamless experience for the customer. The giant e-tailer, Epsilon, also has many

dropshipments collaborations. Considering their leverage in volume and relations, they have managed to secure Epsilon-branded boxes and tape for their dropshipments.

Omni-channel puts much pressure on delivery options and requires multiple couriers, as several retailers mention. “It would be much easier for the retailers if customers settled for only parcel station delivery”, one respondent states. Whether retailers can offer customers same-day home delivery depends on whether the couriers offer that as a service. Four retailers currently have express home delivery options available. All retailers use many different couriers, often a combination of LSPs and specialized last-mile delivery actors, to provide the variety of options demanded by customers. Moreover, the couriers differ depending on the market, as the respondent from Alpha highlights. In one European country, they introduced the national postal service as a delivery option, which increased sales since the customers in that country were more comfortable with a delivery option they recognized. IKEA has invested in in-house electrified fleets for last-mile delivery, as has the e-tailer Epsilon through a strategic partnership with an automotive manufacturer.

In addition to the classic options of parcel station pick-up and home delivery, which all retailers offer, six of seven offer box delivery through, for example, Instabox. Parcel station and box delivery is not possible for the bulky products in Elgiganten’s and IKEA’s assortment. One retailer mentions that home deliveries have increased in popularity compared to click & collect due to the pandemic. Beta and Delta, which offer same-day delivery for home deliveries, use their stores to ship to customers. Besides an increased number of delivery options, there is an increasing expectation of higher delivery precision and shorter delivery windows, as mentioned by several respondents. Epsilon thinks that the customer should choose a time slot for home delivery, even if it is 10 a.m. – 11 a.m. on a Saturday. Would the customer not be home, the courier should be able to leave the parcel at the neighbor, in the garden, inside the house, and so on.

Regarding delivery fees, most retailers offer free delivery if a certain price level is reached. These limits range from 99 SEK to 499 SEK, depending on the industry. For some actors, additional services affect the delivery cost. For instance, both IKEA and Elgiganten charge more if customers want their bulky products carried into their homes. Most retailers have a delivery lead time of two to four days, and most offer variations of express delivery options, often to a higher cost. However, two retailers who are only present on the Swedish market, Beta and Delta, can deliver most e-commerce orders within one day. The respondent from Delta explains that they can reach 70 % of the Swedish population with same-day delivery, mainly by shipping orders from the retail stores. However, as one retailer mentions, campaigns and other promotions can affect lead times. Another retailer also states that customer expectations on lead times differ depending on the market.

In summary, all retailers naturally use their DCs as a source of distribution. However, shipping from stores and dropshipments is used to varying degrees. All retailers offer home delivery, and six offer delivery to store. A clear majority offer delivery to parcel stations and box deliveries. IKEA and Elgiganten naturally cannot offer delivery to parcel stations and boxes for bulky products. The set-up regarding fees and lead time for deliveries are scattered among the retailers as some choose to price freight very close to the actual cost of it, and some offer cheaper or even free freight. Some retailers offer express alternatives, often to a higher price, and some even leverage their store inventory to reach the customers the same day.

4.3.5 Returns management

All retailers offer both returns in-store and by post. Returning products in-store is free while some retailers charge the customer for returning by post, why returning in-store is the most common choice of return node. The e-tailer has taken this one step further, offering their customers to return products in their parcel stations and boxes. Alpha and Gamma, the two fashion retailers, experience a much larger return flow than other retail segments, although Alpha claims to have few returns compared to the rest of the industry. As an extreme, Gamma has a return rate of approximately 25 % in the German market, where customers on average order 6.5 pieces per order. As previously mentioned, Gamma has installed automized pocket sorters in some of their warehouses to cope with the return flow efficiently. Epsilon also experiences return rates of up to 50 % on their clothing items. The rest of the case companies only experience a couple of percentage points in return flows.

With stores being the most common node of returns, most retailers process and try to resell the products in-store since they do not want to ship back a tiny flow of goods to a central DC. Alpha highlights that even if a customer sends returns by post, the package is sent to the closest store for processing. Cervera, as previously mentioned, has an omni-initiative that leverages their store inventory for fulfilling click & collect orders at other stores. That way, if an expensive and hard-selling product is returned to a store where it might not be sold, it can be sold elsewhere instead. IKEA reuses some returns as spare parts in the stores. Delta mentions that their DC does receive returns from stores if the item is broken or when the stores have not managed to sell items from a campaign. However, the campaign flow is easily managed since the return flow from many stores is consolidated centrally. The returns management process is more complex for bulky products such as the ones IKEA is selling. Although it is a high cost to pick up returns at customer's homes, it is a necessary offering since customers demand convenience.

Some respondents discuss specific measures taken to minimize product returns. Delta scans online orders just before packing to ensure the right SKUs and the correct quantity, while Alpha has developed standardized fits for some products so that recurring customers can be sure of their size. Epsilon takes a more data-driven approach than the omni-channel retailers towards understanding root causes and thereby minimizing returns. For clothes, they discuss using AR technology to get suggestions on the correct sizes to minimize the number of products customers order in the first place. Epsilon works with ML solutions for damaged goods and tries to forecast what products will be damaged during transportation, allowing warehouse workers to pack those more carefully.

In summary, the challenges posed by returns management differ from retail segment to retail segment. Fashion has a significant return flow compared to other retail segments, so the focus needs to be on minimizing returns and the number of items of the same SKU that customers buy. For IKEA, Elgiganten, and other actors with bulky products, the reverse logistics flow needs to be efficient and processes for handling costly returns in place. Moreover, the entire retail sector needs to take a more data-driven approach towards returns management, as demonstrated by the more technologically mature e-tailer Epsilon.

4.3.6 Information technology and information systems in logistics

One retailer mentions that "the single most significant investment linked to omni-channel is information systems to enable omni". This is supported by several retailers who emphasize that it is critical to have traceability and real-time stock balances, which are enabled through smartly integrated IS. Gamma has been through a long transformation journey in replacing IS, and the respondent explains that it has been, and still is, incredibly challenging. One explanation for this is that a lot of change management resources need to be involved when changing systems in a vast organization fulfilling several markets. Several respondents support this and mention that one challenging aspect is that IS are often built robust and static. This hinders customization and adaptation over time, which in the omni-channel context is critical to meet the new customer demand and behavior more flexibly. The system landscapes are generally complex, why it is hard for retailers to integrate their systems efficiently. Some retailers have chosen to outsource some parts of their IT functions and instead focuses on having project management and requirements specifications in-house. On the other hand, one of the retailers has reorganized to make IT a more integral part of their business development. Almost all business development initiatives need IT support, and they have experienced tremendous benefits from merging these two previously separated functions.

"Good master data management is critical to be seamless across channels and products", as one retailer states. Especially when it comes to e-commerce, a correct stock balance is necessary to say whether the item can be delivered or not. What is considered real-time data differs among respondents. While some have updates in the system every ten minutes, others rely on less than daily stocktaking. Often, an order management system is used for keeping track of orders and inventory balances. This system should ideally be integrated for the online and offline channels. Cervera mentions that all system integrations are API-driven in real-time, which is necessary. Epsilon has an extensive AI system that handles customer orders, which takes many different factors into account before deciding in which warehouses the order should be picked. The system supports real-time decision-making, such as adding warehouse personnel to meet customer promises on lead times. For some retail segments, it might also be easier to reach frequent updates if they, for example, have larger items and thereby fewer items per square meter in-store and in the warehouse and a lower stock turnover. Real-time data must be supported by technologies such as RFID. IKEA has successfully piloted drones for stocktaking to reach more frequent updates and will continue to roll it out.

4.3.7 Challenges

Concluding the past chapters, we wanted to summarize some vital omni-channel logistics challenges mentioned by the retailers. In our interviews, we asked them to mention the major challenges associated with omni-channel logistics today. We have divided the mentioned challenges into three themes; flexibility, cost-efficiency and complexity, and digitalization, including IS integration and real-time data, see Figure 4.3. These are challenges mentioned directly related to logistics, but of course, there are more challenges. For instance, the challenge of performing large-scale transformations will be discussed in chapter 4.4.1.

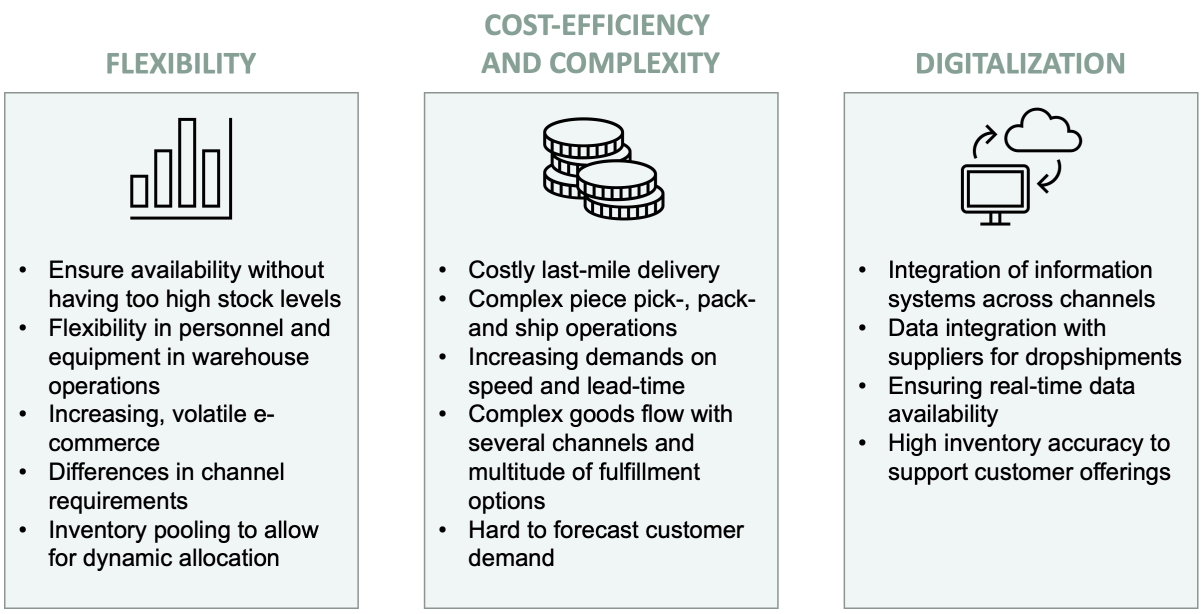


Figure 4.3 *Challenges related to omni-channel logistics*

Firstly, flexibility in the back-end logistics is mentioned by five retailers as a crucial challenge when operating multiple channels, both of those who operate integrated and separate structures. Flexibility is often mentioned in connection to warehouse operations. The challenge is to ensure the availability of products without having too high stock levels, something that requires accurate forecasts and high delivery precision. Balancing flows between channels with growing e-commerce requires flexibility in equipment and personnel. Being an omni-channel retailer, as mentioned by many retailers, means making all stock available for customers independent of the channel. How to deal with differences in channel requirements effectively is a tough challenge. Most retailers also mention that they might have to increase storage in retail stores if click & collect as a service continues to grow, thereby transferring some warehouse operations to the stores. A first step towards overcoming the challenge and creating flexibility is operating integrated inventory, thus pooling inventory. Further, it is mentioned that flexible equipment and automation solutions are required to handle the varying needs of both channels.

Automation is also mentioned as the only option going forward concerning another challenge, namely making the entire omni-channel logistics more efficient and productive. With increasing e-commerce, complex and costly operations such as last-mile delivery and OFC picking increases, further putting pressure on already slim margins. Speed and lead times are continuously expected to be faster and shorter. Consequently, four retailers mention cost-efficiency as a significant challenge for omni-channel logistics. The respondent from Elgiganten mentions that they strive for efficiency at the individual nodes. However, it is just as essential to have the flexibility to run goods flows the optimal route through the supply chain, which will be the most cost-efficient. The inherent complexity of an omni-channel network with multiple channels and markets inevitably makes the flow of goods and supply chain design a complex task. This fact points towards the increasing need for data-driven planning. Nevertheless, it is complex to forecast customer demand, and even more so the future customer needs and wants, which swiftly can make strategies obsolete. With complexity also comes costs. The respondent from PostNord states that fulfillment from stores is a costly operation and highlights that multiple stocking locations drive increased cost of capital.

With the complex omni-channel logistics, integration of IT systems across channels is critical for making stock available to customers, which is a challenge for many retailers. This aspect is further complicated by logistics solutions such as dropshipments, which require additional integration of data with suppliers. More customer offerings than ever require real-time data in back-end fulfillment. Correct and frequently updated stock balances are, among other things, a prerequisite for fulfillment from store and for allowing customers to reserve store stock. PostNord argues that retailers often can account for the stock balance in the entire supply chain but do not know exactly where products are. According to the LSP respondent, some retailers might be down to 60 – 70 % inventory accuracy, while those performing well are above 90 %. This implies that the retailers with the best data quality still cannot account for 10 % of their inventory. Retailers especially struggle with keeping track of stock in-store. The two home appliance retailers, Elgiganten and Delta, do not mention this as a challenge. This challenge is partly a data problem driven by growing e-commerce and increasing amounts of available customer data. The respondent from Gamma mentions that the amount of data required to have a real-time assortment is incomprehensibly large since they introduce more than 60 000 SKUs each year, and a report for all SKUs in-store in one market amounts to several gigabytes. This requires enormous processing power and is hard to automate. Generally, there are many SKUs in small quantities in fashion, making data availability a complex endeavor.

In summary, navigating omni-channel logistics is a complex task, and challenges arise from it. These challenges were mentioned by the retailers and could indicate what the industry in total experiences. These challenges will work as input to our analysis in chapter 5.

4.4 Competencies within omni-channel logistics

In this chapter, we will summarize what the retailers had to say about competencies within omni-channel logistics. We have structured the results based on the conceptual framework. First, organizational capabilities will be brought up as they result from several competencies in various departments. On that basis, we will go through SCM competencies, foundational competencies, and supporting functional competencies, the three main pillars in the conceptual framework. Appendix C outlines the different competence areas, examples of competencies within each area, and what competencies retailers referred to as essential to provide an overview of the results. It is to be noted that the interviews used a semi-structured approach, and the retailers were not given competencies to choose from during the interviews. The interviewees instead pointed out competencies that they considered important according to their perception of market trends and challenges. Lastly, this chapter will outline how the case companies view competence provision regarding recruitment, competence development, and outsourcing of competencies, respectively.

4.4.1 Organizational capabilities

As mentioned in the literature review under chapter 2.3.2, competencies bundled together can create organizational capabilities. According to the interviewed retailers, organizational capabilities critical to succeed with omni-channel retailing and logistics can be the ability to work cross-functionally, collaborate across the supply chain, and design and perform transformations. Driving cross-functional projects is a critical capability to offer a seamless customer offering since competencies from many various departments are needed. For instance, Alpha runs a cross-functional omni-initiative aiming to create a uniform packaging that works in all channels, optimizing the suppliers' product packaging to be maintained throughout the entire supply chain. Performing this initiative, they must have representatives from procurement, logistics, sales, production, and sustainability departments to cover competencies from the entire supply chain. In addition, they also need to collaborate with other actors within their supply chain. It would not be possible to meet all different requirements from different channels without collaboration across the supply chain. One retailer mentions that their project management office is responsible for managing all cross-functional projects. The respondent from Gamma mentions that organizational theory for a long time has emphasized that one should move away from working in silos towards working in end-to-end supply chains, but Gamma has not acted upon that until recently. Among the new actions towards working end-to-end is the new strategic department of the respondent, Supply Chain Center of Excellence.

Another essential organizational capability is the ability to design and perform transformations fast. Most retailers state that they today rely on external competencies, such as management consultancies, for strategy and supply chain design decisions. The respondent from PostNord explains that the logistics requirements today are much more complex than in the past. Then, one could pick up boxes from a shipper, distribute and deliver. The complexity increases exponentially when transitioning into an omni-channel universe. Understanding that complexity, what factors drives cost and what solutions are viable is crucial to get the right set-up in transformations. Delta's respondent agrees and states that if they are to establish a new DC or move their DC in the future, they need to understand the vision three to five years ahead. Before dimensioning a warehouse, the purpose must be defined; should they offer the fastest deliveries in the industry, have the broadest delivery offering, or something else? That depends on the strategic viewpoint of e-commerce, looking many years ahead. In those analyses, they

will probably need external help, even though that competence could be recruited, since it will be a much faster solution. A further complication is that omni-channel retailing is developing so quickly that long-term plans and visions are often made obsolete before they are finished and executed. A very recent example is the explosion of e-commerce volumes with the covid-19 pandemic, which disrupted many retailers' plans.

In contrast to this, Epsilon does not have any weaknesses in terms of data analysis capabilities. They rather struggle with keeping up with the physical changes. They must build ten large warehouses with 3 000 employees in Europe in ten months. For them, the bottleneck is physical growth. The respondent from Gamma also touches upon this and claims that all industries with a flow of goods generally need to be more proficient in doing big and complex things quicker, to be faster at executing. It is no longer viable to have a 5-year cycle for a new warehouse, at least not within retail, since the technology may be outdated, or the market may look completely different before the transformation is done. Gamma is currently executing on the strategy that resulted from a management consultancy project and is building competencies to have the organizational capability to investigate such major strategic decisions themselves in the future through their Supply Chain Center of Excellence.

The respondent from Implement explains why it is so hard for retailers to execute transformations fast without external support. While retailers and other companies go through significant transformations, perhaps once every five years, management consultants have the advantage of going through five to ten of those in a year. Through this, consultants have a better idea of the common pitfalls of transformations and what to do to succeed. They also have more experience in how to get from intent to design and what works in this process. In one of the first projects where the respondent went into depth on this topic, they spent three months mapping the customer journey. In the latest project, the same mapping took around two weeks. Consultants bring knowledge of the market and on "what good looks like" into the equation.

In summary, the organizational capabilities omni-channel retailers need to possess are many, but some mention collaborating across functions, supply chains, and designing and performing transformations.

4.4.2 Supply chain management competencies

Throughout the rest of the empirics, if three or more retailers mentioned the competence, the text is bold, and the boxes are colored light gray to mark it as important. Finally, the supporting actors' perceptions will be discussed when they emphasized a competence, and the e-tailer's perception will be used as a benchmark. Table 4.6 below outlines the SCM competencies, divided into SCM knowledge areas and applied SCM analysis, which were highlighted as important by respondents during the interviews. SCM knowledge areas are related to expertise within specific elements, including supply chain management and operational warehousing knowledge, while applied SCM analysis deals with converting and applying this knowledge to decisions and processes. As the competencies related to applied SCM analysis mentioned during the interviews were relatively few, this chapter will discuss the two competence areas interchangeably. Since supply chain management competencies span from strategic to tactical to operational, this will be used as a chronology to present the results, starting with the more strategic and ending with the more operational.

Table 4.6 *Supply chain management competencies important in omni-channel, as highlighted during the interviews*

Supply chain management competencies			
SCM knowledge areas		**Applied SCM analysis**	
Competencies	**Respondent**	**Competencies**	**Respondent**
Supply chain management	IKEA Elgiganten PostNord	Forecasting	Cervera PostNord
Net working capital	Cervera	**Facility location / network configuration analysis**	Elgiganten Delta Epsilon
SME within some area	Beta	Tactical planning and scheduling	Elgiganten
E-commerce	Delta		
Product development	Epsilon		
Operational warehousing knowledge	Alpha Cervera Delta		
Process management expertise (Lean and Six Sigma)	Epsilon		

The right competencies must be in place to build up the capability of investigating major strategic issues such as large-scale transformations. In connection to omni-channel supply chain management expertise, three respondents highlight network design as a critical competence in an omni-channel context. Building and configuring a logistics network is a complicated question, and one respondent emphasizes that both supply chain expertise and experience are required to understand what nodes are needed and where these nodes should be placed. The supply chain network needs to be configured based on the main drivers in terms of customer requirements. As presented in the previous chapter, strategic projects such as reconfiguring a network or dimensioning new DCs are important but challenging from an organizational capabilities' perspective. This capability, among other things, requires SCM expertise competencies. One of the most critical skills on the strategic level is understanding the entire goods flow, trade-offs in the supply chain, e-commerce implications, net working

capital, and how to integrate the flow of goods with other players on the market. Experience from large transformation projects is mentioned by both Elgiganten and Implement as crucial in this aspect. Beta also mentions that having an SME within some SCM area is attractive.

The strategic plans need to be converted into decisions to determine what efficiency measures should be used in terms of, for example, automation. This requires collaboration and leveraging of different competencies. Breaking down strategic plans to daily operations requires competencies within tactical planning to decide, for example, the number of delivery days to the respective store or lead times to store. Operating multiple, integrated channels has changed logistics from only being about picking up and delivering parcels. This puts pressure on retailers developing expertise competencies within inventory deployment, forecasting, and multiple fulfillment methods. Forecasting models and competencies within this area are highlighted as becoming more and more critical in the future by two respondents due to the volatile, changing customer demand. Epsilon, who has come further in the digital journey, states that product development and process management expertise are important competencies. For instance, product development competencies could be needed when developing new technical solutions such as AR services for end-consumers. Also, process management expertise like Lean and Six Sigma could be beneficial to implement in most processes relating to omni-channel logistics.

On an operational level, retailers need to deliver to the proper precision at the correct cost. This requires skilled blue-collar workers who understand both channels' requirements and a competent site manager, something that Alpha, Cervera, and Delta highlight. However, managers also need to have operational warehousing knowledge to understand what processes are feasible to revise or implement.

4.4.3 Foundational competencies

This chapter will summarize what foundational competencies the interviewed retailers find critical for their omni-channel logistics work. Two areas are included in foundational competencies; behavioral and generic competencies and academic foundation. Behavioral and generic competencies refer to inter-/intra-personal skills, leadership, project management, collaboration skills, problem-solving, and communication. On the other hand, academic foundation includes basic SCM knowledge and data analysis, competencies which are accumulated mainly through education. Table 4.7 below outlines the foundational competencies, divided into behavioral and generic competencies and academic foundation, highlighted as important by respondents during the interviews.

Table 4.7 *Foundational competencies important in omni-channel, as highlighted during the interviews*

Foundational competencies			
Behavioral and generic competencies		**Academic foundation**	
Competencies	**Respondent**	**Competencies**	**Respondent**
Leadership (engagement and motivation building)	IKEA Elgiganten Delta Gamma	**Supply chain fundamentals**	IKEA Delta Gamma
Analytical ability and numerical skills	Alpha Beta Cervera IKEA Implement Epsilon	**Data analysis**	Alpha Beta IKEA Cervera Delta Gamma Epsilon Implement
Self-leadership	Alpha		
Agile mindset/work	Beta IKEA Cervera		
Project management	Beta IKEA Epsilon Cervera		
Communication and rhetorical skills	Cervera		
Supply chain collaboration	Alpha Cervera Delta		
Cross-functional collaboration	Alpha Cervera Elgiganten		
Structured thinking	Cervera		
Information sharing	Delta		
Problem-solving	Gamma		

Behavioral and generic competencies

Leadership is a vital competence that four different logistics managers highlight as important in developing omni-channel logistics. Since logistics operations and projects generally involve and affect many employees, the respondent from Elgiganten argues that leadership, engagement, and motivation building are significant aspects; "it is about getting existing competencies to pull in the same direction". Managers should develop their co-workers and ideally pass on their role when they quit, as Delta's respondent puts it. This is also a way of ensuring that competencies and "know-how" are sustained within the company. The same respondent argues that inclusive leadership is crucial to achieving this. Being transparent, sharing information, and delegating to make co-workers feel involved and develop are mentioned as critical components of this type of leadership. Another aspect of leadership is self-leadership, which Alpha stated as important to support continuous development and progress.

Closely interlinked with leadership is project management, which four retailers mention as key given that much of their daily work today revolves around projects. Consequently, all retail respondents highlight leadership or project management as a critical competence to succeed with omni-channel retailing and logistics. Beta, IKEA, and Cervera further specify this by highlighting that working in agile projects is a foundational competence they want to see in their co-workers and employees. The respondent's team at Cervera almost works as internal consultants, why social, communication, and rhetorical skills are fundamental. They need to confidently deliver and present changes that not all employees might like.

In developing and performing changes, the organization needs to collaborate, which can be strengthened by employees possessing competencies within supply chain and cross-functional collaboration. Alpha and Cervera mentioned both as important, while Delta strengthened supply chain collaboration and Elgiganten emphasized the latter. Finally, more generic competencies like possessing a strong analytical ability and having numerical skills were mentioned by a clear majority of retailers; Alpha, Beta, Cervera and IKEA. In addition, it was strengthened by Epsilon and Implement. Structured thinking and problem-solving are important competencies but were only brought up by one respondent respectively.

Academic foundation

Most retailers assert that basic logistics skills and an academic foundation within supply chain management are almost a prerequisite for working with omni-channel logistics. Delta argues that it is hard for academics to keep up with practice in a fast-paced field as omni-channel. The respondent from Epsilon supports this, saying that what is taught at universities regarding logistics is barely relevant for tech-focused e-commerce players such as themselves. Only one employee out of 25 in the respondent's team has studied pure logistics.

Data analysis is the competence mentioned most frequently by all respondents as crucial in connection to omni-channel logistics. One respondent argues that competencies related to omni-channel logistics have to do with data and data analysis in one way or another: "being data-driven is key to succeeding with omni". In being an omni-channel actor, much more data points are available, and the entire team is dependent on aspects such as data, database management, and SQL, making analysis a critical competence in supporting and making decisions. With the new demand for data mining, the ability to handle a large Excel file is no longer enough. Employees must have the skills and competencies to connect visualization tools such as Power BI and know how to analyze the data. The respondent from Beta agrees, stating that visualizing flows, creating a story around them, seeing trends, and explaining them is the

most critical competence in the fast-changing environment. Moving from data to information to insights is crucial according to Implement as well. Epsilon, who is more mature within technological solutions, is looking for employees who can write Python code, SQL and know software development and data science. The respondent from IKEA emphasizes that they must understand and work with ML and Python solutions but that not all employees have to know how to code in Python. The most important thing is instead to understand the requirement specifications and limitations of the software.

The respondent from Elgiganten points out that analyses, reports, and solutions do not matter if they are not feasible and cannot be implemented in operations and function with operational personnel. Therefore, SCM and process expertise are needed to support data analysis competencies. Consequently, the retailers' opinions differ regarding which degree of data analysis competencies needs to exist in-house. They all agree that it is one of the most important competencies connected with omni-channel logistics and something they will have to secure to be competitive going forward.

4.4.4 Supporting functional competencies

Following SCM competencies and foundational competencies, the third building block of the conceptual framework is supporting functional competencies. These competencies consist of two components, dynamic awareness and technological competencies. Dynamic awareness includes cross-functional awareness like knowledge of the customer offering, sustainability, strategic awareness, industrial experience, and other important aspects for supporting decision-making within logistics. As previously outlined, IT and IS play an integral part in enabling omni-channel logistics, and technological competencies within this area are also grouped as supporting functional competencies. This chapter will present what competencies the interviewees mentioned as especially important within this area. Table 4.8 below outlines the supporting functional competencies highlighted as important by respondents during the interviews.

Table 4.8 *Supporting functional competencies important in omni-channel, as highlighted during the interviews*

Supporting functional competencies			
Dynamic awareness		**Technological competencies**	
Competencies	**Respondent**	**Competencies**	**Respondent**
Logistics experience	Alpha IKEA Cervera Elgiganten Delta Gamma	Information system knowledge	Cervera Elgiganten Gamma
Commercial/customer awareness	Elgiganten Implement Alpha IKEA Cervera Delta	Connecting logistics flows to IT	Alpha Beta Elgiganten Gamma Delta
Industrial awareness/experience	Alpha IKEA Gamma Delta	IoT/AI/ML understanding and knowledge	IKEA PostNord Gamma Epsilon
Sustainability	Beta IKEA Gamma Epsilon	IT knowledge	Cervera Gamma
Holistic perspective	Elgiganten IKEA	Requirement setting	Cervera Elgiganten
Strategic awareness	Elgiganten Delta	WMS expertise	Cervera
Operational awareness	Alpha Elgiganten	Automation understanding	Cervera Elgiganten
Stakeholder management	Epsilon		
Decision making/execution skills	Alpha Gamma Delta Elgiganten		
Performance measurement/evaluation	Cervera		

Dynamic awareness

As mentioned in chapter 4.4.1, cross-functional collaboration and supply chain collaboration are critical organizational capabilities for omni-channel retailers to possess. Hence, it is not sufficient for logisticians to possess logistics-related skills and competencies, but there is a need for dynamic awareness that spans cross-functionally. One example of such competence is the importance of stakeholder management, as Epsilon mentions.

As argued previously, network design and configuration of logistics processes need to be rooted in customer demands and requirements. Therefore, as five retailers and one supporting actor mention, commercial awareness and insights into the customer journey are more critical for people working within omni-channel logistics today than ever before. The respondent from Delta states that customers are the reason why a company exists and that all actions must start with the customer, something that Alpha, IKEA, and Cervera also emphasize. “What happens in the warehouse has a large impact for people working in the stores and vice versa”, one respondent states. Optimizing logistics is not enough, as savings in time somewhere in the supply chain can be lost in-store if the customer is forgotten. Metrics such as inventory cost and inventory turnover rate need to be compromised in favor of service level, the most important measure according to Cervera. Beta argues that the analytical ability to understand changing customer behavior, draw conclusions and act upon it is both a skill and mindset that logisticians must possess. According to Implement, any retailer should ask themselves who will be the dominant customer in the future. “Is it the digital immigrant or the digital native? Most likely, the answer is the latter”. Therefore, digital natives need to be engaged in the decision process, and that competence needs to be brought in if it does not exist internally.

Moreover, creating the right customer offering and adapting back-end logistics to realize front-end solutions requires the ability to work based on prominent market trends, as Beta, Cervera, IKEA, and Delta all point out. This requires both an understanding of the retail industry and a holistic perspective to connect multiple areas. One prominent market trend that several respondents highlight that they need to increase their competencies within is sustainability. Sustainable transportation expertise and knowledge of frameworks around circular economy are two specific competencies highlighted as attractive in this area. Additional competencies within this theme are the ability to optimize logistics for speed and reduced carbon emissions. Beta, Gamma, and Epsilon all highlight that sustainable growth is high on their agenda.

The respondents from Delta and Gamma argue that experience is equally important as an academic foundation and that one acquires substantial knowledge working with real cases and networking with suppliers, couriers, and other actors. This is supported by several actors, among them Elgiganten, where the respondent states that “a majority of knowledge is assimilated through experience”. Six different respondents mention the importance of logistics experience, with four of them also highlighting the importance of industrial awareness and expertise. Closely related is operational awareness, as it is vital for the people tackling strategic decisions to have operational insight, for example, into picking and packing operations to ensure the feasibility of suggested solutions. At Alpha, all personnel should spend two days each year in-store to gain that experience.

Besides the experience and operational awareness, tackling strategic decisions naturally requires strategic awareness, as highlighted by Elgiganten and Delta. Strategic awareness refers to the ability to develop and understand strategic, long-term plans. Moreover, Alpha, Gamma, Elgiganten, and Delta mention having decision-making/execution skills as a competence necessary concerning setting a strategic direction for the business. This competence is also

essential for logistics and making sure strategic plans are acted upon and plans are converted to decisions and implemented in operations.

Technological competencies

According to the respondent from Gamma, with IS and IT playing an integral role in enabling omni-channel retailing, an "excellent understanding of IT is a critical competence". It is necessary to understand limitations in the interface, and what the processes look like in IT systems, why connecting logistics flows to IT was a competence mentioned either directly or indirectly by five respondents. The respondent from Gamma talks about this as a dividing line. If one does not have that competence, the dialogues stay theoretical, talking about safety stock and reorder points. This is supported by the respondent from Elgiganten, who argues that IT knowledge is crucial in transferring theoretical thoughts to practice and connecting logistics flows. Further, the respondent outlines that competencies within system integration are essential in facilitating the process from customer order to delivery, as this is key in ensuring data availability and service levels, as previously mentioned. Even if IT systems are not managed in-house, as is the case for Cervera, competencies within requirement specifications are critical to achieving better system integration.

The respondent from PostNord believes that as robots and co-bots are getting cheaper, their usage will be more widespread, and logistics will see the same industrialization as manufacturing has done. For this reason, they are focusing on acquiring competencies within robots, robotics, co-bots, IoT, AI, ML, and analytics to a more significant extent to support retailers in this journey shortly. Understanding and having knowledge of areas such as AI and ML was also mentioned to be important by IKEA, Gamma, and Epsilon. As is the case for many IT functions, outsourcing is often deployed when it comes to implementing an automation solution, as these competencies do not exist in-house, and automation suppliers have excellent expertise within this area. However, both Cervera and Elgiganten highlight the importance of having a basic automation understanding. This will help retailers set the correct requirement of suppliers and customize automation solutions over time and make sure they cater to their specific needs. Concerning automation and warehousing, the respondent from Cervera states that having WMS expertise is a prerequisite for having warehousing operations in-house.

4.4.5 Recruitment

When asking the retailers what profiles they are searching for when recruiting for roles related to omni-channel logistics, they generally pursue holistic profiles with a broad set of competencies and analytical skills. One retailer had a name for them: “skilled generalists”. Although expertise is not expected, some basic SCM knowledge, such as an academic foundation in the field, is important. What differs is that one retailer mentions that they focus on values rather than competencies. They believe that a person with the right profile in terms of values and mindset can learn anything. Their value agenda includes entrepreneurial spirit, continuous improvements mindset, and cost-consciousness, to mention some. Alpha is also interested in profiles with the right attitude and self-leadership, and Beta is another retailer mentioning continuous improvement mindset as necessary. Generally, a common theme the retailers seek is project management and experience in working in agile projects. Delta lifts another aspect and mentions that location previously was an important aspect in attracting competencies, which they believe is not as important today with the increased digitalization and opportunities to work remotely.

The inherent complexity of omni-channel retailing and logistics means that retail companies having their warehouses in-house require competent warehouse personnel. If they have automated large parts of the warehouse, they need a more significant part of the workforce to be engineers. Both situations force the employer to make those roles attractive. Another result of digitalization and shifts in the retail context is that fewer administrative roles are left, and more data scientist roles emerge. Delta has become better at filling the need for data mining competencies through recruitment but sees a need for people working exclusively with data mining on the e-commerce side in the future. More specifically, many retailers mention that they actively seek external competencies within AI, ML, advanced analytics, and data science. This results from the continuous rise of big data, digitalization, and the decrease of administrative roles.

Epsilon is generally seeking a more diverse employee group to gain different perspectives and competencies from people from different backgrounds, which they believe will support their global expansion and growing footprint. More specifically, in more strategic roles, they only want people with experience within e-commerce and logistics. Specific competencies are recruited externally through headhunting, for example, hiring a partner from a management consultancy with extensive experience from AI within the automotive industry to make their last-mile delivery even smarter. They previously lacked experience within process development methods, like Lean and Six Sigma, why they recently recruited people with this competence, especially from the automotive industry.

The respondent from Implement claims that retail companies will have to acquire and recruit competencies to rethink large parts of their business models. Also, it will not be enough only to be good with data or have a great commercial mindset. Retailers will need to recruit people who have competencies and are familiar with working in going from data to information to insights. This strengthens the retailers claimed demand for people with strong analytical capabilities and a holistic foundation.

4.4.6 Competence development

Historically, retailers have mainly educated their personnel in sales and customer management. For example, Delta has an education program for all sales personnel focused on product, assortment, and customer service. They also have leadership educations, both internal and external, for managers. This is consistent with the state at Elgiganten, which recently started a leadership program. They also have educations within project management. Cervera's respondent believes they can improve their endeavors within competence development, and ideally, they would have an individual plan with relevant educations for each employee. Some retailers mention they purchase specific educations for employees on a case-to-case basis.

IKEA mentions that they do not have any specific omni-channel competence development, but do have ongoing competence development within forecasting, needs calculations, and other areas important in the omni-channel logistics context. They also continuously work with developing core competencies such as a basic understanding of AI.

Gamma has some competence development within software development in their department consisting of business development and IT. However, the respondent admits they have not invested that much in internal competence development. In general, the respondent thinks it is not a common thing to do in the industry. Instead, Gamma works with recruitment to acquire skills and competencies. This is strengthened by Epsilon's respondent, who states that a high churn rate and growth in combination necessitates recruitment rather than merely focusing on internal competence development.

There is a discrepancy between respondents as to whether new skills should be developed or recruited. Implement's respondent states that retailers are willing to pay for advice, but the price point on the markets is too low for management consultancies to compete at when it comes to training programs. At the same time, the players who do compete at those prices do not have the same strategic understanding of contemporary events. This could be a reason for the lack of appropriate competence development.

4.4.7 Outsourcing of competencies

Not all competencies related to omni-channel logistics are kept in-house, and outsourcing non-core competencies is a well-known phenomenon in the industry. To capture this aspect, we interviewed supporting actors, both an LSP and a management consultancy firm, and asked the retailers what competencies they outsource and perceive as non-critical to have in-house.

All retailers outsource transportation and most of the last-mile delivery to LSPs and last-mile specialized couriers. As PostNord mentions, all sorting and distribution require technology, machinery, and automation, making them capital-intensive operations. Commonly, retailers want to focus on optimizing their storage, the picking and packing operations, and the overall efficiency in the fulfillment center, why they outsource the delivery part to actors such as PostNord. According to the PostNord respondent, scale advantages are required to have distribution in-house. IKEA and Epsilon have started to have some last-mile delivery in-house, and Gamma operates some transshipments between DCs in one market. Another logistical process that all retailers outsource to some extent is warehouse operations. While most retailers only outsource warehouse operations for specific product categories, particular markets, or smaller delivery hubs, Beta and Cervera have outsourced to a more significant extent. An LSP runs Beta's offline warehouse, while Cervera has an LSP handling their entire central warehouse.

Although IS knowledge and IT understanding are competencies highlighted as critical in the previous chapter, it is common to outsource the implementation of IS and the development of e-commerce platforms, apps, and other technical solutions. For example, Alpha has its e-commerce platform managed externally but in close contact with its internal IT department. Large automation projects also require using external competencies. Competencies of implementing such solutions and integrating with different IS do not exist internally and will continue to require consultants, as one retailer mentions. Some competencies do have to exist in-house, but not the knowledge of how to implement an entire concept. One respondent highlight that when using integration partners in an IT implementation, one loses a critical business competence since the skills and knowledge are lost when the consultants leave.

Significant strategic transformations are another area where six of seven retailers highlight that they need to utilize external competencies, mainly consultants. The respondent from Alpha highlights that this is partly a matter of resources, as sales and operational responsibilities come first for the internal resources. Other reasons mentioned for this are getting a second opinion from an external party, accelerating development, and getting experience from similar projects. This is in line with the statement from Implement's respondent, who argues that management consultants contribute with extensive experience compared to the retailer's internal resources in this area. Moreover, strategic transformations and projects require a lot of data analysis, where external support is necessary.

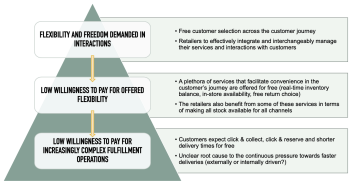
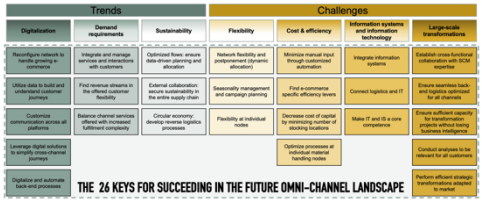
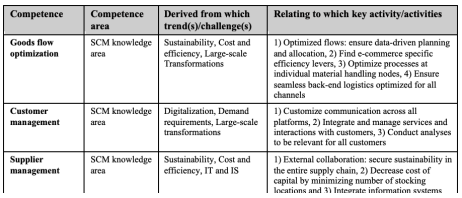
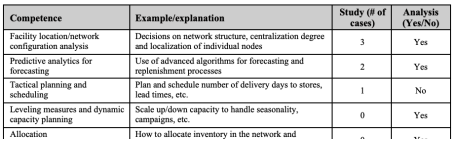
On the other hand, three respondents believe that outsourcing of competencies will not be the way forward. Gamma states that they want to own everything in the long run when it comes to resources, both material and immaterial. Epsilon also has the ambition to have all logistics functions in-house. The respondent from IKEA has a slightly differing opinion and thinks that it will be necessary to collaborate with other actors within fast-moving segments such as digitalization.

5 Analysis of trends and challenges in the omni-channel landscape

This chapter will analyze and identify the prominent trends and major challenges that will affect the omni-channel landscape going forward. Trends and challenges have been identified partly through related literature and partly through the aggregate results from the interview study. For each trend and challenge, a couple of key actions for ensuring successful omni-channel logistics are identified. After discussing trends in chapter 5.1 and challenges in chapter 5.2, these key actions are summarized and out perception of the future omni-channel landscape is presented in chapter 5.3.

Table 5.1 below provides an overview of the structure and content of the coming three analysis chapters, 5, 6 and 7.

Table 5.1 *Structure of the analysis chapters and short descriptions of the content*

Chapter(s)	Illustration	Content
5.1 Trends affecting omni-channel retailers		This chapter will discuss four prominent trends (digitalization, changing demand requirements and sustainability, and "towards omni-channel") and outline what is needed from omni-channel retailers to cater to these
5.2 Challenges in omni-channel retailing and logistics		An analysis of the four main challenges (flexibility, efficiency, IT and IS, and large-scale transformations) in omni-channel logistics and what is needed to overcome them
5.3 Our perception of the future omni-channel landscape		A summary of the trends and challenges identified. This chapter identifies 26 keys for succeeding in the future omni-channel landscape
6.1 Implications on competence requirements from the future omni-channel landscape		In this chapter, the 26 keys work as input for an ideation around the implications on competence requirements. The chapter presents unique competence requirements and allows for traceability regarding what trend, challenge and actions resulted in the implication
6.2 – 6.4 The six competence areas		Based on the implications on competence requirements from the previous chapter and the results on competencies from the interview study, the critical competencies within each competence area are analyzed
7 Omni-channel logistics personas and their required competencies		The critical competencies are grouped into different sets of competencies and five personas that will contribute to successful omni-channel logistics are identified

Reiterating the table content, we will now explain the connection between the analysis chapters and our research purpose and research objectives. We need to understand and describe the omni-channel landscape to fulfill our research purpose of mapping the context in which retailers run their businesses. To understand the landscape that omni-channel retailers operate in, we need to investigate and consolidate the trends and challenges mentioned in the literature and by the interviewed retailers. We believe that these trends and challenges dictate the prerequisites and impact the retailers' need for developing and acquiring new competencies. Therefore, in this chapter, we will first tie back to RO2 through "mapping what market trends and logistical challenges will dictate the omni-channel landscape for retailers in the coming years". Then, implications on competence requirements will be outlined in chapter 6, fulfilling RO3: "determine what competencies will be required, in connection to omni-channel logistics, to respond to trends and challenges and remain competitive in the omni-channel landscape". These implications will be compared with results from the interviews, and based on this, critical competencies within each competence area will be analyzed and discussed. Lastly, we identify different sets of critical competencies and group them into five logistics personas that will contribute to successful omni-channel logistics, elaborated on in chapter 7.

5.1 Trends affecting omni-channel retailers

Based on the literature and conducted interviews, this chapter will summarize the most prominent trends within omni-channel retailing and their implications. The trends that will be discussed are visualized in Figure 5.1 and are *digitalization, demand requirements, sustainability* and *towards omni-channel*. The analysis will outline the critical challenges and considerations arising from the respective trends.

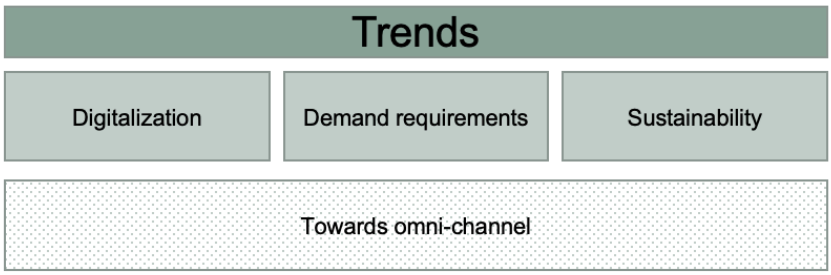


Figure 5.1 *Prominent trends affecting omni-channel retailers*

5.1.1 Digitalization

In this chapter, we will discuss the aspects of digitalization that retailers need to respond to. The condensed challenges that retailers are facing as a result of digitalization are shown in Figure 5.2 below. Digitalization is a broad and unspecific term. However, we will consider it to contain all impacts that the introduction of the online channel has had, from new digital services to the increasing importance of data analysis within companies to new automation solutions.

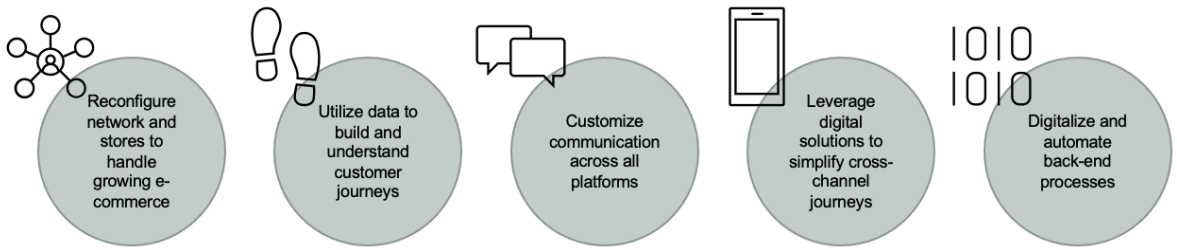


Figure 5.2 *Challenges for omni-channel retailers regarding digitalization*

What has become evident during both the literature review and the interview study is that e-commerce is growing and will continue to do so (Hübner et al., 2015; Karlöf, 2018a; Kembro & Norrman, 2019b; Marchet et al., 2018). As online sales grow, they tend to cannibalize bricks-and-mortar sales (Hübner et al., 2015). As observed in the results, some retailers have observed a shift from having a clear majority of their sales from their physical stores to an equal split between physical stores and e-commerce. The pandemic has partly driven this since new demographics have been forced to the online platform due to closed physical stores. However, there is a consensus that even post-pandemic, the online channel will play an increasingly important role and contribute to a larger share of sales than it has previously done. If retailers do not capture larger market shares and thereby increase overall sales, their physical retail stores cannot continue to exist and play the same role in their customer offering as before. Either stores must be shut down, reconfigured to OFCs, or must support the seamless customer offering by providing services related to omni-channel customer journeys such as click & collect, click & reserve, and order-in-store.

Digitalization has made unprecedented amounts of consumer data available to retailers (Aversa et al., 2021). Converting that data to information and insights is a critical step in moving from web presence to bridging the information competence gap, as Ashworth et al. (2006) highlighted. This is one reason why retailers want to recruit holistic profiles with competencies to analyze and act upon macro and micro trends. The respondent from Implement states that 80 % of customer journeys go across channels. Understanding the customer journeys is the first step towards succeeding in omni-channel and creating a seamless customer offering. By understanding the customer journeys, retailers can also offer customized service, something that needs to be supported by technological development. This is an organizational capability that signifies more mature omni-channel retailers since it further leverages and integrates the value offered by the different channels (Ashworth et al., 2006). Integrated customer service is also one of the six components signifying an IT-enabled retail organization (Oh et al., 2012). Cervera and Delta for example use one-on-one video calls to provide the store experience through another channel. On the other hand, it is evident that many retailers still need to improve in this area. For instance, several respondents stated that the customer service system cannot be reached in-store.

While it is crucial to integrate service and communication based on the customer journey, it is equally important for retailers to create digital services and solutions that support these journeys. Both IKEA and Epsilon are building AR solutions that enable customers to view products in a way similar to visiting a physical store. This is also a means of minimizing returns by providing customers with an opportunity to ensure that the purchase is correct before ordering (Bernon et al., 2016). Since fashion retailers experience a significant return flow and the return management process for bulky products is more complex than for smaller items, such technological solutions become especially critical for retailers in those segments. Increasing self-service technology is another trend highlighted by both literature (Piotrowicz

& Cuthbertson, 2014) and the respondents. This allows for further integration of online and physical channels through order-in-store functionalities. It is important to state that digital services should add to the experience and provide the simplest customer journey. Not all customers desire the same amount of interaction with technology. Piotrowicz & Cuthbertson (2014) point out that the integration should drive customers to visit the physical store, supported by the retailers who desire an increased number of click & reserve orders since this creates an additional touchpoint with the customers and hopefully additional sales.

Self-service technology can be provided either through tablets/screens in-store or smartphones (Piotrowicz & Cuthbertson, 2014). Gamma's scan-in-store function provides customers with a similar service, and retailers need to recognize the increasingly important role of the smartphone, apps, and social media platforms. As channels are and should be interconnected, understanding specific online channels and clear strategies for each channel are required. This goes beyond the physical store, the e-commerce platform, and the app to also understanding the main social media platforms used by customers.

Lastly, digitalization does not only take place in the interaction with customers. We have observed a clear trend of digitalizing internal processes such as order replenishment and forecasting. Moreover, all interviewed retailers today have or are in the process of implementing some automation solution in their warehouses to create efficient back-end operations that support the customer offering.

Consequently, digitalization dictates and will continue to dictate the omni-channel landscape. Retailers need to configure their network to deal with increasing e-commerce and utilize the data generated to build and understand customer journeys. Communication needs to be customized to the individual customer, and digital solutions need to be leveraged to support and simplify the cross-channel journeys. Back-end processes need to be digitalized and automated, to provide a seamless and integrated customer offering in an efficient manner.

5.1.2 Demand requirements

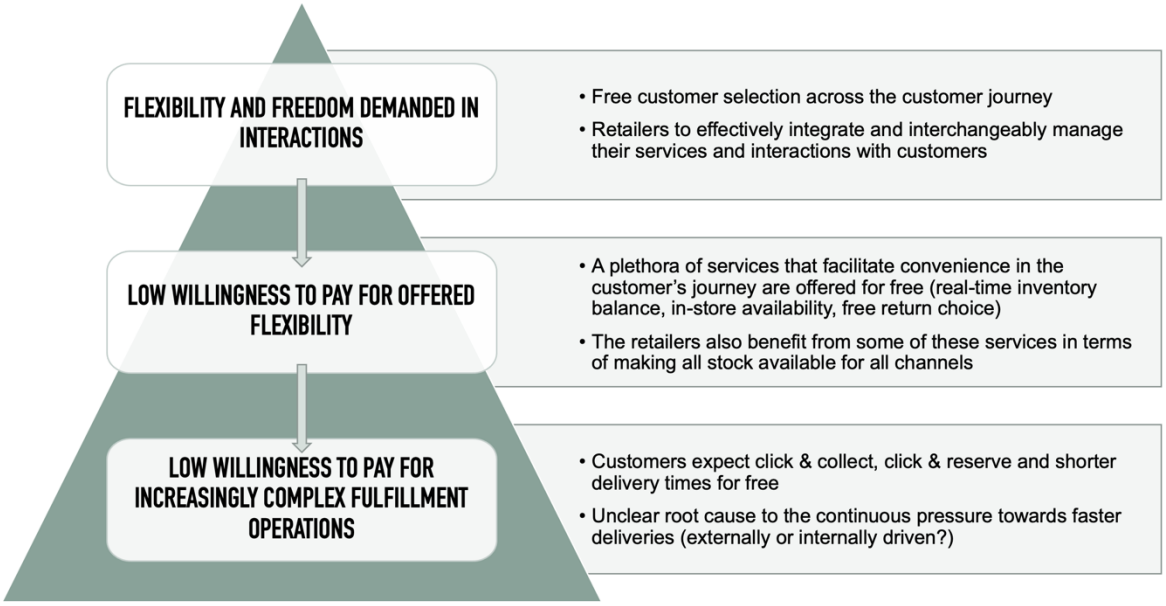


Figure 5.3 *Summarization of trends considering demand requirements*

Starting high level, see Figure 5.3, consumers overall demand flexibility, freedom of choice, and convenience in customer journeys and interaction points. From the literature, we understood that technology-savvy consumers expect to obtain pre-sales information, services during the sale, and after-sales support, all through a conveniently customized channel (Piotrowicz & Cuthbertson, 2014). Thus, retailers who effectively integrate their service operations and manage them interchangeably are deemed more proficient in catering to the consumers' demands. The data gathered from the interview study strengthened this as some retailers actively work with different personas to customize their interactions with customers, and most retailers mentioned that they adapt and individualize customer communication. Further, the literature suggested that there needs to be free customer selection and interaction choices in all touchpoints across the customer journey (Piotrowicz & Cuthbertson, 2014). These insights suggest that global players generally have more considerations, both in logistics and commercial communication, due to differences in market requirements.

Going more into detail, customers demand convenience but have a low willingness to pay for almost all added services. In the interview study, IKEA and Elgiganten stated that customers are willing to pay for home delivery and installation services. We acknowledge their statement but do believe that this is true specifically for the case of bulky products. The alternative cost to getting IKEAs help in delivering a sofa is considerable, whereas the alternative cost of picking up a sweater at a retail store is not comparable. Further, the interview study concluded that customers expect to take advantage of retailers' entire service offer, consuming close to real-time inventory balances, picking freely from all available delivery options, and having total flexibility to do so, without paying for it directly. Naturally, offering all these services is not a pure cost for retailers as they also benefit from, for example, establishing real-time inventory balances.

Going one layer deeper into the willingness-to-pay aspect, the literature exemplified two services that retailers believed customers would not pay for, as it was deemed critical to offer click & collect and click & reserve for free (Hübner, Wollenburg, et al., 2016). Retailers use their own established supply chains to offer this service, with some added work mostly connected to administration, so this is a reasonable requirement. Secondly, it was believed one could not transfer the entire cost of shortening lead times to customers. Both because most customers settle with next-day delivery and neither needs nor demands faster delivery. The interview study highlighted that retailers also believe customers only pick the fastest delivery option because it exists, not necessarily because they need it. IKEA tries to stay close to the actual price point of fast deliveries to show customers what it truly costs, but says other retailers use other margins to cover the cost of the fast deliveries. From the interview study, we conclude an unclear boundary between what is demanded by customers in terms of delivery speed and what is driven internally as a differentiation agenda.

Concluding, demand requirements and other forces continue to challenge retailers' fulfillment operations, and charging the customers the actual price of all omni-channel services would not be possible. One size does not fit all in omni, why communication and interactions continue to call for adaptation, individualization, and customization.

5.1.3 Sustainability

The expectations on sustainability in terms of both consumer brand and employer brand are outlined in Figure 5.4 below, as well as their implications on logistical challenges for omni-channel retailers.

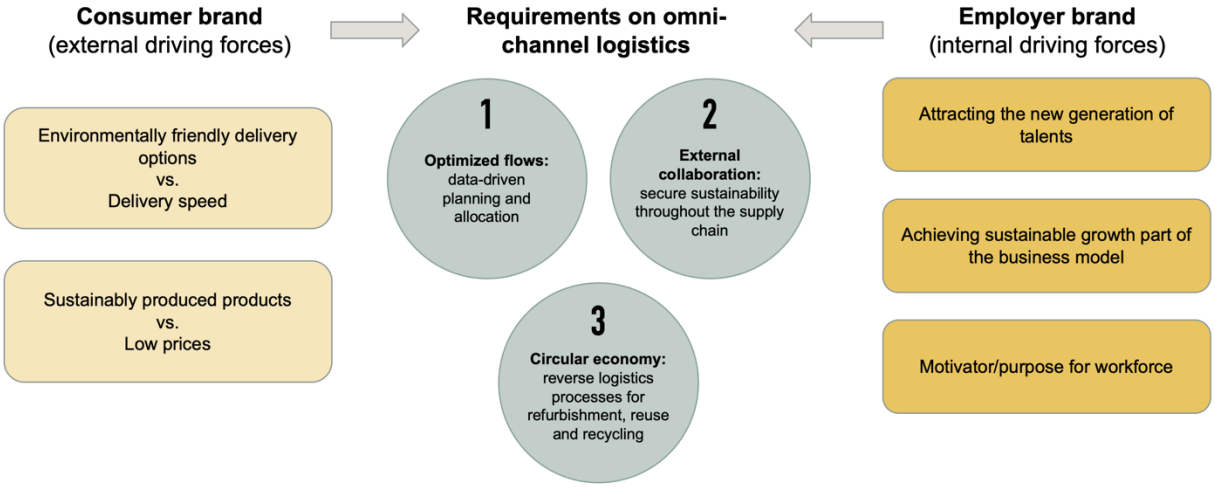


Figure 5.4 *Requirements on omni-channel logistics arising from sustainability*

During the interviews, it became apparent that sustainability is a trend that impacts retailers more than ever before. Today, a sustainability agenda is necessary, and the pressure and demand for it are twofold; internal and external. Consequently, sustainability needs to be imbued in every decision and action.

The trend is partly driven internally as employer branding, something that both Elgiganten and Delta highlighted. Delta stated that having a sustainability agenda is necessary to attract new competencies, while Elgiganten pointed out the importance of social responsibility and CSR questions. Gamma highlighted that sustainable growth has become a key point in their business model and that a larger share of their sales must be driven sustainably since the fashion industry is the second-worst in terms of carbon footprint. Epsilon also highlights that they do not have a clear answer on how to solve the sustainability question today. This is quite contrasting to the traditional view of retailing, which aims to commoditize products merely by buying cheaply and selling more expensive at relatively slim margins. Consequently, sustainability needs to be prioritized within the retail organizations to secure meaningful growth and attract future co-workers.

E-commerce, by nature, involves a lot of packaging and shipping and is therefore not the most environmentally friendly of businesses. Picking, packing, and shipping pieces to customer homes and pick-up stations incur high carbon emission levels and sustainability needs to be incorporated in those processes. This requires more data-driven planning and allocation to secure an optimized flow through the supply chain. However, as evident by the fact that Alpha has worked hard to eliminate plastic in their packaging only to be forced to include it when selling through third-party marketplaces, it is challenging for retailers to control processes and procedures in the entire value chain. Therefore, an increased amount of collaboration across the supply chain is required. For example, Alpha is currently conducting an omni-channel packing project, where they have involved suppliers to guarantee unison packing of products

throughout the supply chain. Collaboration with couriers and last-mile delivery actors is another aspect that retailers must focus more on going forward. Customers also demand environmentally friendly products and increased transparency from retailers, as stated by several retailers. However, they also demand low prices and are not always willing to pay for sustainability, as highlighted by the respondent from Elgiganten.

Given that all retailers outsource almost all transport functions, they must work with couriers and LSPs to secure high utilization of trucks and sustainable delivery options. Beta and Delta try to nudge customers towards choosing sustainable delivery options by labeling them at check-out when purchasing online, and IKEA is developing electrified fleets for last-mile delivery. On the other hand, it has been made clear that customers, to an increasing extent, demand short lead times, an increased array of delivery options, and the option to order many products and return them without any additional cost. Picking up single parcels for home delivery is not as sustainable as transporting full truckloads with replenishments from a DC to a retail store. Retailers must balance these contrasting demand requirements to ensure that they meet the sustainability requirements from the market without compromising on sales and market shares because they cannot deliver products at the demanded speed and cost.

Within sustainability, there is also an evident trend within circular economy and refurbishment, reuse, and recycling of products. This puts pressure on retailers to develop their returns management processes and reverse logistics. Most interviewed retailers try to re-sell products in-store if that is the return node, but further efforts are required to understand where to pick up returns, sort them and manage them to utilize the material from the products thoroughly. For bulky items, picking up at customer homes is a costly and non-efficient process that is hard to standardize.

5.1.4 Towards omni-channel

Our interpretation of the retailers' intentions is that all seem to strive forward. There are no indications of retailers settling and being satisfied with what has been achieved so far, and rather everyone pushes forward. The desire to further integrate channels and be innovative is remarkable. When talking about channels, it is almost inevitable not to think of online and offline as the two main ones. However, with insights both from the literature and the interview study, the term channel instead refers to how one can meet the customer through social media, app solutions, offering the right assortment, meeting their wants before they know they want it, and so on. As highlighted in literature and empirics, the physical store plays a crucial role in these channel offerings with the possibility to reconfigure stores fully or partly to OFCs, utilizing idle sales personnel for omni-channel services, installing self-service technology in-store, and so on. As mentioned in the literature, the aspiration of integration in omni-channel goes both ways. When thinking about this integration, we often think about the ineluctable growing e-commerce and that digital newcomers should find their way to the online channel. However, it is also essential to get the "online natives" to the stores to meet and service them face-to-face to increase their engagement in the omni-channel offering.

With these insights, it is evident that omni-channel is here to stay. We predict that the concept of omni-channel will evolve and include many things, most of which are impossible to specify today. However, what we can conclude is that all retailers have omni-channel projects in the pipeline. Some have internal logistics projects, such as opening or automizing omni-channel warehouses, and some have projects around new customer offerings that require support from

innovative logistics. Everything points towards increased omni-channel retailing through further integration, innovative logistics, and data-driven decisions.

5.2 Challenges in omni-channel retailing and logistics

This chapter will summarize the most prominent challenges within omni-channel retailing and their implications on organizations practicing omni-channel logistics based on the literature and conducted interviews. The challenges discussed are visualized in Figure 5.5 and are *flexibility, cost and efficiency, information technology and information systems, and finally, large-scale transformations*. The analysis will outline the critical considerations arising from the respective challenges. In chapter 6, we will analyze the implications arising in the form of competence requirements.

Figure 5.5 *Major challenges for omni-channel retailers and omni-channel logistics*

5.2.1 Flexibility

The different elements of flexibility required for omni-channel retailers to overcome this challenge are summarized in Figure 5.6 below. Omni-channel logistics must be adapted to create a resilient supply chain capability, a supply chain that can efficiently respond to unexpected risks and disruptions.

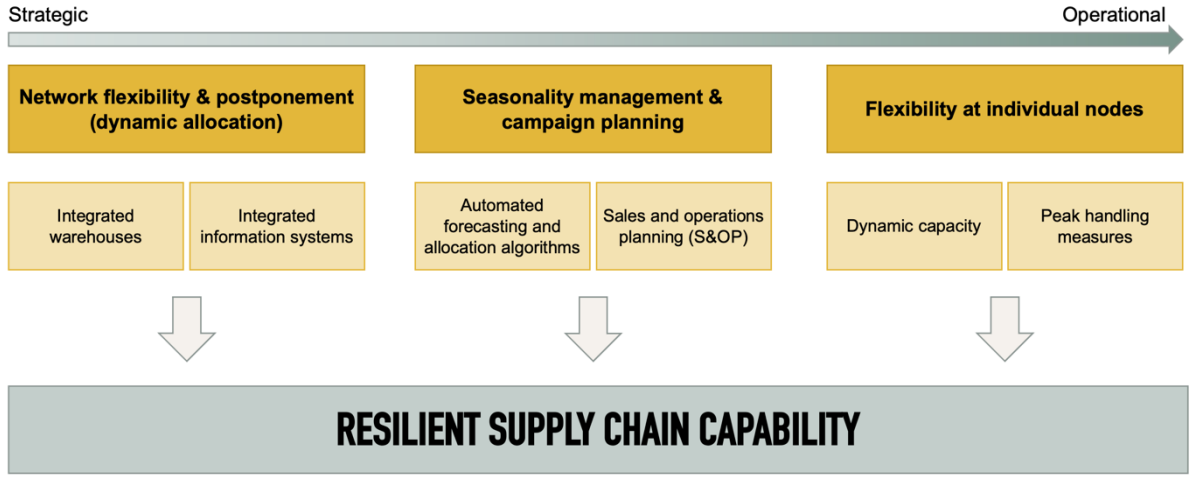


Figure 5.6 *The elements of the flexibility challenge and how to create a resilient supply chain*

The historical purpose of retailers' networks has been to support physical stores, why their established networks' inherent characteristics do not fit today's business (Ishfaq et al., 2016). The biggest challenge caused by this dissonance is the limited flexibility in the back-end

logistics when fulfilling through multiple channels, mentioned by a clear majority of retailers in the interview study. With insights from our literature study and interview study, we believe that the clear solution to this problem is integrating IS and building omni-channel DCs to enable inventory pooling. We perceive inventory pooling as one of the most commonly mentioned benefits of omni-channel in literature. To clarify, flexibility is a challenge that could be partly solved through inventory pooling, which literature mentions as a major benefit of operating omni-channel logistics (Hübner et al., 2015; Hübner, Holzapfel, et al., 2016; Marchet et al., 2018). For this reason and indications in the interview study, we predict most retailers will try to move towards inventory pooling to solve the flexibility challenge. However, predecessors to pooling inventory are having an omni-channel DC and integrated IS, both of which call for organizational capabilities within large-scale transformations.

Naturally, this solution will not be easy for all retailers. Size and network set-up broadly impact the possibility to pool inventory. Again, global players face a more significant challenge with their more dispersed footprint and warehouses serving multiple markets. Both Gamma and IKEA mentioned this as a barrier towards pooling inventory. Literature also argues that as the volume of online orders increases, it might be more suitable to adapt a separate structure with dedicated OFCs to improve efficiency (Marchet et al., 2018). Therefore, the bigger, multi-national retailers need to find flexibility through other means, for instance, through automation solutions or by postponing allocation to the different channels at a central pallet-load warehouse.

In addition to creating overall flexibility in the network structure through postponement of allocation, individual nodes need increased flexibility in staff and equipment to handle demand peaks and manage resources and capacity efficiently (Hübner et al., 2015). Delta utilizes a dynamic picking force, where pickers can pick for both channels even though they are dedicated initially to one or the other. Another aspect of flexibility is the opening hours of the warehouse. While warehouses are generally in operation during business hours on weekdays, most e-commerce sales occur during evenings and weekends. To support offerings such as same-day or next-day delivery, retailers may have to consider adding flexibility by operating warehouses 24/7 or on weekends to support this offering and leveling capacity utilization over time.

Another driving force requiring flexibility is that promotions and seasonality largely drive the retail sector. Most retailers in the interview study have automated their forecasting and optimized allocation algorithms on this basis. These are challenged as a large share of sales move from stores to e-commerce, and suddenly store inventory would be better off being stored centrally. E-commerce, in addition, is more volatile than store sales and harder to forecast (Hübner et al., 2015; Marchet et al., 2018). Undoubtedly, the changing role of the physical store plays a vital part here as well. Having fewer traditional physical retail stores and introducing concept stores with a thinner assortment (fewer pieces of the same SKU) will enable keeping more stock centrally, making it possible to delay allocation as late as possible. This will mitigate the impact of the flexibility challenge. Delta and Cervera highlight that in their pooled inventory, they have a certain safety stock of each SKU that is purely allocated to e-commerce, and this allocation enables them to prioritize e-commerce orders since these directly correlate with service levels.

Seasonality puts additional pressure on the capacity management of retail companies. Firstly, planning processes such as S&OP create a platform for communication between the sales department and operations that need to be developed to prepare back-end logistics for incoming demand peaks. Secondly, retailers need to have processes and procedures for securing dynamic

capacity and scaling up and down to handle demand peaks resulting from either seasonality or volatile e-commerce demand. This could be temporary staffing in picking, increased usage of dropshipments during peaks, or outsourcing. Alpha, for instance, outsources warehousing of an entire product category that is highly seasonal. It will not be sustainable from a cost perspective to dimension capacity based on peaks. Instead, the capacity must be dynamic.

In summary, being flexible is one of the most challenging tasks posing a threat to retailers' success. With today's ever-higher customer demands, retailers are almost forced to make logistics part of their core competencies to have a chance of appealing to customers. The switching cost is low, so if the suitable services are not offered at the right price at one retailer, there is probably another who does. Our study has gathered that the key to being competitive in this landscape almost always lies in the supply chain and logistics. Having the capability to operate a supply chain with high resilience is key. A resilient supply chain is one that quickly responds and recovers from unexpected disruptions and returns to the normal state or moves into a new, better state rapidly.

5.2.2 Cost and efficiency

Interrelated with the challenge of flexibility is that of cost and efficiency: how do retailers ensure short lead times at the lowest possible cost for all available channels throughout the supply chain? Cost, efficiency, and productivity were highlighted as critical challenges for omni-channel logistics by all retailers interviewed. The challenges and measures required to solve them can be grouped into the four categories pictured in Figure 5.7 below.

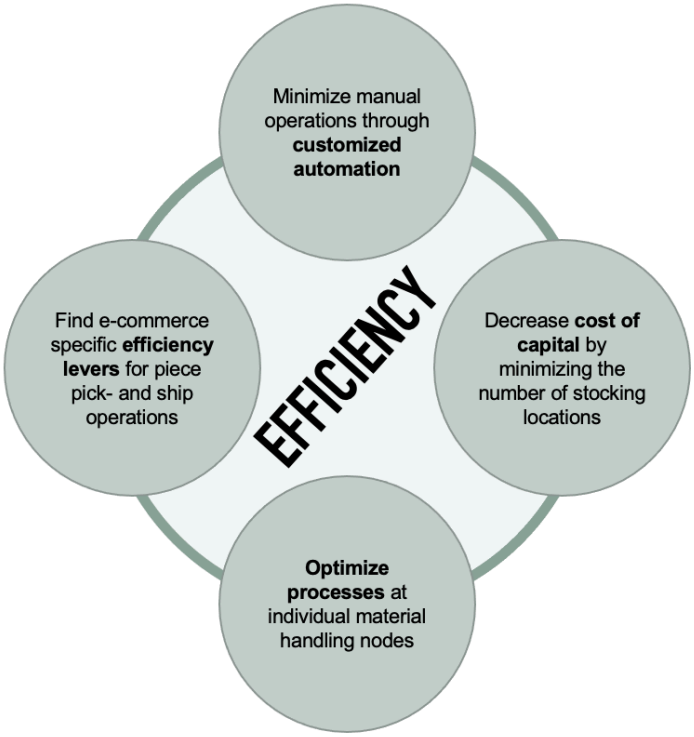


Figure 5.7 *The elements of the cost and efficiency challenge*

Firstly, picking and packing operations are inherently complex in an e-commerce context, given the order sizes and volatile demand (Hübner et al., 2015). Automation is required, independent of the retail segment, to get efficiency in these operations. All retailers interviewed

have invested in some automation solution, with multi-level AS/RS being the most common. However, automation is rarely a plug-and-play solution. Customization is required, and implementing an automation solution is a significant investment. In Beta's case, a retailer that implemented automation in their warehouse in 2020 still struggles with productivity and reaching the KPIs set in the business case. This showcases that it is hard to find a standardized automation solution that contributes to reaching the desired efficiency without adaptations and customizations to the systems that automation suppliers deliver.

Additionally, increasing productivity requires process management knowledge. The respondent from Epsilon highlighted the need for additional competencies within, for example, Lean and Six Sigma regarding this challenge. The automation must be integrated with other IS upon implementation, and as tailor-made solutions become a necessity, the automation suppliers move from merely being hardware suppliers to being system suppliers. Consequently, retailers are more dependent on automation suppliers since these competencies do not exist in-house. Another aspect that affects omni-channel retailers compared to pure e-tailers is that automation is hard to introduce in the physical retail store (Marchet et al., 2018). Comparing the cases shows that this, on the other hand, might be possible for some companies, as IKEA uses drones for stocktaking in their retail stores. Essentially, this is because their stores are very similar to warehouses compared to, for instance, a typical fashion store. Gamma's pocket sorters can also highlight the differences between retail segments. Pocket sorters efficiently manage returns in warehouse operations for the fashion segment that experiences a large return flow but is only suitable for small SKUs.

Secondly, the complexity of piece-picking operations has forced retailers to find e-commerce specific efficiency levers. A streamlined picking process is an enabler of short lead times and one of the main arguments for why a separate network structure should be deployed (Marchet et al., 2018). In an integrated warehouse, potentially with pooled inventory, it can be harder to reach the desired efficiency due to the significant difference in order characteristics between store replenishments and customer orders. Generally, the more similarities between the two types of orders, the easier it is to get efficiency in an integrated process.

One way of fulfilling this can be to separate initial stockings to stores from replenishments (Hübner et al., 2015). As replenishments consist of smaller quantities, they have more similarities with e-commerce orders, and these picking processes would be easier to integrate. Gamma has removed the need for different picking processes through automation by introducing AGVs with goods-to-person functionality in one of their integrated warehouses. Even though there are two separate picking locations, this does not affect the pickers since they get the orders delivered to them by the AGVs and are only responsible for packing and sorting orders. Besides implementing automation, manual operations and human errors can be minimized in warehouse operations by introducing other technologies to the picking process. Pick-by-voice or pick-by-light are two methods commonly deployed to simplify the picker's job and increase efficiency. However, as picking distance constitutes up to 50 % of the picking process, these levers will not get the desired impact if the picking distance cannot simultaneously be minimized. This can be done through automation, as showcased by Delta who decreased the area of one of their picking zones by 90 % by introducing paternoster lifts.

Thirdly, a common struggle within the retail industry is the high cost of tied capital. Inventory costs must be balanced against service levels since increasing availability contributes to higher service levels and higher inventory costs. The respondent from Cervera considers service levels to be the most important measure in retailing. Today, switching costs for customers are low, and if the product is not available in stock, it is easy for the customer to purchase from a

competitor. One way of reducing the cost of capital is to minimize the number of stocking locations for each SKU. This can, for example, be done by operating an integrated structure and pooling inventory or by slimming the assortment in-store and using the online platform as a virtual shelf extension. Another way is not to own the product but rather use dropshipments or VMI, transferring the inventory cost to suppliers. All these options require an increased focus on optimized material flows to not compromise on lead times.

Lastly, processes at individual nodes must be optimized. This is essentially a question of warehouse operations, as discussed above. In addition to these processes, last-mile delivery is a costly operation. Although transport is commonly outsourced, this can cause bottlenecks in the operations and impact lead times greatly. Retailers will need to work together with LSPs and couriers to optimize route planning and minimize the costs associated with the plethora of delivery options. Route planning, both in transport and optimizing picking routes inside warehouses, are complex tasks that will require AI to a more significant extent going forward.

5.2.3 Information technology and information systems

The third challenge we wanted to analyze was that of information technology and information systems since it has been one of the leading root causes of all problems and challenges mentioned in the literature (Kembro & Norrman, 2019a; Oh et al., 2012) and empirics. Some condensed elements of this challenge can be seen in Figure 5.8 below.

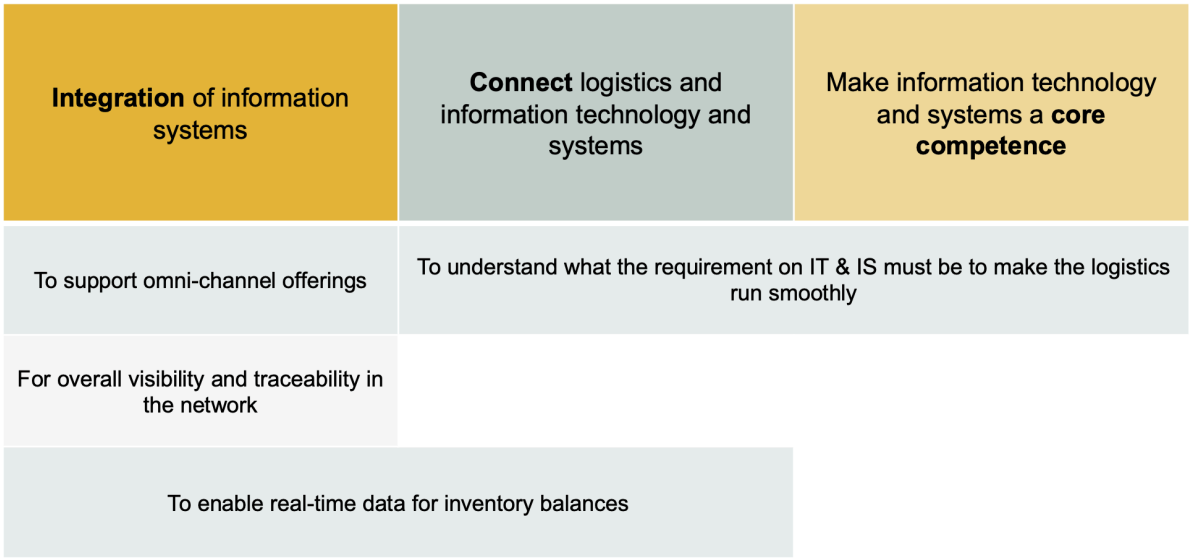


Figure 5.8 *The elements of the information technology and information systems challenge*

Separated IS hinder many omni-channel customer offerings. In the literature, we found that many omni-channel retailers still have siloed systems, relying on channel-specific IS (Zhang et al., 2020). One retailer from the interview study strengthened this by stating their assumption of the anomaly of channel-integrated IS in the industry overall. According to the literature, not integrating IS neglects the potential efficiency of omni-channel retailing (Zhang et al., 2020). Another complicating factor is that it is not enough only to integrate internal systems. For instance, when selling through dropshipments, retailers also need to integrate their systems externally.

Further, IT and IS are mentioned as enablers for supply chain integration which is key in delivering the omni-channel experience to the customers. Components in this are allowing them to learn about offerings, completing orders and obtaining customer service across channels as they please (Wallace et al., 2009). Consistent master data management on customers, orders, and inventory across channels is a necessary enabler of these seamless operations, and such integration can be achieved through the efficient and integrated use of IT and IS. It is not only about servicing the customer, but there are also self-seeking benefits to this. The literature suggested that this type of channel integration through IT improves the efficiency of retail organizations and contributes to better performance overall (Oh et al., 2012). However, the genuine reason retailers have not integrated their IS fully yet, is the complexity of the endeavor, the human resources to achieve it, and the inherent cost of such a complex operation. As mentioned in the interview study, information systems might be the most significant investment connected to omni-channel.

Nevertheless, we believe that it is an unavoidable development that all retailers wanting to stay competitive must go through sooner or later. The literature framework for omni-channel maturity mentions bridging the information competence gap as one of the first gaps to progress (Ashworth et al., 2006). Ashworth et al. (2006) did also mention that to control costs, it is vital to build internal IT competencies. Being proficient in IT and IS could enable supported decision-making to meet customer promises, traceability, and real-time data on stock balances in the network. This is especially important for omni-channel retailers since they do not only need to monitor warehouses, but also stores filled with customers.

Real-time data has been a leading success factor both through the literature review and the interview study. Retailers are still dependent on manual operations such as stocktaking to supply this today, indicating the need for further development. Supporting technology such as RFID can help bridge this gap and enable customers to have visibility on overall stock available in the entire network. To fulfill orders placed by customers with this information puts requirements on well-developed IT and IS to support integrated inventory management and order fulfillment.

Given this, the ability to quickly tweak small factors in information technology and systems is needed to be resilient and fast-responding in the omni-channel context. To even be able to act upon this ability the retailers need to connect logistics and IS. It is vital to go from a logistics decision or phenomena to processes to implementing it in the IS. IT and IS are as previously mentioned enablers, and historically it has not been a core competence to develop. It has been outsourced, and the focus has been on excelling in requirement specifications. However, we believe that it must become a core competence, tying it closely to the business model. During the past decade, it has become such a strategic part of retailers' business that it would not make sense to keep it outsourced. Resilient supply chains demand IT and IS support. We firmly trust that it will be integral to make the IT function a more central part of the business since it affects, impacts, and supports almost all omni-channel initiatives today.

5.2.4 Large-scale transformations

As discussed in chapter 4.4.1, designing, and performing large-scale transformations is an important capability for omni-channel retailers to possess, considering the ever-changing landscape and shorter strategic cycles. As highlighted in the interview study, retailers often rely on external competencies for such projects, why it is considered a significant challenge in omni-channel retailing and omni-channel logistics today. Figure 5.9 below categorizes the

factors making transformation projects and strategic supply chain design a complex task into five different challenges. Firstly, cross-functional collaboration with SCM expertise is required since decisions concern the entire supply chain and involve several functions. Secondly, seamless back-end logistics that is set up to meet the demands of both channels is a prominent challenge and is further complicated by order fulfillment processes dependence on the network configuration. Thirdly, retailers tend to prioritize daily operations and outsource strategic projects, resulting in lost business intelligence. Moreover, transformations require large amounts of data analysis given increased customer expectations and the increased amount of data generated by growing e-commerce. Lastly, strategic cycles are getting shorter, and the landscape is changing rapidly, putting additional pressure on conducting large-scale transformations quickly.

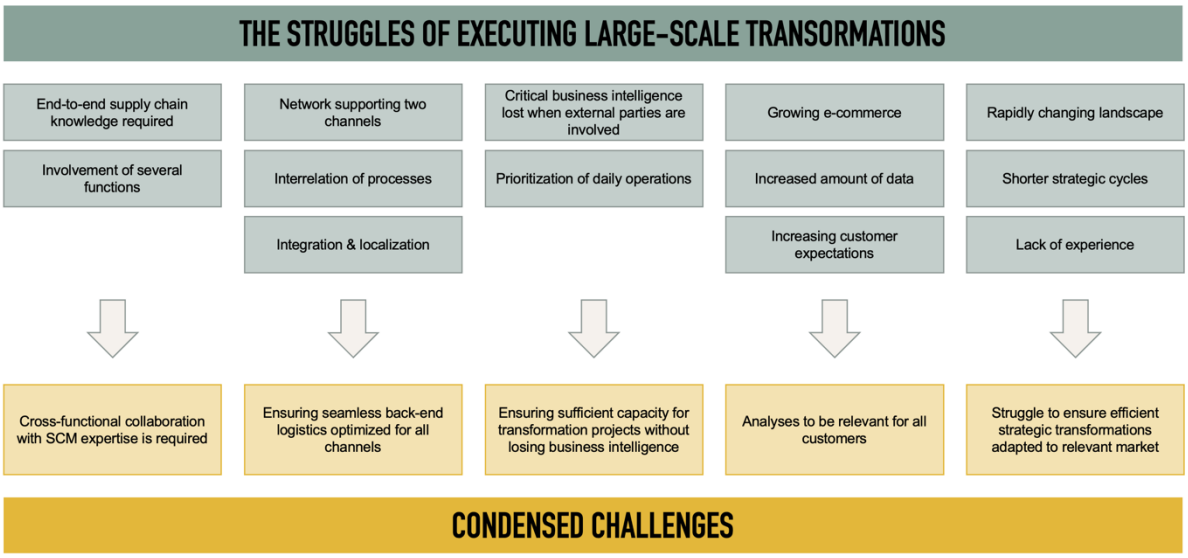


Figure 5.9 *The elements of the large-scale transformations challenge*

Compared to the traditional single-channel retailing, omni-channel is inherently complex, and as concluded in the trends chapter, the landscape is changing rapidly. The online channel has developed from being a complement to the physical retail store to being an integral part of the customer offering. The pandemic has further accelerated the growth of online orders and has forced retailers to reconsider how their network should support the co-existing channels and how processes should be integrated to enable efficiency and effectiveness throughout the supply chain. Digitalization has dictated the context and the conditions for strategy and growth and will continue to do so.

Therefore, network configuration has become a complicated process, as highlighted by almost all retailers and supporting actors. The placement and utilization of physical nodes must support the customer offering and meet customer expectations such as lead times, delivery options, and assortment. In addition, as outlined in the literature review, all logistics processes connected to order fulfillment depend on the network configuration (Hübner et al., 2015). Supply chain strategy and design decisions are challenged because strategic plans are quickly made obsolete and must be executed at a higher speed than ever before to keep up with market requirements. Especially connected to omni-channel, where the concept has no clear definition since it gets outdated very quickly, the trend of shorter cycles due to a changing landscape is evident. Consequently, executing large-scale transformations quickly is an organizational capability that is critical for retail organizations to possess to achieve sustainable competitive advantage. This capability is dependent on the firms' competencies. Connecting to the RBV, a

dynamic capability requires managers to integrate, build, and reconfigure internal and external competencies (Eisenhardt & Martin, 2000). Moreover, the RBV supports that these dynamic capabilities are especially important in rapidly changing environments (Eisenhardt & Martin, 2000).

In terms of human capital resources contributing to this capability, many different actors play a role in supply chain design decisions. With six of seven retailers having utilized consultants and external competencies in larger transformations and strategic decision making, it can be concluded that internal competencies are not sufficient for dealing with these questions. This is partly a question of resource support since internal resources need to be allocated to daily operations and sales-related tasks, while network decisions require extensive amounts of analysis. On the other hand, it is also a matter of experience from transformation projects. Consultants by nature have more experience from similar projects, and the experience was highlighted as a critical success factor for transformations by several respondents. However, several respondents highlighted that they want to keep project management for transformation projects in-house to ensure that cultural aspects and company expertise are considered. Critical business intelligence is also lost if external parties are carrying out the project without internal involvement.

5.3 Our perception of the future omni-channel landscape

We have now summarized, discussed, and analyzed each prominent market trend and significant challenges that we believe will dictate the future omni-channel landscape. For each trend and challenge, we have concluded a couple of critical success factors that omni-channel retailers will need to consider to become or continue to be competitive in the future. These aspects and considerations are summarized in Figure 5.10 below.

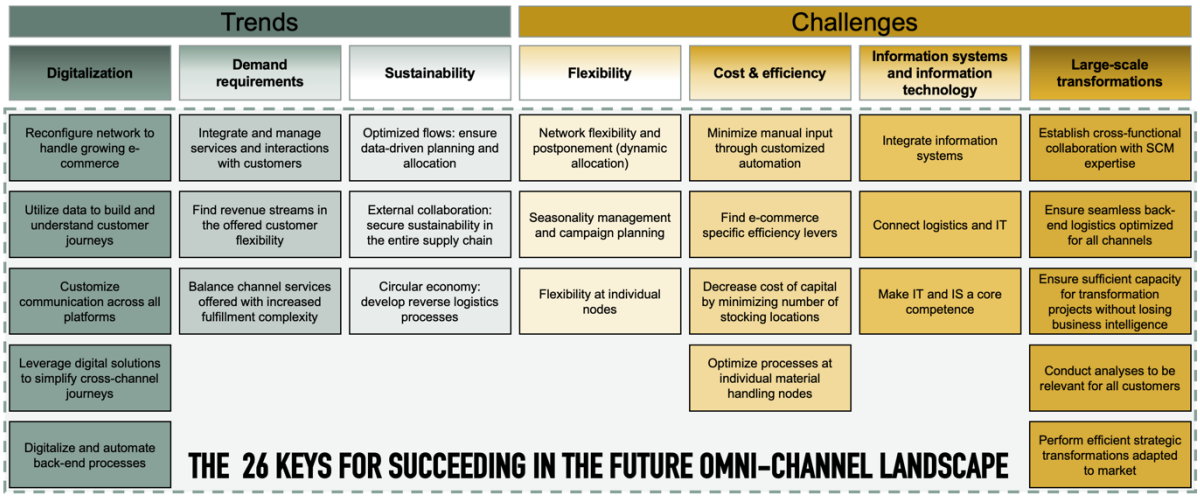


Figure 5.10 *Our perception of the future omni-channel landscape*

One of the most obvious implications for retailers and omni-channel logistics is that a customer perspective must be undertaken in every action made. As customers have unlimited availability of information and switching costs are lower than ever, it is not feasible to not offer customers the services and offerings they demand in favor of, for example, cost reductions and decreased complexity. Retailers must leverage the data they generate, build customer journeys, and

understand the movements across channels, also highlighted by Implement. Then, customer communication and offerings can be customized to create additional value for customers and, in turn, allow the retailers to capture larger market shares. The omni-channel logistics must support all these demand requirements, and digital solutions should be leveraged further to erase the line between the online and offline channels.

With the vast array of channel services and offerings required to stay relevant, pressure on back-end omni-channel logistics increases. The logistics network needs to be flexible enough to meet the demands of all channels, with a growing share of orders coming from the volatile e-commerce side (Hübner et al., 2015; Marchet et al., 2018). Simultaneously, cost-efficiency needs to be incorporated in operations initially designed for supporting a network of physical stores. Automation and other efficiency levers for handling piece pick and ship operations will be critical in this aspect.

Furthermore, the landscape is ever-changing and strategic cycles are shorter than ever before, as emphasized by, for example, Delta and Gamma. Retail organizations need to execute large-scale transformations quickly and create a more resilient supply chain to counteract this. This will require cross-functional collaboration, and retailers need to ensure that sufficient capacity is allocated to long-term planning, which seems to be a struggle with organizations often focusing on daily operations and maximizing sales during the coming week or month.

The most significant enabler for integrated omni-channel offerings and integrated back-end logistics is supporting IT and IS. Without integrated systems enabling real-time data and other functionalities, retailers will not meet the new customer requirements of the future omni-channel landscape. Consequently, retailers need to increase their understanding of IS and their connection to IT and make this a core competence, as it is the essence in supporting efficient and effective omni-channel logistics.

6 Analysis of competence requirements for omni-channel retailers

This chapter will analyze the implications on competence requirements following the mapping of the omni-channel landscape. In chapter 6.1, we divergently ideate competence implications given the key actions, and in chapters 6.2 through 6.4, we convergently analyze and categorize the competence implications into our conceptual framework. As a result, the competencies considered critical for succeeding with omni-channel within each competence area will be presented and discussed.

6.1 Implications on competence requirements from the future omni-channel landscape

Referring to the double diamond framework presented in chapter 3.2.5, this part of the analysis considers the ideation phase and the answers to the "HMW"-question of "how might we, as retailers, respond to these key actions". Once trends and challenges had been condensed to 26 keys in the synthesis phase, see Figure 5.10, we ideated what competencies will be required to act upon these actions. The implications on competence requirements were noted ongoing while analyzing trends and challenges. Firstly, we considered the three competencies, leadership, project management, and problem-solving, to be enablers of all keys. Secondly, we could see a significant overlap between the competencies from this ideation analysis and those mentioned by retailers during the interview study. However, some competencies identified in this phase of the analysis were not brought up during the empirics. These competencies, along with what trend, challenge and key action or actions they relate to, are summarized in Table 6.1 below. The identified competencies that overlapped with the empirics will be presented in the coming chapters, chapters 6.2 through 6.4, instead. In these chapters, it will be highlighted whether competencies were derived from this analysis, identified during the interviews, or both.

Table 6.1 *Additional competencies identified during the ideation phase, and what trend/challenge and key(s) they relate to*

Competence	Competence area	Derived from which trend(s)/challenge(s)	Relating to which key activity/activities
Goods flow optimization	SCM knowledge area	Sustainability, Cost and efficiency, Large-scale Transformations	1) Optimized flows: ensure data-driven planning and allocation, 2) Find e-commerce specific efficiency levers, 3) Optimize processes at individual material handling nodes, 4) Ensure seamless back-end logistics optimized for all channels
Customer management	SCM knowledge area	Digitalization, Demand requirements, Large-scale transformations	1) Customize communication across all platforms, 2) Integrate and manage services and interactions with customers, 3) Conduct analyses to be relevant for all customers
Supplier management	SCM knowledge area	Sustainability, Cost and efficiency, IT and IS	1) External collaboration: secure sustainability in the entire supply chain, 2) Decrease cost of capital by minimizing number of stocking locations and 3) Integrate information systems
Reverse logistics	SCM knowledge area	Digitalization, Sustainability	1) Reconfigure network to handle growing e-commerce, 2) Circular economy: develop reverse logistics processes

S&OP implementation and execution	SCM knowledge area	Flexibility, Cost and efficiency	1) Seasonality management and campaign planning, 2) Flexibility at individual nodes, 3) Optimize processes at individual material handling nodes
Advanced engineering competencies in warehouse workforce	SCM knowledge area, Technological competence	Cost and efficiency, IT and IS, Digitalization	1) Minimize manual input through customized automation, 2) Make IT and IS a core competence, 3) Digitalize and automate back-end processes, 4) Flexibility at individual nodes and 5) Optimize processes at individual material handling nodes
Integration of automation and information systems	SCM knowledge area, Technological competence	IT and IS	1) Integrate information systems, 2) Connect logistics and IT, 3) Make IT and IS a core competence
Leveling measures and dynamic capacity planning	Applied SCM analysis	Flexibility	1) Network flexibility and postponement (dynamic allocation), 2) Seasonality management and campaign planning, 3) Flexibility at individual nodes
Allocation	Applied SCM analysis	Sustainability, Flexibility, Cost and Efficiency	1) Optimized flows: ensure data-driven planning and allocation, 2) Network flexibility and postponement (dynamic allocation), 3) Decrease cost of capital by minimizing number of stocking locations
AI for route planning	Applied SCM analysis	Cost and Efficiency, Sustainability, Digitalization	1) Find e-commerce specific efficiency levers, 2) Optimized flows: ensure data-driven planning and allocation, 3) Digitalize and automate back-end processes
Innovative mindset	Behavioural and generic competence	Cost and Efficiency, Digitalization, Demand requirements	1) Find e-commerce specific efficiency levers, 2) Leverage digital solutions to simplify cross-channel journeys, 3) Find revenue streams in the offered customer flexibility
Data analysis in combination with commercial awareness	Academic foundation	Digitalization, Large-scale transformations	1) Utilize data to build and understand customer journeys, 2) Leverage digital solutions to simplify cross-channel journeys, 3) Conduct analyses to be relevant for all customers
Incentive alignment and risk-sharing models	Academic foundation	Sustainability, Large-scale transformations	1) External collaboration: secure sustainability in the entire supply chain, 2) Establish cross-functional collaboration with SCM expertise
Change management experience	Dynamic awareness	Large-scale transformations, Cost and Efficiency	1) Perform efficient strategic transformations adapted to market, 2) Optimize processes at individual material handling nodes
Technological solution development	Technological competence	Digitalization, IT and IS	1) Leverage digital solutions to simplify cross-channel journeys, 2) Digitalize and automate back-end processes, 3) Make IT and IS a core competence

In the coming chapters, we will discuss the competence requirements derived from the ideation analysis above and the qualitative data on competencies gathered during the interviews related to the six competence areas in the conceptual framework. Competencies will be highlighted in *italic font* to guide the reader. This analysis will aim to combine the two viewpoints and conclude what competencies will be the most critical logistics-related competencies for omni-channel retailers going forward, considering prominent market trends and challenges.

6.2 Supply chain management competencies

Firstly, this chapter will discuss SCM competencies considered critical for omni-channel logistics. The SCM competencies are divided into two areas, SCM knowledge areas and applied SCM analysis. The two following chapters will discuss the two areas, respectively.

6.2.1 Supply chain management knowledge areas

The competencies related to SCM knowledge areas highlighted in the interview study and derived from the analysis in chapter 6.1 are presented in Table 6.2 below. All tables presenting competencies in the following chapters will include an example or explanation of the mentioned competence. Further, it will be communicated if the competence is derived from the interview study, our analysis or both in the last two columns. In the column "Study (# of cases)", it is stated how many respondents from our case companies mentioned the competence. The last column, "Analysis (Yes/No)" marks if the competence was identified in our analysis presented in chapter 6.1.

With literature outlining a plethora of SCM knowledge areas, interviewees highlighted only a few. Respondents primarily put their focus on other competence areas. However, the analysis in chapter 6.1 provided some additional insights into relevant knowledge areas within SCM.

Table 6.2 *SCM knowledge areas from the interviews and the analysis*

Competence	Example/explanation	Study (# of cases)	Analysis (Yes/No)
Supply chain management	Understand interdependence of processes	3	Yes
E-commerce	Expertise in piece pick and ship operations	1	Yes
Process management expertise	Experience and expertise in, for instance, Lean and Six Sigma	1	Yes
Net working capital	Minimize inventory locations in network	1	Yes
Warehouse operations	Reduce picking, put-away times, and transportations in the warehouse	3	Yes
Product development	Design and development of new solutions, e.g., digital services	1	No
SME within some area	Broad SCM knowledge combined with SME within for example inventory management	1	No
Goods flow optimization	Create efficient processes throughout the network and at individual nodes	0	Yes
Customer management	Measure customer satisfaction and ensure customer focus in all areas	0	Yes
Supplier management	Build good supplier relations to use in the business offers, e.g., dropshipments	0	Yes
Reverse logistics	Manage returned goods, parts, and scrap disposals	0	Yes
S&OP implementation and execution	Integrate customer-focused marketing plans with management of the supply chain	0	Yes
Advanced engineering competencies in warehouse workforce	Ability to customize, service, maintain, and improve automation solutions	0	Yes
Integration of automation and information systems	Knowledge of how to integrate purchased automation solutions with existing systems	0	Yes

Three high-level SCM knowledge areas that were outlined as critical in interviews and analysis, considering market trends and challenges, were *supply chain management, e-commerce,* and *process management expertise*. Firstly, *supply chain management* might be considered too rudimentary to mention in this context, but with the increased complexity of the goods flow, the variety of fulfillment options, and the interdependence of processes in omni-channel logistics (Hübner et al., 2015), *supply chain management* is a competence as important as ever before. It was also implicitly highlighted by IKEA, Elgiganten, and PostNord. As the respondent from PostNord mentions: "more supply chain skills are needed as inventory deployment, forecasting, multiple fulfillment methods and so on becomes more critical. It is not just about picking up and delivering parcels anymore". With the paradigm shift of logistics becoming more of a strategic function than an executing one, it is necessary to understand the entire value chain and trade-offs to create the prerequisites for efficient and effective processes at every single material handling node. Secondly, *with e-commerce* constituting an increasing share of growth and revenue, it is no longer enough with SCM competencies to handle the characteristics of a traditional bricks-and-mortar network. Retailers need to deepen their understanding of *e-commerce* and e-commerce logistics. Piece pick and ship operations are something that many retailers struggle to find efficiency in, why Delta highlighted that specific e-commerce efficiency levers need to be found. Taking inspiration from pure e-tailers and recruiting specialists with greater experience from such areas could be a way forward for retailers, something that Epsilon emphasizes as important when recruiting for more strategic roles. The online platform will not play a smaller part in the future, considering the impact of digitalization, why this aspect of retailing needs to get more focus.

Furthermore, we believe *process management expertise* to be a necessary ingredient in omni-channel logistics. By further adopting process management and methodologies such as Lean and Six Sigma, retailers will focus on what customers want and value, a core principle of Lean (Dombrowski & Mielke, 2013), and based on that, improve organizational performance. Even though such methodologies were initially developed for the manufacturing industry, they will benefit retailers in their processes. With many retail segments experiencing high seasonality and large return rates, Lean principles could be incorporated to level capacity and reduce waste and defects in processes. Fashion is one segment that could benefit significantly from increased quality and process improvement knowledge, enabling them to reduce their costly return flows.

Two more specific SCM knowledge areas that have been mentioned are *net working capital* and *product development.* Firstly, knowledge of how to minimize tied capital in the value chain is important, although only stated by Cervera during interviews, since retailing by its nature involves much inventory, and omni-channel retailing even more so given that inventory should serve two channels. On the other hand, for retail segments where the products are not as expensive, inventory is perhaps not the most critical component in reducing cost and turning a profit. Hence, this competence is primarily important for capital-heavy product segments such as premium home interior products or home appliances. For such retailers, it is more important to understand how they can leverage stores as showrooms and minimize the number of stocking locations in the value chain, to free up capital for other initiatives. However, reducing stocking locations might impact lead times and service levels. If service levels are considered the most important KPI, as one respondent believed, this might not be the best solution going forward. These tendencies are partly supported by our interview study, where fashion retailers such as Alpha stated that they more or less carry the same assortment in their online channel as their offline channel, while premium actors such as Cervera only carry about 10 % of their online assortment in each store. It should, however, be stated that Alpha's share of online exclusives is growing and that Gamma has both online exclusives and practice showrooming through

concept stores, indicating that *net working capital* is an area that gets greater focus across the industry.

Secondly, *product development* competencies are also important to different degrees depending on the company's position and maturity. This competence was only highlighted by Epsilon, in connection to developing technology solutions that will support the customer offering. Commonly, though, retailers are less technologically developed and outsource the development of apps, digital services, and similar solutions. As they mature technologically and digital services become a central component of the customer offering, this competence will be of higher importance. However, we can see that not many omni-channel retailers have come that far in their technological journey, concluding that *product development* competencies will not be critical soon for most actors.

In terms of SCM competencies, it is evident that retailers need to deepen their competence base within areas relating to external parties, for example, *supplier management*, *customer management,* and *reverse logistics*. These competencies are necessary to facilitate operational solutions such as dropshipments and strategic decisions concerning the logistics network. Good supplier relations must be built and used in customer offerings, as exemplified by Alpha's involvement of suppliers in their omni-channel packing initiative. Collaborating with suppliers and customers to come up with new solutions was also highlighted by Delta as important. Collaboration with suppliers, couriers, and other external parties was also mentioned during interviews as an important factor for gaining experience and accumulating knowledge. Another competence related to collaboration is *S&OP implementation and execution*, which requires internal departments to collaborate to better integrate marketing plans with the management of the supply chain and to achieve planning excellence and better handle demand peaks, something that several retailers mentioned as a struggle given the high impact of seasonality, campaigns, and promotions.

Finally, with automation becoming an increasingly common part of warehouse operations and processes are becoming digitalized, the roles of warehouse personnel, and thereby also the requirements on competencies, are changing. Firstly, implementation of such solutions is usually outsourced, as evident throughout the interview study. However, *advanced engineering* competencies are needed to service, maintain, and improve on these solutions. Secondly, competencies for the *integration of automation solutions with existing information systems* will be of increasing importance. This closely correlates with technological competencies, which will be discussed in chapter 6.4.2. Third, for processes that still require manual labor, *warehouse operations knowledge* is required. This is a comprehensive competence highlighted in the interviews with references to "skilled warehouse workers" and a "competent site manager". To make it concrete, this can refer to picking personnel who can pick for both channels and develop competencies within their area to improve the manual process. With the scope of this study being interviews with supply chain and logistics managers, we might have missed a deeper understanding of what competencies more operative personnel need to possess.

6.2.2 Applied supply chain management analysis

The competencies related to applied SCM analysis highlighted in the interview study and those derived from the analysis are presented in Table 6.3 below. Applied SCM analysis competencies refer to competencies required to carry out specific analysis and convert SCM knowledge into methods and processes. Besides those mentioned during interviews, we identified an additional three competencies during the analysis in chapter 6.1.

Table 6.3 *Applied SCM analysis competencies from the interviews and the analysis*

Competence	Example/explanation	Study (# of cases)	Analysis (Yes/No)
Facility location/network configuration analysis	Decisions on network structure, centralization degree and localization of individual nodes	3	Yes
Predictive analytics for forecasting	Use of advanced algorithms for forecasting and replenishment processes	2	Yes
Tactical planning and scheduling	Plan and schedule number of delivery days to stores, lead times, etc.	1	No
Leveling measures and dynamic capacity planning	Scale up/down capacity to handle seasonality, campaigns, etc.	0	Yes
Allocation	How to allocate inventory in the network and between fulfillment channels	0	Yes
AI for route planning	Use of advanced algorithms for last-mile delivery planning	0	Yes

With *network configuration* requiring challenging analyses that often necessitate support from external actors such as management consultancies, it is one of the most critical competencies in applied SCM analysis. Elgiganten's respondent stated that "how to build a network, decide what nodes are needed, what customer requirements are the main drivers and how to design the supply chain to cater for this" is challenging and requires external competencies, something that was supported by several other retailers. From the interviews and presented results, it has become evident that experience is a vital success factor for such projects and that retailers lack that experience since they do not undergo such significant transformations often, as emphasized by Implement's respondent. Alternatives to hiring consultancies to accelerate and support such projects would be to recruit or develop that competence internally. However, this would challenge how the resources possessing those expertise competencies would be utilized in their daily work when not carrying out transformation projects. Retailers naturally must focus a lot of time and resources on day-to-day operations, why it might not be possible to suddenly remove ten or more resources from their daily tasks to manage a *facility location* project. From a business case standpoint, this is an interesting question. Is it financially viable to recruit or develop those competencies in-house and have them constantly on the payroll, or should organizations instead hire a management consultancy for accelerating when necessary? As previously mentioned, it has also become critical to perform such analyses, take decisions, and implement them quickly, not to be exposed to changing markets, as mentioned by Gamma, Delta, and Epsilon. Five year-cycles for reconfiguring the logistics network are no longer viable, as the solution could be obsolete before the project is finished.

In terms of more tactical applied SCM analysis, we noticed a need for *forecasting, planning,* and *scheduling competencies*. To connect back to the challenge of flexibility, *dynamic allocation* and *dynamic capacity planning* are key mitigation strategies for the volatile demand that the entire retail industry is experiencing. This was outlined both by literature (Hübner et al., 2015; Marchet et al., 2018) and respondents from Alpha, IKEA, Elgiganten, and Gamma. *Predictive analysis for forecasting* and *tactical scheduling and planning* (number of delivery days, lead times, etc.) were mentioned during the interviews as important in this aspect by the respondent from Gamma. Additionally, the analysis identified the need for competencies within *leveling measures and dynamic capacity planning* to mitigate the flexibility challenge. As service levels, as mentioned, are an important measure and retailers need to secure availability and low lead times without compromising cost efficiency, these are key areas to build competencies within. With some retailers experiencing lead times of up to 20 days during

the disruptions of the pandemic, this evidently is something that might be lacking today. Finally, *AI* has been highlighted as a key technological competence by many retailers. More specifically, there is a significant upside to securing *AI competencies within route planning* and collaborating with couriers to cater to the vast array of delivery options in an efficient way. Route planning is complex, and it is hard to find optimal solutions, why this competence requires a combination of knowledge within transportation/distribution and analysis in terms of optimization and using IT for AI-based algorithms. These analyses are too complicated for a human to carry out by themselves, why it will rely on *AI* to an increasing extent as companies mature and secure further competencies within the area.

6.3 Foundational competencies

In this chapter, the foundational competencies required for successful omni-channel logistics will be analyzed. The first part will discuss behavioral and generic competencies, and the second part will consider the importance of the different elements within an academic foundation.

6.3.1 Behavioral and generic competencies

The behavioral and generic competencies highlighted in the interview study and derived from the analysis are presented in Table 6.4 below. For this competence group, it can be stated that there is a significant overlap between the competencies mentioned during the interviews and those derived from the analysis. Only one competence, namely an *innovative mindset*, was added to this group from the analysis.

Table 6.4 *Behavioral and generic competencies from the interview study and the analysis*

Competence	Example/explanation	Study (# of cases)	Analysis (Yes/No)
Leadership	Motivate others, create openness for others to develop	4	Yes
Project management	Lead the work of a team to meet project requirements	4	Yes
Structured thinking	Put a framework to an unstructured problem	1	Yes
Analytical ability and numerical skills	Ability to perceive, process and use calculations on qualitative data	6	Yes
Problem-solving	Recall and apply information to propose alternatives based on goal-oriented thinking	1	Yes
Supply chain collaboration	Involve external actors in strategic, tactical, and operational work	3	Yes
Cross-functional collaboration	Collaborate with other departments to make sure processes are aligned and interdependencies considered	4	Yes
Agile experience	Experience and knowledge of how to work in agile projects	3	Yes
Self-leadership	Ability to manage one's own time and resources efficiently in relation to different tasks	1	No
Communication and rhetorical skills	Ability to present and communicate information effectively and adjust communication to the audience	1	No
Information sharing	Share relevant information to involve and develop co-workers	1	No
Innovative mindset	Ability to generate creative or novel solutions that result in improved performance	0	Yes

Leadership and *project management* were among the competencies highlighted in chapter 6.1 as competencies that enable all key actions mentioned. Moreover, these competencies were both mentioned as essential by four respondents and something that several focus internal competence development efforts on. With the inherent complexity of omni-channel logistics, more work is project-based and involves several functions. Combined with the fact that the roles within the workforce tackling problems related to omni-channel tend to change quickly, *leadership* and *project management* become a core component of a logistics or supply chain manager in an omni-channel context. As one respondent put it, leadership is about "getting existing competencies to pull in the same direction". *Leadership* is also key in developing internal competencies by delegating tasks and *sharing information*, thereby developing the workforce. Most of the retailers are currently working on some strategic project related to omni-channel involving many resources from different functions, further highlighting the relevance of *project management* in this context. *Project management* also considers counteracting the slim margins in the industry by utilizing time and resources in the best way possible.

The next level of behavioral and generic competencies concerns *structured thinking, analytical ability,* and *problem-solving*. In roles connected to omni-channel, especially strategic decisions, large-scale transformations, and tackling major challenges, tasks are seldom repetitive. With retailers having to find new efficiency levers adapted to e-commerce, increase productivity in newly implemented automation solutions and design their network to support new customer expectations, they cannot always look to experience for the solution. Retailers need people who can recall and apply information to propose alternatives for *solving problems* based on goal-oriented thinking. Therefore, "moving from data to information to insight", as Implement puts it, is critical for the entire workforce in finding new solutions to new problems. Generic competencies such as *structured thinking* and *analytical abilities* are the foundation of this, with *analytical ability* being one of the most mentioned competencies during interviews, with six respondents highlighting it as essential.

Collaborating cross-functionally and *across the supply chain* are two other competencies that have been identified as critical both in retailers' current work and in their mission to overcome specific challenges and respond to trends. Having the inter-personal skills to *collaborate across functions* is necessary to ensure that last-mile delivery operations meet customer requirements, that warehouse operations meet delivery requirements, and that inventory planning meet warehouse requirements, to mention some aspects. As Delta's respondent stated, decisions in one end of the supply chain affect processes elsewhere. With services such as dropshipments playing an increasingly central role in adding value for customers while simultaneously decreasing inventory carrying costs for retailers, *collaboration with other actors* plays an as important role as collaboration within the company. This is made evident by the fact that two out of seven retailers offer drophsipments and that five retailers directly mention collaboration competencies as critical. In addition, *collaboration skills* must be supported by competencies within SCM and dynamic awareness, which partly has been and will be discussed later.

Furthermore, with emphasis on the ever-changing landscape and the capability to quickly adapt, *agile* and *innovative mindsets* have emerged as key competencies. *Agile* was mentioned in several interviews and further strengthens the importance of *project management, problem-solving,* and *collaboration skills*. Moreover, it focuses on creating working deliverables and iteratively improving them, also referred to as rapid prototyping. This, in combination with an *innovative mindset*, a competence derived from analysis, concludes that responding to change through innovation needs to be embedded in every organization dealing with omni-channel.

Some behavioral and generic competencies that have not yet been discussed are *communication*, *rhetorical skills,* and *self-leadership*. Although we acknowledge their general importance, they do not specifically contribute to successful omni-channel retailing and omni-channel logistics. The fact that many of these competencies were mentioned by only one retailer point towards that they are not of critical importance within this context. Moreover, this is supported by our analysis. Other examples of behavioral and generic competencies that the literature highlighted were *self-awareness*, *political skills*, *self-management*, and *self-motivation* (Derwik et al., 2016). These are also disregarded critical in the omni-channel logistics context due to the results and analysis. An aspect worth lifting is that the interview group consisted mainly of supply chain and logistics managers. If employees with more operational roles had been interviewed, the results might have been different.

6.3.2 Academic foundation

The academic foundation competencies highlighted in the interview study and derived from the analysis are presented in Table 6.5 below. While supply chain management fundamentals and data analysis were identified already in the interviews, two additional competencies within this area were concluded from the analysis: *data analysis in combination with commercial* and *incentive alignment and risk-sharing models*.

Table 6.5 *Academic foundation competencies from the interview study and the analysis*

Competence	Example/explanation	Study (# of cases)	Analysis (Yes/No)
Supply chain management fundamentals	Possess basic knowledge of supply chain activities and different elements involved in moving a product from supplier to customers	3	Yes
Data analysis	Ability to handle qualitative data and generate insights and material for decision-making based on relevant analysis methods	8	Yes
Data analysis in combination with commercial awareness	Data analysis with an outside-in perspective, where the customer requirements are used as a basis for analysis and decisions	0	Yes
Incentive alignment and risk-sharing models	Ability to develop and implement incentive and risk-sharing models that cater to the omni-channel landscape	0	Yes

During interviews, there was somewhat of a discrepancy in the importance of *supply chain fundamentals* as a competence in omni-channel logistics. While three retailers highlighted it as important to have a basic logistics understanding and an academic foundation within supply chain, several retailers also highlighted that it is hard for academics to stay relevant and up to date within a field so fast-paced as omni-channel. Furthermore, experience was by one retailer mentioned as "equally important as an *academic foundation in supply chain management*; a combination of the two is key". The importance of this factor, both in terms of *logistics experience* and *retail experience*, will be discussed further in chapter 6.4.1. What can be concluded from this is that competencies within *supply chain fundamentals* are critical for omni-channel logistics but how one assimilates them, whether it is through education or experience, is less important. Delta's respondent mentioned that it is hard for academics to keep up with a fast-paced field as omni-channel. For academics to contribute further to the development of omni-channel logistics competencies, the focus of the curriculum needs to shift

from purely conventional aspects as materials management and physical distribution to IT, commercial awareness, and other competencies highlighted as important in this study. Retailers do not see academic foundation competencies as critical today, except for the broader competence data analysis, but this implies that there is room for academics to contribute further by collaborating with practitioners to understand and cater to their future competence needs.

One aspect of academic foundation that was not mentioned during interviews but concluded from the analysis was competencies within *incentive alignment and risk-sharing models*. Although this can be considered to fall under *supply chain fundamentals*, we believe that there is an increased need for knowledge and education within these areas, as supply chain collaboration is considered necessary for successful omni-channel logistics. As highlighted by Cervera's respondent, the omni-channel customer offering can create difficulties in incentive models, for example, when the party that receives the payment gets the sale, even though the handling of the order falls on another node in the supply chain.

The *ability to analyze data* is central to all aspects of omni-channel logistics and omni-channel retailing. Analyzing the large amounts of consumer data available to retailers today requires a foundation in mathematics, statistics, and analytical thinking. Data scientists are becoming increasingly important in retail organizations since big data and more extensive data analysis are needed to support all business decisions. What has become evident from interviews and analysis is that *data analysis* competencies alone are not enough. They need to be combined with other competencies for retailers to excel fully. If the purpose of the analysis and what insights the data should be converted to are not defined, then the analysis competencies will not be fully utilized. *Commercial awareness* is one competence that, when combined with *data analysis*, enables building and understanding customer journeys and utilizing customer data to customize communication and offerings, highlighted as critical by Implement's respondent among others. Commercial awareness will be discussed more in detail under chapter 6.4.1.

Moreover, it is no longer sufficient to handle large Excel files, which obligates other data handling and analysis tools, such as Power BI, Python, and SQL. This compels additional technological competencies to supplement those within *data analysis*. Although the competencies within *data analysis* clearly are a foundation for omni-channel work, the extent to which they need to be developed, and their importance depend on the retailer's technological maturity. Some retailers are still building customer journeys and trying to understand customer data, while, for example, Cervera has expanded to using Google search data and macro data more extensively. Epsilon, the e-tailer, is more advanced than the traditional retailers in this regard, and a more significant part of their workforce has data scientist roles. With the impact of digitalization and as retailers are maturing technologically, we will only see an increased need for *data analysis*-related competencies, even though it has already been highlighted as one of the most important areas.

6.4 Supporting functional competencies

6.4.1 Dynamic awareness

The dynamic awareness competencies highlighted in the interview study and derived from the analysis are presented in Table 6.6 below. For this competence group, there is a great overlap between the competencies mentioned during the interviews and those derived from the analysis. We only added one competence in the analysis, namely *change management*

experience, which was never explicitly mentioned in the interviews but unquestionably discussed implicitly.

Table 6.6 *Dynamic awareness competencies from the interview study and the analysis*

Competence	Example/explanation	Study (# of cases)	Analysis (Yes/No)
Logistics experience and awareness	Previous experience from logistics-related roles and projects	6	Yes
Industrial experience and awareness	Previous experience from the retail industry	4	Yes
Commercial/customer awareness	Knowledge of the customer offering, demand requirements, and customer journeys	6	Yes
Sustainability	Frameworks around circular economy, sustainable transportation, etc.	4	Yes
Holistic perspective	Understand the interconnection of processes, different internal functions, and trade-offs in the supply chain	2	Yes
Stakeholder management	Develop and maintain good relations with individuals, both external and internal	1	Yes
Operational expertise, experience, and awareness	Understand limitations in operational processes	1	Yes
Execution skills	Ability to plan, develop, recommend, and execute on plans and strategies	4	No
Performance measurement/evaluation	Use key performance indicators, benchmarks, and best practices to monitor and evaluate performance	1	No
Strategic awareness	Develop and understand strategies and long-term plans of the company	2	Yes
Change management experience	Effectively communicate change initiatives to all levels of the organization	0	Yes

Competencies related to dynamic awareness are by nature spanning over multiple areas and are high-level. As discussed in chapter 6.3.1, experience is a competence highly valued within the complex context of omni-channel logistics. First, *logistics experience and awareness* was mentioned as especially important in the interviews. Some processes demand logistics experience more than others, but the critical aspect of experience is the general awareness accumulated over the years. Having experienced pressing problems and chaos in the logistics network in real life equips an individual with a know-how that is hard to teach at universities. Knowing how to tackle sudden problems effectively and having a pragmatic attitude towards the ultimate truth of theory taught in academics is critical. This is especially true for complex tasks such as network configuration, mainly emphasized by Alpha, Elgiganten, and Implement, where experience is crucial in knowing "best-practice" and minimizing time spent on such projects. Another aspect of logistics experience is the network an individual accumulates over their work life. Having good relations with couriers and contacts within specific fields could be of strategic importance.

Secondly, *industrial experience and awareness*, and within the company for that matter, is significant for the understanding of the retail industry's requirements and limitations. With experience, other competencies are also developed, such as leadership, that can contribute to more successful omni-channel retailing. Having experience from the specific company is advantageous because an understanding of the company's history, culture, products, and customer offerings can favor buy-in from colleagues if changes must be made. Three retailers,

Cervera, Gamma, and Delta, specifically highlight that they value the experience one assimilates by being at the company for a longer time.

As stated under chapter 6.3.2, it is essential to incorporate a customer-centric mindset in almost all processes in omni-channel logistics and tie them to the customer journey. Understanding how changes in the customer offering put pressure on omni-channel logistics and what limitations the logistics demonstrate regarding what can be offered to the customer is vital. Having this *holistic perspective* and understanding of the interconnection of processes, paired with *commercial awareness*, is a key factor for operating omni-channel logistics. This concerns commercial awareness and the interconnection of logistics processes as well as other functions within the company, for example, product development and purchasing. General business acumen and insights will facilitate each part of the omni-channel business since one of the biggest challenges is interpreting and intercepting trends and responding to them. Interpreting trends, emphasized as important by Beta, Cervera, IKEA, and Delta, not only requires a *holistic perspective* but needs to be supported by, for example, data analysis, as discussed in chapter 6.3.2.

One insistent trend previously highlighted is *sustainability*. It is vital to have general dynamic awareness competencies to respond to the increased sustainability focus and SME within sustainability. This can include understanding product life cycles to realize how to set up the supply chain to allow for circularity and interaction with different departments and supply chain actors to better collaborate around sustainability. Further, having experience within logistics and the industry helps comprehend in what parts of the logistics it is possible to tweak to best achieve impact. Although sustainability was emphasized as important throughout the interviews and it has been highlighted that this trend impacts all actions, it is evident that there is a lack of concrete competencies that can support retailers' sustainability-journey. Since it is a relatively new field for many actors, practitioners do not yet have the necessary understanding of which sustainability-related competencies that will be necessary.

Tweaking specific parts of the logistics and trying out concepts requires *execution skills*. Having the ability to act upon perceived trends, data, and so on demands forceful execution and decision power. Shortening transformation cycles is a non-negotiable for omni-channel logistics going forward. Attaining this requires an organizational structure that supports decision-making, without complex and fragmented decision authorities, which is more of an organizational capability. This statement is supported by Elgiganten, who argues that implementation power is needed for converting strategic plans to decisions and actions. To set a direction for the business and fulfill plans and strategies efficiently, this calls for individuals to develop, recommend and execute activities. Developing strategic, long-term plans also requires *strategic awareness,* a competence mentioned by Elgiganten and Delta. Besides *strategic awareness, operational expertise, experience, and awareness* are of high utility in a strategic decision-making role. The operational awareness supplies an individual with the understanding of limitations in processes and resources, for instance, in warehouses, and the comprehension of whether solutions discussed are feasible or not. With all changes occurring in an omni-channel context, *stakeholder management* is vital throughout all processes. Both in actual process development and optimization, since individuals get new tasks and responsibilities, but also connected to end-to-end collaboration across the supply chain. It is critical to keep individuals satisfied and to maintain professional relations when demanding such dynamic performance.

Consequently, the performance must be measured and evaluated. This connects back to working agile since one must have good measurements in place to benchmark progress against

a baseline when prototyping concepts. The omni-channel eruption in retail logistics, in our opinion, demands a shift in traditional performance measurements. With the increased focus on customer satisfaction and the interconnection of processes, some key performance indicators may have to be compromised to benefit the customer's seamless journey. As Cervera's respondent states, "service level is the most important measure, and we need to compromise in terms of inventory cost and inventory turnover rate". We believe this will inevitably call for new ways to measure the performance of omni-channel logistics. In this transformation, skilled individuals with a great understanding of *performance measurement and evaluation* will be required.

Finally, there have been multiple indications that omni-channel tends to implicate changes for retailers, both in the organization and individual employees' daily tasks. To succeed with all these changes, organizations will need skilled change managers who communicate the changes to the organization. *Change management expertise* is required to explain why the change is essential, from motivating it on a strategic business level for senior managers and the individual employee and why they should get more tasks and responsibilities.

6.4.2 Technological competencies

The technological competencies highlighted in the interview study and derived from the analysis are presented in Table 6.7 below. Technological competencies mainly relate to IS and IT and specific expertise within automation and other digital solutions. All technological competencies outlined as important by respondents during the interviews were also identified in the analysis, except for *WMS expertise*. Moreover, the analysis pointed out three additional competencies within the competence area.

Table 6.7 *Technological competencies from the interview study and the analysis*

Competence	Example/explanation	Study (# of cases)	Analysis (Yes/No)
Information system knowledge and understanding	Knowledge of the system landscape, the functionalities of different systems, and limitations in the interfaces	3	Yes
Information technology knowledge	Knowledge of available technology to support back-end logistics processes, e.g., RFID for real-time data	2	Yes
Connecting logistics flows to IT	Understanding of how logistics flows are connected to and visualized in systems	4	Yes
IoT/AI/ML understanding and knowledge	Understand what these solutions mean and how to work with the developed tools in day-to-day operations	4	Yes
Requirement setting	How to set requirements on system suppliers to cater to customization needs	2	Yes
Automation understanding	Knowledge of automation solutions, how they can be leveraged to increase efficiency, and what customizations are necessary	2	Yes
WMS expertise	Understand how to utilize WMS for optimizing replenishment, pick rounds, etc.	1	No
Integration of automation and information systems	Knowledge of how to integrate purchased automation solutions with existing systems	0	Yes
Technological solution development	Develop solutions that support the customer offering in apps, the e-commerce platform, or through self-service technology	0	Yes
Advanced engineering competencies in warehouse workforce	Ability to customize, service, maintain, and improve automation solutions	0	Yes

As outlined several times during empirics and analysis, retailers have traditionally outsourced most responsibilities connected to IT and IS. Their *information system knowledge* and *information technology knowledge* have, as a result, been limited. With e-commerce platforms, app development, automation solutions, and IS being developed or managed externally, retailers need to improve their competencies within *requirement setting* to secure systems and functions that are customized and cater to their specific needs regarding network configuration and product characteristics. Two retailers mention this, with Cervera's respondent claiming it to be critical in achieving better system integration. Even though many retailers believe suppliers can do a better job providing these solutions, systems, and platforms, projects should be managed internally to leverage experience, change management expertise, and cultural aspects. To communicate these requirements to suppliers and integration partners, *connecting logistics flows to IT* becomes a critical competence. Knowing what processes and flows look like in systems is necessary when specifying requirements that will support seamless logistics and enable retailers to innovate in logistics and the customer offering. Going forward, we believe that IT and IS must be made a core competence in-house. Since real-time data and digital services are at the core of an integrated omni-channel customer offering, retailers need to venture deeper into developing and recruiting these competencies. Otherwise, business intelligence will not be kept, maintained, and leveraged to a sufficient extent, something that Delta's respondent thinks retailers need to consider to a more considerable extent when deciding whether to outsource. In connection to IT and IS, we can highlight that the two fashion retailers are the only ones currently not picking orders in-store since they do not have the real-time data and system support necessary. It will be imperative for them to secure deeper competencies related to IT and, for example, RFID.

The customer offering, especially in the online channel, needs to be supported by digital services to create opportunities for customers to get similar service as when visiting a physical store and make the customer journey smooth. Such solutions can also create significant benefits for back-end logistics. For example, Epsilon is developing AR solutions that allow customers to see the fit of clothing items before purchasing them. IKEA uses similar solutions in their app allowing customers to view how the product would look like in their home before purchasing. Besides potentially increasing revenue streams, this creates a platform for more considered online purchases and will, thereby, most probably lead to a lower return flow. Therefore, *technical solution development* competencies should be something omni-channel logistics should focus even more on. Especially within industries where products are size/fit/measurement dependent, there is a tremendous upside in simplifying the online purchases and supporting the customer in that journey. Besides requiring competencies within *product development* (an SCM knowledge area), *IoT, ML and AI* competencies will be required. A basic understanding within these areas is necessary to identify potential new services and solutions, while additional competencies within programming, for example, Python, will be essential to possess to move the entire development process in-house. Hence, retailers will have to acquire more data scientist roles if they want to be present in the *technological solution development* space in the future.

Lastly, the importance of IS and competencies within this area has been underlined as critical throughout the report. One of the most extensive improvement areas seems to lie within warehouse operations since warehousing is critical from an efficiency standpoint, and automation is becoming almost a prerequisite for fulfilling online orders. The retailers mentioned automation solutions as one way of overcoming challenges in flexibility. As one respondent mentions, with the increasing e-commerce, "automation might be the only way forward". First, *automation knowledge and understanding* are required to utilize the solutions purchased and implemented by automation suppliers. Over time, automation needs to be customized to increase productivity and decisions on when to scale up or down and why needs to be taken, and retailers cannot rely on outsourcing all competencies related to automation. *Advanced engineering competencies* are required in the warehouse workforce to support in this matter and ensure maintenance of the system. Second, it must be ensured that the automation solutions are *integrated with existing information systems*, where the importance of both a warehouse control system and WMS (Kembro & Norrman, 2019a) can be mentioned. *WMS expertise* was mentioned as a necessity for having warehouse operations in-house by Cervera's respondent. Going forward, it will not be desirable for retail organizations to, for example, put themselves in a position where they rely on one external party for automation implementation, a second for WMS implementation, and a third for integration. Even if only one system supplier is used for all these purposes, outsourcing will still increase retailers' dependence on external parties, resulting in loss of business intelligence when the system provider finishes the implementation.

Concluding, with IT and IS playing a leading role in omni-channel logistics, retailers can no longer view it as a supporting competence and outsource all related functions. First, the general knowledge must be increased to enable adequate requirement setting and put pressure on suppliers to deliver customized solutions. Then, competencies need to be moved in-house as the organization's technological maturity increases, as this will support the integration of systems and facilitate innovations in the customer offering through new digital solutions.

7 Omni-channel logistics personas and their required competencies

The implications on competence requirements arising from prominent market trends and logistical challenges have been analyzed coming into this chapter. In combination with the results on competencies from the interview study, they have been analyzed and discussed in connection to the six competence areas from the conceptual framework. This chapter will condense the competencies highlighted as especially important into five different personas that we believe will be important in future omni-channel logistics. Each persona will consist of a set of competencies that complement each other.

Firstly, it should be stated that there are some competencies that all personas need to possess. Collaboration skills, both in collaborating cross-functionally internally and across the supply chain, are required for all people working with omni-channel logistics. The interconnection of processes and increased dependence on external partners, considering the importance of, for example, dropshipments and automation solutions, are motivators for these competencies. One could presume that generic competencies like project management, agile methods, and problem-solving are needed in all omni-channel logistics employees. We would suggest that those are vital competencies for all project teams, however, it is enough that some people have these competencies and manage the daily work based on their competence-base.

We will present five personas with varying competencies and responsibilities. Figure 7.1 below presents an overview of the five personas: *the experienced strategic transformation manager, the customer-centric logistician, the warehousing technology and system expert, the data-driven generalist, and the data scientist*. The following pages will elaborate on all personas and their associated competencies and responsibilities.

However, it is important to keep in mind that these are personas developed by us as a part of our analysis. Therefore, they are naturally not the only right answer to companies looking to acquire employees for their omni-channel logistics work. Nevertheless, it does provide an inspiration and one part of the solution. Companies reading this must take their company specific aspects and prerequisites into consideration.

Figure 7.1 *An overview of the five personas identified*

The first persona is *the experienced strategic transformation manager*, see Figure 7.2.

Figure 7.2 *Competencies and responsibilities for "the experienced strategic transformation manager"*

The experienced strategic transformation manager has solid expertise and knowledge within supply chain management, goods flow optimization, net working capital, reverse logistics, and network configuration. This persona has experience in all forms, from logistics in general to the industry and company especially. Given that the tasks for this persona should include making strategic decisions and setting the direction for the strategy, having a holistic perspective will help in the role. Also, strategic awareness combined with operational expertise and experience, or awareness will guide discussions only to consider alternatives that are feasible down to the operational level. The experienced strategic transformation manager should naturally also be a skilled project manager and change management expert. To develop strategic directions, detail transformations, and manage them, there is a need for change communication and people management. Finally, an integral part of this persona's competence base is sustainability, since it needs to set the agenda for the company's sustainability efforts. Sustainability was identified as a prominent trend and will be critical for companies to act on for their future company success and position. It all starts with the long-term plan and therefore it is vital for strategic managers to incorporate it in their work.

This persona is critical for retailers to secure, given the current challenge of performing large-scale transformations (see chapter 5.2.4) effectively and at an adequate speed. To reach the latter stages in the 5-stage evolutionary approach for moving to omni-channel proposed by Ashworth et al. (2006), retailers need to reorganize people and structures. This was made evident during interviews, where Gamma has implemented a Supply Chain Center of Excellence to move away from viewing logistics as an executive function. Such reorganization is necessary to make room for this persona and view logistics as a more strategic function. The role of logistics and supply chain managers has changed dramatically with the globalization of supply chains and continued outsourcing (Derwik et al., 2016; Gammelgaard & Larson, 2001), why strategic roles within logistics organizations need to be rethought. Alpha supports this by mentioning that industry requirements will reduce administrative roles and urge more strategic competencies. With the inherent interconnection of omni-channel logistics processes (Hübner et al., 2015), supply chain design is a challenging task, as evident by the fact that six of seven retailers have used management consultants for such projects. The interview study emphasized that involving industry and company experience is crucial for successful transformation

projects, why an increased focus should be put on acquiring or developing the experienced strategic transformation manager in-house.

The second persona is *the customer-centric logistician*, see Figure 7.3.

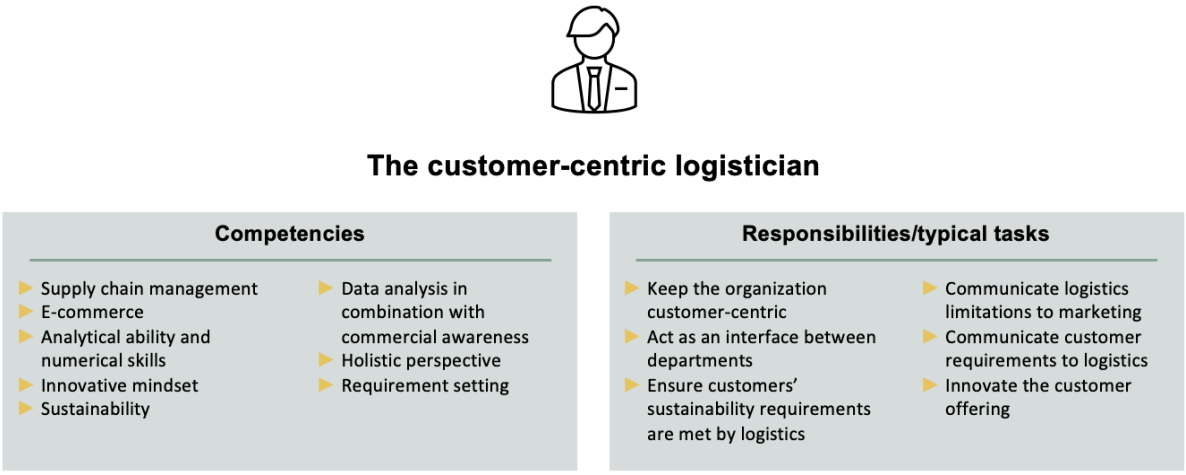


Figure 7.3 *Competencies and responsibilities for "the customer-centric logistician"*

The customer-centric logistician will require competencies within data analysis combined with commercial awareness, supply chain management, and requirement setting. Vital competencies are also analytical ability and numerical skills, an innovative mindset, and a holistic perspective. This person is responsible for keeping the retail organization and the back-end logistics customer-focused at all times. By analyzing customer data and knowing different demand requirements, *the customer-centric logistician* ensures that the customer expectations are kept in mind in all decisions and processes. This person will often act as an interface between internal departments and communicate customer requirements to logistics and logistics limitations to the commercial side. A vital part in the interface are the sustainability requirements from customers but also from external actors like governments. This persona will therefore have to have competencies within sustainability aspects and be able to formulate initiatives to ensure customers' sustainability requirements are met by logistics. This persona will also work together with the IT department and data scientists to suggest new customer offerings and co-create digital services and technological solutions to support this, why this person needs to be proficient in requirements setting.

The omni-channel customer offering gives rise to many different customer journeys (Cao, 2014; Galipoğlu et al., 2018), which challenges the back-end logistics through an increasingly complex flow of goods (Bernon et al., 2016; Ishfaq et al., 2016; Wallace et al., 2009). Four different retailers state that all actions must start with the customer, with the respondent from Delta stating that "customers are the reason why a company exists, and all actions have to be based on what the customer wants". The respondent from Implement emphasizes that understanding the customer journey and the cross-channel movements is a challenge. With the quickly changing demand requirements discussed in chapter 5.1.2 and the freedom demanded in customer interactions (Piotrowicz & Cuthbertson, 2014), the logistics department needs to cater to more fulfillment and return options. The growth of the volatile e-commerce (Hübner et al., 2015; Marchet et al., 2018), seasonality, and campaigns are other driving forces that make this persona increasingly important for successful omni-channel logistics. By having insights into consumer data, the proper requirements can be set for back-end logistics. This will be crucial in overcoming the flexibility challenge outlined in chapter 5.2.1. If customer expectations such as lead times and assortment are unmet, the company will inevitably lose

market shares. As Delta's respondent puts it: "if customers do not find the offering attractive enough, they will simply go to a competitor". *The customer-centric logistician* will ensure that the customer offering is innovated and kept relevant while simultaneously ensuring that logistics limitations are considered.

The third persona is *the warehousing technology and system expert*, see Figure 7.4.

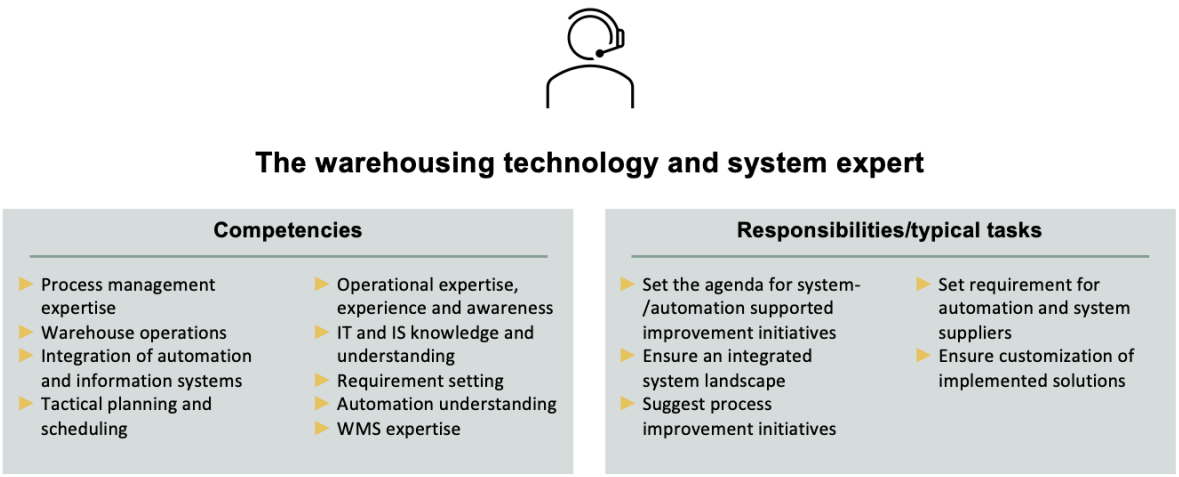


Figure 7.4 *Competencies and responsibilities for "the warehousing technology and system expert"*

The *warehousing technology and system expert* fills the role of connecting warehouse process expertise with strong IT and IS knowledge. Firstly, this individual will have to carry solid warehouse operations and process management competencies, understand the limitations of processes, see improvement potential and assess the feasibility and impact of different automation and IT initiatives. Secondly, a great understanding of automation and information systems is necessary to implement and customize automation initiatives to improve existing processes and integrate systems. More specifically, the warehousing technology and system expert must possess WMS expertise and set detailed requirements on automation and system suppliers. These requirements should cater to the needs of all processes related to warehouse operations, whether those warehouses only handle store replenishments, are customer fulfillment units, or integrated warehouses.

Integration of systems, connecting logistics with IT and IS, and making IT and IS a core competence were the three keys to overcoming the challenge retailers face regarding IT and IS, presented in chapter 5.2.3. Securing a *warehousing technology and system expert* is one step in bridging this challenge. Cervera, Gamma, and Delta mention that their most significant investments linked to omni-channel were related to IS, further highlighting the criticality of having a suitable system landscape. Although channel-integrated systems can improve efficiency and overall performance (Oh et al., 2012), many retailers still rely on channel-specific system structures (Zhang et al., 2020). The retailers in the interview study have integrated systems to different extents, with some struggling more to make all stock available for both channels. Alpha's respondent states that they need to improve the availability of real-time data to support the customer offering and enable picking in-store. Here, *the warehousing technology and system expert* will provide IT expertise to support and motivate such solutions.

Moreover, *the warehousing technology and system expert* will help retailers in the cost and efficiency challenge presented in chapter 5.2.2. Piece pick, pack and ship operations are costly given the small order sizes (Hübner et al., 2015) and with the growing e-commerce (Bernon et al., 2016; Marchet et al., 2018) resulting from digitalization (chapter 5.1.1) and further

accelerated by covid-19, retailers need to find e-commerce specific efficiency levers. This was highlighted, among others, by the respondent from IKEA, who stated that "cost efficiency in the entire process to the customer is a big challenge". What was highlighted both by literature (Kembro & Norrman, 2019b) and the retailers in the interview study, among them IKEA and Delta, is that automation will be required to create efficiency in omni-channel logistics operations. With automation understanding, process management expertise competencies, and a deep understanding of warehouse operations, this persona will enable retailers to reach efficiency at the individual nodes.

The fourth persona is *the data-driven generalist*, see Figure 7.5.

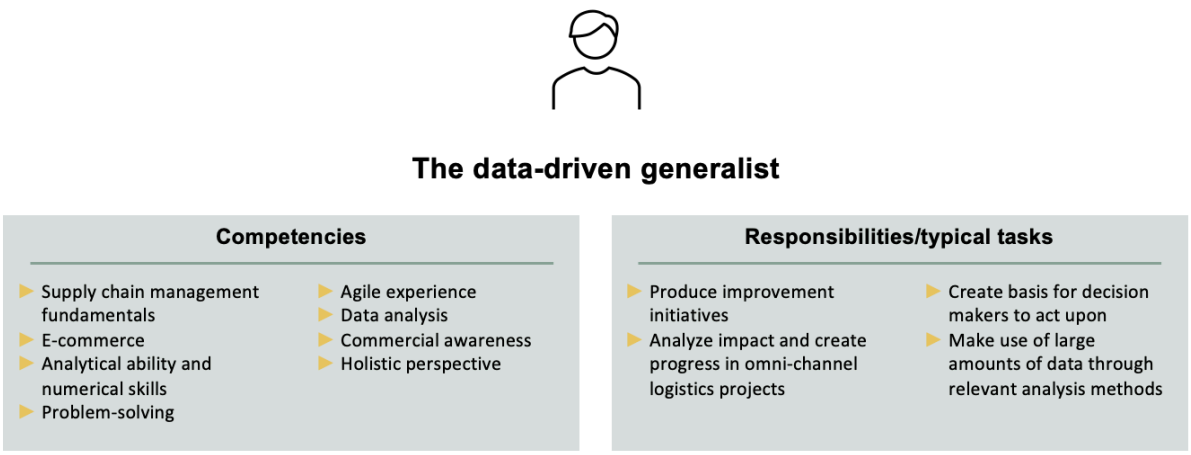


Figure 7.5 *Competencies and responsibilities for "the data-driven generalist"*

The data-driven generalist must possess competencies within supply chain fundamentals, e-commerce, problem-solving, data analysis, agile methods, and commercial awareness. The persona must also have a holistic perspective and a strong analytical ability, including numerical skills. In the daily work, *the data-driven generalist* should develop improvement initiatives, analyze how to create impact in omni-channel logistics projects, and create a basis for decision-makers to act upon. This will require the person to work cross-functionally in agile projects and make use of large amounts of data through suitable analysis methods.

During the interview study, data analysis was the most commonly mentioned competence required for successful omni-channel logistics, with eight out of ten respondents highlighting it. Digitalization has contributed to the large amounts of consumer data available to retailers today, as highlighted in chapter 5.1.1, calling for additional competencies within data analysis. Beta's respondent stated that especially considering the fast-changing environment this is "the most important competence: to visualize flows, create a story around it, see trends and explain them". Alpha mentioned that "data analysis is a critical competence in order to support and make decisions". With consumers' new shopping behaviors and raised expectations on delivery times and service (Hübner et al., 2015), it is crucial to have the "analytical ability to understand changing customer behavior, draw conclusions and act upon it", as the respondent from IKEA puts it. *The data-driven generalist* is a critical persona for omni-channel retailers to possess to not depend on consultant support for large amounts of analysis. With the inherent complexity of omni-channel logistics, it becomes increasingly important to have the ability to analyze macro and micro trends while simultaneously have a holistic perspective to connect multiple areas. This persona will ensure that omni-channel logistics adapt to the trends affecting the landscape, outlined in chapter 5.1.

The fifth persona is *the data-scientist*, see Figure 7.6.

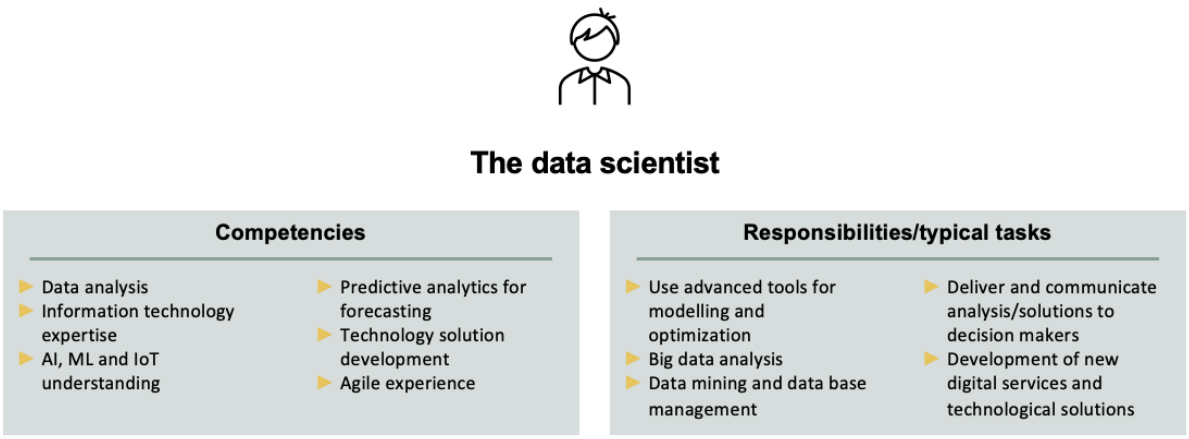


Figure 7.6 *Competencies and responsibilities for "the data-scientist"*

The data scientist will enable retailers to accommodate the digitalization trend and incorporate a digital native mindset into omni-channel logistics. Individuals with this persona need to have an excellent understanding of IT, AI, ML, and IoT. They should be able to use advanced tools for modeling and optimization and work in agile projects. The individuals will deploy these competencies in technology solution development, predictive analytics for forecasting, route planning, and other optimization initiatives. The *data scientist* does not necessarily have to be knowledgeable within the field of supply chain since requirements for the solutions should be set by the logistics department or commercial functions. This individual should only provide solutions and perform analyses, which will be delivered to managers and decision-makers. As organizations increase data availability, the *data scientist* role will be increasingly important and can provide much value for retailers in terms of efficiency and effectiveness. However, in this thesis, we saw that mainly technologically mature companies focus on securing people with this set of competencies. We suggest that all retailers could benefit from involving this type of persona in their businesses.

Several retailers, for example, Alpha, Cervera, and Delta, emphasized an increasing need for data mining skills and people that can work with tools such as Power BI. The respondent from Delta says that "the ability to handle a large Excel file is no longer enough, but you have to connect visualization tools such as Power BI and know how to analyze data". Several retailers, for example, Alpha, already has some people working with data science to handle the large amounts of data generated on SKU and store-level. However, most retailers have not ventured far in this area compared to the e-tailer Epsilon. Epsilon is very mature technologically and focuses a lot of their efforts on developing technological solutions that will support both the customer offering and back-end logistics, for example AR solutions that support the online buying experience and minimize returns. While not all customers demand the same level of interaction with technology (Piotrowicz & Cuthbertson, 2014), the pandemic and the impact of digitalization has contributed to more demographics using digital channels. Inevitably, as both companies and consumers become more technologically mature, the importance of *the data scientist* persona will increase.

8 Discussion and implications

In this chapter, we will take a step back and discuss the general implications of the study. The competencies and personas identified and their role in future omni-channel retail organizations will be outlined. This chapter will also highlight how the retailers' different conditions regarding product characteristics and technological maturity impact their competence situation.

Omni-channel retailing has forced entire organizations to rethink their logistics network and fulfillment operations (Hübner et al., 2015; Hübner, Wollenburg, et al., 2016; Marchet et al., 2018), which, in many ways, has resulted in an endeavor to remove silo-thinking in businesses. The logistics function cannot keep operating isolated in its silo, which means that the competence requirements for omni-channel logistics become more complex and intertwined, as showcased by the results of the interview study. This finding is also supported by the interdependence of logistics processes (Hübner et al., 2015) and the trends and challenges contributing to the complex omni-channel landscape outlined in chapter 5.3. Critical competencies no longer only relate to specific supply chain and logistics competencies. Instead, they include many soft values and competencies related to dynamic consciousness in business landscapes, like collaboration, agile methods, and stakeholder management. This shift is shown by the great relevance of behavioral and generic competencies and dynamic awareness, as outlined in chapters 6.3.1 and 6.4.1, respectively. Answering what competencies will be required to enable successful omni-channel logistics is not as easy as diving into a set of specific competencies. We have found that the key is often in the connection between competencies, and it is not easy to precisely pinpoint which competencies contribute to what output. Given that, we have clustered specific competencies into six comprehensive categories to communicate the core of what is needed.

Overall, we propose a call for further competence development programs and efforts within some specific areas that omni-channel logistics give rise to, for instance, commercial awareness and agile methods, as there is a lack of this is practice. On the other hand, some competencies and general awareness are better accumulated through experience, as highlighted by several respondents in the interview study, and are challenging to comprehend early in a career. Further, what competence areas demand what development is judged based on the prerequisites of each organization. Aspects like product characteristics, industry-specific requirements, and technological maturity need to be considered when deciding what competencies are required. For example, technical solutions like AR might be more relevant for size, fit, or measurement-dependent products, like furniture and clothes, to minimize the return flow and pressure on logistics.

On the other hand, smaller and less mature organizations might want to focus on developing data analysis competencies to improve business intelligence, meet customer requirements, and respond to trends requiring logistics resources more competently. The case companies in this thesis all had different maturity levels, both in terms of omni-channel and technologically, which gives them different prerequisites that change their current competence need. There was often a gap in advanced analytics and transformation power, as highlighted through the challenge that large-scale transformations constitute, which we believe will dictate the degree of outsourcing for different organizations going forward. Organizations will have to map current and desired core competencies and reconsider their outsourcing model based on their competence strategy. We urge organizations to read our thesis to get inspiration and insights

into what areas might be relevant for them to develop and acquire competencies. To facilitate the process from insights to action, we developed five omni-channel logistics personas that we thought should exist in an omni-channel retailer's organization to enable successful omni-channel logistics.

Regarding the five different personas identified, company prerequisites such as technological maturity need to be considered. For example, if data is not captured, stored, and made available for analysis to a sufficient extent, there will be no use in securing data scientist personas. The same goes for the warehousing technology and system expert, a persona that probably will not be relevant for retailers that have warehousing outsourced. All retailers do not experience the same challenges related to omni-channel logistics and their competencies, as they have different backgrounds and prerequisites. Some have operated integrated warehouses and integrated IS for a long time, implying that they have less of a need to secure competencies that will bridge, for example, real-time data challenges. However, the trends and challenges highlighted in chapters 5.1 and 5.2 of this thesis will impact the entire future omni-channel landscape, and retailers need to consider how they will respond to this. On a high level, we believe that retailers would benefit from taking inspiration and recruiting from other industries. With the continuous growth of e-commerce, omni-channel retailers from a bricks-and-mortar-retailing background could benefit from looking at pure e-commerce players or omni-channel retailers originating from the online channel. They will have more significant experience and knowledge of logistics aspects such as piece pick, pack, and ship operations. The same goes for the incorporation of digital services and technological solutions in the customer offering. For example, the giant e-tailer Epsilon has proven more mature within data science and associated competencies. Omni-channel retailers that originally come from the bricks-and-mortar business might not possess the capabilities to develop those competencies internally, why they need to look outside of the company and outside of their specific industry for recruitment, strategic partnerships, and collaboration.

How to fit these personas into the different roles of the logistics organization is also a question of how omni-channel retailers organize. Omni-channel has no natural place in a traditional organization chart, and different organizational structures are suitable for different retailers. Global players with a large logistics organization might create a specific function for supply chain strategy, such as Gamma's Supply Chain Center of Excellence, while this is not possible for smaller retailers where two or three persons are responsible for the entire strategic agenda of omni-channel logistics. Then, there will be no room for a niched persona such as a warehousing technology and system expert or a strategic transformation manager. However, analysis shows that retailers generally need to organize less process, channel, or function-oriented and more project and product-oriented to secure cross-functional collaboration, ensure progress, and leverage synergies between channels.

The practical implications discussed above are naturally dependent on our methodological choices and our analysis approach. Our primary method of data collection was semi-structured interviews. Given this format, respondents seldom covered all competence areas but instead directed the discussion to specific competencies relevant to their situation, their current omni-channel projects, and challenges. Hence, cross-case analysis was complex since the data collected from different interviews were not directly comparable. Given these factors, the ideation analysis indicating competence requirements arising from prominent market trends and challenges was considered necessary. This analysis provided a more comprehensive view of competencies required for the retail industry in general rather than what is needed to overcome company-specific challenges. A further challenge with a qualitative study was that the importance of different competencies was hard to determine since the strength of different opinions cannot be compared to one another. Although these limitations exist, the methodological choice was necessary given the unexplored nature of the area. This thesis could not build on any previous research within the area since no such research on competence requirements within omni-channel logistics has been conducted. This fact also impacted the literature review and the possibility to put results and analysis in comparison to related literature. With the thesis's purpose of exploring competence requirements, we believe that the methodology and analysis provided a mapping of competencies related to the successful operation of omni-channel logistics that can benefit retailers.

9 Conclusion

This chapter will conclude the thesis by summarizing the key findings, addressing the research objectives, and answering the research question. Secondly, the theoretical and practical contributions will be discussed. Thirdly, the limitations of this study will be outlined and suggestions for future research related to the area presented. Lastly, we will shortly reflect on the process of writing this thesis.

The purpose of this thesis was "to explore what competencies will be required within the retail industry, related to omni-channel logistics, to cater to the changing customer demand and other trends within the industry". The purpose was met by investigating literature on omni-channel logistics to familiarize ourselves with the concept and conducting an interview study with seven omni-channel retailers, two supporting actors and one e-tailer. The e-tailer, a management consultancy, and an LSP were included to understand how retailers rely on external parties and outsourcing for certain processes and competencies, and to get insights into best-practices in logistics. Through this qualitative data, we compiled the mentioned competencies into our competence framework. In the analysis, we performed an ideation phase from the double-diamond framework to find competencies needed, and finally, we made an overlap analysis and explained why some competencies were not found in the interview study but through the ideation phase and vice versa. The results from the interview study were, to a large extent, supported by the ideation analysis. Finally, the most essential competencies were summarized in five different omni-channel logistics personas that, in our opinion, all retailers should acquire, develop, or sustain.

To summarize, the *key findings* in this thesis were:

- A mapping of the prominent market trends and challenges impacting the omni-channel landscape, in the perspective of leading Swedish retailers
- A framework categorizing competencies required related to omni-channel logistics into six different competence areas
- Critical competencies within each competence area validated through an interview study, ideation, and reasoning based on market trends and challenges
- Five personas, each consisting of a set of competencies that will contribute to successful omni-channel logistics.

These findings will be further discussed in chapters 9.2 and 9.3, presenting the theoretical and practical implications.

9.1 Answering the research question and addressing the research objectives

The following research question was formulated to fulfill the purpose of the thesis: "what competencies will be required for successful omni-channel logistics, considering changing customer demand and other market trends?" Before we could answer this research question, a couple of research objectives had to be met.

The first research objective, RO1, was to "map how omni-channel retailers configure their back-end logistics to provide a seamless customer offering and what challenges they see concerning this". The purpose of this research objective was partly for us as researchers to familiarize ourselves with the subject of omni-channel logistics and partly to take a first step towards mapping the omni-channel landscape. To analyze the challenges related to omni-channel logistics, we needed to understand how retailers configure their back-end logistics to cater to the existing and future demand requirements. Firstly, we conducted a literature review outlining the customer offering in an omni-channel context and identified five logistics processes primarily impacted by operating multiple, integrated channels. How the leading Swedish retailers organize their back-end logistics to cater to the customer offering was outlined in chapter 4.3. For example, we could see that whether retailers operate integrated or separate network structures largely depends on the size of their operations, with prominent global players operating separate structures due to their large volumes. However, we noticed a trend towards operating integrated warehouses to capture the synergies of inventory pooling. The challenges relating to omni-channel logistics were grouped into three themes: flexibility, cost-efficiency and complexity, and digitalization, including IS integration and real-time data.

The second research objective, RO2, was to "map the market trends and the logistical challenges that will dictate the omni-channel landscape for retailers in the coming years". This objective aimed to identify what considerations retailers will have to make to stay competitive in the omni-channel context. Then, we would be able to analyze the competence requirements arising from those considerations. Trends and challenges were identified both through literature and based on the results of the interview study. Three main market trends were identified: digitalization, changing demand requirements, and sustainability, see chapter 5.1. Overall, we saw a trend towards omni-channel, with retailers further integrating channels and innovating in the customer offering and back-end logistics. The mapping of the retailers' omni-channel work and perceived challenges were condensed to four major logistical challenges: flexibility, cost and efficiency, information technology and information systems, and, lastly, large-scale transformations, see chapter 5.2. Together, these trends and challenges will dictate the future omni-channel landscape, see chapter 5.3. We identified 26 keys for succeeding in the future omni-channel landscape, as shown below in Figure 9.1.

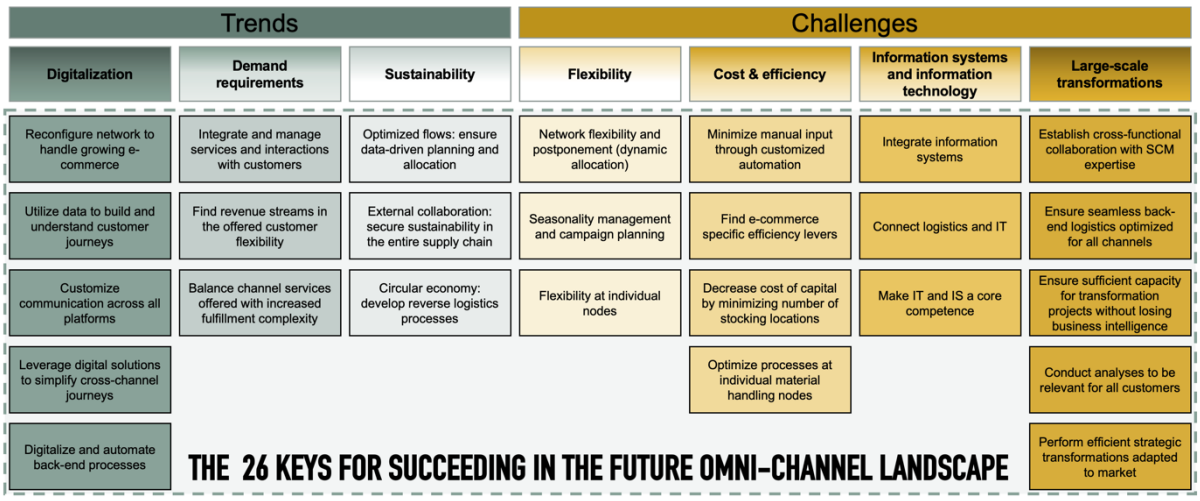


Figure 9.1 *26 keys for succeeding in the future omni-channel landscape*

The third research objective, RO3, was to "determine what competencies will be required, in connection to omni-channel logistics, to respond to trends and challenges and remain competitive in the omni-channel landscape". Implications on competence requirements arising from the 26 keys were analyzed, as discussed in chapter 6.1. These implications were identified ongoing while analyzing trends and challenges, and each competence derived from the analysis can be connected to the keys visualized above. Leadership, project management and problem solving were identified as three behavioral and generic competencies that will greatly impact all activities and will be required for the key actions identified. Overall, the overlap between competencies derived from the ideation analysis and the ones mentioned during interviews was considerable, but an additional need for SCM competencies such as goods flow optimization and reverse logistics was identified. These additional competencies, along with which challenge, trend, and key action(s) they relate to, is presented in chapter 6.1 and accounted for in Table 6.1.

The competencies derived from the analysis were compared to the competencies from the empirics, presented in appendix D, to answer the research question. An overlap analysis was conducted, and the importance of different competencies in relation to the six competence areas was analyzed and discussed in chapters 6.2 through 6.4. So, "*what competencies will be required for successful omni-channel logistics, considering changing customer demand and other market trends*"? Some SCM competencies, such as network configuration and facility location analysis, were found to be of great importance, especially considering the challenges of flexibility and large-scale transformations highlighted in chapters 5.2.1 and 5.2.4, respectively. However, they need to be supported by dynamic awareness as well as behavioral and generic competencies. For instance, data analysis, collaboration skills, agile expertise, logistics, and industrial experience, and commercial awareness are competencies that are critical given the increasing complexity and ever-changing nature of omni-channel retailing and omni-channel logistics. Moreover, IT and IS should be made core competencies for retailers going forward, as technological competencies, notably information systems knowledge and requirements setting, are critical for enabling effective and efficient omni-channel logistics. Ultimately, in chapter 7, we presented five personas, each with a specific set of competencies, that will enable successful omni-channel logistics for retailers.

9.2 Theoretical contribution

Given the previously unexplored nature of this area, the main theoretical contribution of this thesis is the exploration of the interception of competencies and omni-channel logistics within retailing. No previous research had taken an effort to map or explore competencies in an omni-channel context specifically and, there is no consensus on how to categorize and view a company's competence base in the existing literature. There is a multitude of frameworks that, for instance, categorizes an individual's competencies into occupational and personal. This thesis has built on these frameworks (APICS, 2014; Gammelgaard & Larson, 2001; Niine & Koppel, 2014) and developed a framework for categorizing competencies needed to operate omni-channel logistics that future studies can build on. The framework is anchored both in literature and in how practitioners view their competence-base. Moreover, previous studies on competencies and attempts to categorize and classify logistics competencies disregard the interconnection of foundational competencies and profession-related competencies. Here, we contribute to the theory by defining five different personas, each with their set of competencies, that will contribute to successful omni-channel logistics and help retailers overcome the prominent trends and challenges of the omni-channel retailing landscape.

Much of previous literature on omni-channel logistics has focused on a single logistics process or function, such as distribution and last-mile delivery (Hübner, Holzapfel, et al., 2016; Ishfaq et al., 2016), warehouse operations (Kembro et al., 2018; Kembro & Norrman, 2019b), returns management (Bernon et al., 2016; Ofek et al., 2010) or information systems (Kembro & Norrman, 2019a). These studies have focused on the trends, implications, and challenges of isolated parts of the logistics system. On the contrary, this thesis has not been limited in this sense, rather taking an explorative approach to highlight the interconnection of different factors to map the entire omni-channel logistics landscape, our second research objective (RO2). Our study takes an outside-in perspective, focusing on the necessary customer offering to qualify as competitive within omni-channel retailing today (Cao, 2014; Hübner, Wollenburg, et al., 2016; Piotrowicz & Cuthbertson, 2014). In this aspect, a further contribution is the discrepancy highlighted between existing literature and practitioners in omni-channel definitions such as click & collect vs. click & reserve.

When outlining how to configure omni-channel logistics to cater to the complex customer offering, this study has confirmed several trends discussed in the literature, such as the increasing need for inventory pooling and, thereby, the transition to more integrated networks to overcome the flexibility challenge (Hübner et al., 2015). Additionally, several of the challenges related to omni-channel retailing and logistics presented in this study has been mentioned in previous research, for example, integration of IS (Kembro & Norrman, 2019a) and the changing role of the physical store (Alexander & Blazquez Cano, 2020). The challenges identified in this thesis are anchored in interviews with leading Swedish retailers and provide areas for academics to further focus on going forward. Additionally, we provide one puzzle piece to the solution by identifying the competencies and omni-channel logistics personas required to cater to these trends and challenges.

Goldsby et al. (2019) argued that academics could contribute to the future of logistics and supply chain management by identifying the capabilities required to add value to new business models and cater to emerging technologies and what is needed to assess and close capability gaps. By adapting the RBV (Barney, 1991), this study outlines what competencies, and in extension, what capabilities, concerning omni-channel logistics, will be required for retailers to adapt to trends such as digitalization. Additionally, Hoberg et al. (2020) called for further research to understand what individual competencies will be required for supply chain employees to handle the demands of the field as supply chains become increasingly complex. Here, we directly contribute to theory by outlining the importance of different competencies, categorized into six competence areas that will improve logistics performance in the complex omni-channel landscape.

Finally, this thesis is not biased, considering it was not written for a specific company. Instead, ten different companies' viewpoints on the context were lifted and analyzed. Hence, the theoretical results are of greater width and generalizability.

9.3 Practical contribution

The first practical contribution of this thesis is that to omni-channel retailers, both those participating in the interview study and others. For them, this thesis provides an agenda of what competencies and personas they need to acquire and develop to cater to prominent market trends and challenges and remain competitive. Moreover, the empirics give an overview of how omni-channel retailers configure their logistics and how they view the customer offering in an omni-channel context. For practitioners, this information is helpful as a means of

benchmarking against competitors and taking inspiration from retailers within different product segments. Besides contributing to retailers, the thesis also outlines what competencies retailers lack and what challenges they see, why supporting actors can view this as material for how they can better support retailers in their omni-channel endeavors going forward.

Secondly, by outlining academic foundation and SCM knowledge area competencies critical to omni-channel logistics, this study contributes to academics. Programs and educations within SCM and logistics can take inspiration and insights to adapt curriculums to cater to the competence need and, thereby, contribute to creating a more competent employee base. Additionally, the result from this study implies that logistics and SCM academics should have an increased focus on educating future logisticians within IT and IS and incorporate elements contributing to an increased commercial awareness into logistics areas. Closely interrelated with the contribution to academics, this thesis provides an overview of required competencies for people seeking a career within omni-channel logistics and retailing. To become an attractive candidate for recruiters and in the future become a competent omni-channel logistician, one could look to this study to get an idea of what competencies to acquire and develop.

Lastly, the contribution of this study goes beyond omni-channel retailing and could also be of interest to other industries. E-commerce retailers wanting to expand into the bricks-and-mortar business and traditional bricks-and-mortar retailers not yet operating an online channel could look to the results in this study to grasp what that transformation would require in terms of logistics processes and competencies. With a clear majority of customer journeys not being limited to a single channel, we believe that pure e-tailers could benefit significantly from adding an offline channel to support their customer offering. Furthermore, one delimitation with this study was to exclude food retailers, as they have specific product requirements regarding, for example, shelf-life and cold storage. However, we believe that they could still benefit from considering the market trends and competence requirements outlined for the retail industry, although not all logistical aspects will be applicable.

9.4 Limitations and future research

Although there are many theoretical and practical contributions following this thesis, there were some delimitations that limited the comprehensiveness of the study. The time frame of the interview study limited both the number of case companies that could be interviewed and the depth of observation for each case company. Exclusively Swedish retailers from five retail segments were included in the study, with no more than two case companies as a maximum, within each segment. This fact limits the transferability of the results, as the study was not comprehensive in terms of product segment and geographical scope. Moreover, grocery retailing was excluded from this study, given the industry's different product characteristics. Omni-channel retailing in the grocery sector appears to, for example, make wider use of OFCs (Eriksson et al., 2019), why the competence requirements in this segment might also differ. Lastly, although it was not a delimitation for this study, all participating case companies originate from bricks-and-mortar retailing. This fact also limits the transferability, as no omni-channel retailers originating from the e-commerce side were included.

Additionally, the interviewee group consisted mainly of supply chain and logistics managers. As a result, the competencies discussed during interviews were primarily related to the role of that person and their team. Implications from this might be that operational competencies, to some extent, were overlooked. The number of interviews and the time with each respondent was also limited, which, combined with the fact that one respondent cannot represent the entire

company's opinion, limited the results. On the other hand, data triangulation was achieved by interviewing seven different retailers and two supporting actors and one pure e-tailer. Therefore, we still believe that the competencies and personas highlighted in the analysis have practical implications for the participating companies and the entire retail industry.

Given the limitations discussed above, there are opportunities to further build on the study in many ways. Our first recommendation for future research is to conduct a quantitative study with a representative sample from the retail industry, evaluating the relative importance of the different identified competencies. In a potential large-scale survey, it would be interesting to include five to ten retailers within each product segment to monitor any differences in competence requirements between segments. Moreover, it would be interesting to conduct similar research to ours with retail segments not included in this study, such as building materials and tools, sports equipment, and spare parts and accessories for vehicles. This could further highlight how the difference in product characteristics impacts the competence situation. We also suggest investigating omni-channel retailers originating from the e-commerce side to understand their prerequisites regarding the competence situation and what that means. As literature (Hübner et al., 2015; Ishfaq et al., 2016) suggests that retailers originating from the bricks-and-mortar business have processes, warehouse lay-outs and distribution networks optimized for traditional retailing, further research could focus on retailers that have initially configured their logistics set-up to cater to an online channel instead.

Further, it would be complementary to dive deeper into the more operational aspect of competencies, looking into blue-collar jobs, to highlight actual competencies needed for warehouse employees. As Hoberg et al. (2020) highlighted, the rise of automation will eliminate many blue-collar jobs within warehousing and transportation. We believe the pure operational warehouse work will not require any critical advanced competencies due to this development since automation will make the work for the employee elementary. This will instead call for an increase in technological competencies relating to automation. In this thesis, we only named them "advanced engineering competencies", but it would be interesting to investigate what that implicates more precisely and the competence implications for more operational personnel. Besides operational competencies, there is a need for more research within the field of competencies related to sustainability. As highlighted in chapter 6.4.1, it is hard to outline what specific competencies that will enable retailers to cater to the sustainability trend. This area needs more attention, as sustainability will continue to dictate the omni-channel landscape.

Finally, we think it would be helpful to do a complete outsource/insource mapping of competencies for retailers. Should retailers make IT a core competence, as suggested by our study, and what are the advantages and disadvantages? This would provide retailers with another guiding document as they navigate the landscape of omni-channel retailing and consider what competencies to outsource and what competencies to keep, develop, or acquire in-house.

9.5 Concluding reflections

As a finishing note, we would like to reflect on the process, methodology, and learnings from writing this thesis. To start, we had little knowledge of omni-channel retailing and omni-channel logistics when committing to conducting this thesis, and no prior research existed within competencies related to omni-channel. Therefore, large amounts of the time spent in the beginning of this study evolved around grasping the subject in question and building an

understanding of omni-channel. During the process, we found it interesting to combine the more concrete aspects of logistics and the softer area of competencies.

During the interviews and the data gathering, we found that supply chain and logistics managers do not seem to have reflected much on competence requirements for omni-channel logistics and the human capital resources that constitute their competence-base. The focus of the interviews, also partly due to the semi-structured approach, differed much from respondent to respondent. We had to learn a lot about qualitative data analysis to make sense of the gathered data and gained a new respect for qualitative research. With this said, we have learned a lot about the retail industry in general and omni-channel logistics specifically and have found the entire research process to be a great learning opportunity.

Finally, we believe that there is a mismatch between the exponential growth of technological innovation and the pace at which organizations change. Tremendous efforts and years are needed to leverage AI and other technology innovations for productivity, similar to when electricity was first discovered. Individuals accelerating this rethinking and innovative creativity will be needed to truly become successful in operating omni-channel logistics, and we hope to be a part of that journey.

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Appendices

Appendix A – Interview guide

Interview guide

Competencies in connection to logistics in omni-channel retail

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- Interviewer: _____
- Date: _____

Background information

Company

1. Company name: _____
2. Retail segment: _____
3. Turnover, total: _____
4. Turnover, online: _____
5. Origin (channel): _____

6. Number of physical stores: _____
7. Number of markets (stores): _____
8. Online channel since (year): _____
9. Number of markets (online): _____

Respondent

10. Name: _____
11. Position: _____
12. Main work tasks: _____

Introduction

1. Shortly describe your role and responsibilities.
2. Describe your background within [the company] and earlier companies.
3. What is your perception and/or definition of the term “omni-channel”?
4. Based on your role, what would you say are the major challenges associated with e-commerce and omni-channel logistics that you see today?

Omni-channel retailing

1. Unified definition and vision
   1.1. Is there a common definition within [the company] of the term “omni-channel”?
   1.2. What is the long-term vision regarding omni-channel?
2. Customer offer
   2.1. In what ways are you offering this omni-channel experience?
   2.2. How does your offer differ from online and physical stores (e.g., assortment)?
   2.3. What services are you currently offering to customers (click & collect, order online return in store, etc.)?
   2.4. What share of purchases are delivered through what offers/services?
3. Market trends
   3.1. What market trends have you observed in relation to omni-channel?
   3.2. What market trends can you predict in the coming 5 years?
   3.3. During the time you have worked in this role, is your perception that the requirements on logistics from market trends, customers and competition have changed?

Logistics configuration, material flow and distribution

4. Omni-channel logistics processes
   4.1. What logistics processes are especially critical to succeed with omni-channel retailing?
   4.2. In what processes do you see the largest challenge associated with the move from multi-channel to omni-channel?
   4.3. Are there any logistics processes which you currently outsource/utilize a LSP for?
      4.3.1. What factors influenced this decision?
      4.3.2. What is your experience of this decision?

5. Network configuration
   5.1. How does the network of warehouses look like?
   5.2. How is your order fulfillment set up?
   5.3. How is your last-mile delivery set up?
   5.4. How do you manage the return flow?
   5.5. In what way have customer requirements influenced your decisions regarding network configuration?

Competence requirements

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6. Competence situation
   6.1. What competencies in your role and your team do you believe are important in the omni-channel work related to logistics?
   6.2. What challenges do you see related to competence requirements within omni-channel logistics processes?
   6.3. What investments have you made regarding competence development in connection to logistics for your employees (e.g., training programs)?
      6.3.1. Do you collaborate with any university regarding future competencies?
      6.3.2. How do you work with recruitment to secure the right competencies?
   6.4. Have you utilized consultancy firms or other external competencies related to logistics in the past years?
7. Future situation
   7.1. Related to market trends and changing customer behavior, what competencies do you see as critical for you to possess in five years in relation to…
      7.1.1. …logistics in general?
      7.1.2. …omni-channel logistics specifically?
      7.1.3. …IT?
   7.2. What logistics competencies can you consider to **not** have/develop in-house in the future (instead use LSPs/consultancy firms for)?
8. Solutions
   8.1. What competencies will you have to acquire in the coming five years?
   8.2. To what extent will you rely on internal competence development vs. recruitment of competencies?
   8.3. What will be the most critical challenges in terms of securing the right competencies for the future of omni-channel retailing?

Appendix B – Quick guide of the case companies

Company	Segment	Turnover (MEUR)	Turnover online (%)	# of markets served	Respondent's role
Alpha	Fashion	300 – 600	*	33	Supply chain developer
IKEA	Ready-to-assemble furniture, homeware	41 300	*	57	Project lead
Beta	Pharmacy	1 000 – 1 500	6 – 7 %	1	Head of logistics development
Cervera	Interior decoration, kitchenware	93	25 – 50 %	2	Head of development and operations
Elgiganten	Home electronics	4 140	*	4	Logistics director
Gamma	Fashion	20 000 – 25 000	*	52	Supply chain strategist
Delta	Home electronics	100 – 200	15 %	2	Head of logistics
Epsilon	e-commerce	*	*	*	Supply chain manager
Implement	Management consultancy	168 (N/A)	N/A	N/A	Senior partner and management consultant
PostNord	LSP	3 810 (N/A)	N/A	N/A	Head of direct parcel distribution

*Confidential

Appendix C – Competencies derived from empirics

Supply chain management competencies			
SCM knowledge areas		**Applied SCM analysis**	
Competencies	**Respondent**	**Competencies**	**Respondent**
Supply chain management	IKEA Elgiganten PostNord	Forecasting	Cervera PostNord
Net working capital	Cervera	**Facility location / network configuration analysis**	Elgiganten Delta Epsilon
SME within some area	Beta	Tactical planning and scheduling	Elgiganten
E-commerce	Delta		
Product development	Epsilon		
Operational warehousing knowledge	Alpha Cervera Delta		
Process management expertise (Lean and Six Sigma)	Epsilon		
Foundational competencies			
Behavioral and generic competencies		**Academic foundation**	
Competencies	**Respondent**	**Competencies**	**Respondent**
Self-leadership	Alpha	**Supply chain fundamentals**	IKEA Delta Gamma
Leadership (motivation and engagement building)	IKEA Elgiganten Delta Gamma	**Data analysis**	Alpha Beta IKEA Cervera Delta Gamma Epsilon Implement
Agile mindset/experience	Beta IKEA Cervera		
Project management	Beta IKEA Epsilon Cervera		
Communication and rhetorical skills	Cervera		
Supply chain collaboration	Alpha Cervera Delta		
Cross-functional collaboration	Alpha Cervera Elgiganten Delta		

Structured thinking	Cervera		
Information sharing	Delta		
Analytical ability and numerical skills	Alpha Beta Cervera IKEA Implement Epsilon		
Problem-solving	Gamma		
Supporting functional competencies			
Dynamic awareness		**Technological competencies**	
Competencies	**Respondent**	**Competencies**	**Respondent**
Logistics experience	Alpha IKEA Cervera Elgiganten Delta Gamma	**IS knowledge and understanding**	Cervera Elgiganten Gamma
Commercial/customer awareness	Elgiganten Implement Alpha IKEA Cervera Delta	**Connecting logistics flows to IT**	Alpha Beta Elgiganten Gamma Delta
Holistic perspective	Elgiganten IKEA	**IoT/AI/ML understanding and knowledge**	IKEA PostNord Gamma Epsilon
Industrial awareness/experience	Alpha IKEA Gamma Delta	IT knowledge	Cervera Gamma
Sustainability	Beta IKEA Gamma Epsilon	Requirement setting	Cervera Elgiganten
Strategic awareness	Elgiganten Delta	WMS expertise	Cervera
Operational awareness	Alpha Elgiganten	Automation understanding	Cervera Elgiganten
Stakeholder management	Epsilon		
Decision making/execution skills	Alpha Gamma Delta Elgiganten		
Performance measurement/evaluation	Cervera		

Appendix D – Competencies derived from empirics and analysis

SCM knowledge areas			
Competence	**Example/explanation**	**Study (# of cases)**	**Analysis (Yes/No)**
Supply chain management	Understand interdependence of processes	3	Yes
E-commerce	Expertise in piece pick and ship operations	1	Yes
Process management expertise	Experience and expertise in, for instance, Lean and Six Sigma	1	Yes
Net working capital	Minimize inventory locations in network	1	Yes
Warehouse operations	Reduce picking, put-away times, and transportations in the warehouse	3	Yes
Product development	Design and development of new solutions, e.g., digital services	1	No
SME within some area	Broad SCM knowledge combined with SME within for example inventory management	1	No
Goods flow optimization	Create efficient processes throughout the network and at individual nodes	0	Yes
Customer management	Measure customer satisfaction and ensure customer focus in all areas	0	Yes
Supplier management	Build good supplier relations to use in the business offers, e.g., dropshipments	0	Yes
Reverse logistics	Manage returned goods, parts, and scrap disposals	0	Yes
S&OP implementation and execution	Integrate customer-focused marketing plans with management of the supply chain	0	Yes
Advanced engineering competencies in warehouse workforce	Ability to customize, service, maintain, and improve automation solutions	0	Yes
Integration of automation and information systems	Knowledge of how to integrate purchased automation solutions with existing systems	0	Yes
Applied SCM analysis			
Competence	**Example/explanation**	**Study (# of cases)**	**Analysis (Yes/No)**
Facility location/network configuration analysis	Decisions on network structure, centralization degree and localization of individual nodes	3	Yes
Predictive analytics for forecasting	Use of advanced algorithms for forecasting and replenishment processes	2	Yes
Tactical planning and scheduling	Plan and schedule number of delivery days to stores, lead times, etc.	1	No
Leveling measures and dynamic capacity planning	Scale up/down capacity to handle seasonality, campaigns, etc.	0	Yes
Allocation	How to allocate inventory in the network and between fulfillment channels	0	Yes
AI for route planning	Use of advanced algorithms for last-mile delivery planning	0	Yes
Behavioral and generic competencies			
Competence	**Example/explanation**	**Study (# of cases)**	**Analysis (Yes/No)**
Leadership	Motivate others, create openness for others to develop	4	Yes

Project management	Lead the work of a team to meet project requirements	4	Yes
Structured thinking	Put a framework to an unstructured problem	1	Yes
Analytical ability and numerical skills	Ability to perceive, process and use calculations on qualitative data	6	Yes
Problem-solving	Recall and apply information to propose alternatives based on goal-oriented thinking	1	Yes
Supply chain collaboration	Involve external actors in strategic, tactical, and operational work	3	Yes
Cross-functional collaboration	Collaborate with other departments to make sure processes are aligned and interdependencies considered	4	Yes
Agile experience	Experience and knowledge of how to work in agile projects	3	Yes
Self-leadership	Ability to manage one's own time and resources efficiently in relation to different tasks	1	No
Communication and rhetorical skills	Ability to present and communicate information effectively and adjust communication to the audience	1	No
Information sharing	Share relevant information to involve and develop co-workers	1	No
Innovative mindset	Ability to generate creative or novel solutions that result in improved performance	0	Yes
Academic foundation			
Competence	**Example/explanation**	**Study (# of cases)**	**Analysis (Yes/No)**
Supply chain management fundamentals	Possess basic knowledge of supply chain activities and different elements involved in moving a product from supplier to customers	3	Yes
Data analysis	Ability to handle qualitative data and generate insights and material for decision-making based on relevant analysis methods	8	Yes
Data analysis in combination with commercial awareness	Data analysis with an outside-in perspective, where the customer requirements are used as a basis for analysis and decisions	0	Yes
Incentive alignment and risk-sharing models	Ability to develop and implement incentive and risk-sharing models that cater to the omni-channel landscape	0	Yes
Dynamic awareness			
Competence	**Example/explanation**	**Study (# of cases)**	**Analysis (Yes/No)**
Logistics experience and awareness	Previous experience from logistics-related roles and projects	6	Yes
Industrial experience and awareness	Previous experience from the retail industry	4	Yes
Commercial/customer awareness	Knowledge of the customer offering, demand requirements, and customer journeys	6	Yes
Sustainability	Frameworks around circular economy, sustainable transportation, etc.	4	Yes
Holistic perspective	Understand the interconnection of processes, different internal functions, and trade-offs in the supply chain	2	Yes
Stakeholder management	Develop and maintain good relations with individuals, both external and internal	1	Yes
Operational expertise, experience, and awareness	Understand limitations in operational processes	1	Yes

Execution skills	Ability to plan, develop, recommend, and execute on plans and strategies	4	No
Performance measurement/evaluation	Use key performance indicators, benchmarks, and best practices to monitor and evaluate performance	1	No
Strategic awareness	Develop and understand strategies and long-term plans of the company	2	Yes
Change management experience	Effectively communicate change initiatives to all levels of the organization	0	Yes
Technological competencies			
Competence	**Example/explanation**	**Study (# of cases)**	**Analysis (Yes/No)**
Information system knowledge and understanding	Knowledge of the system landscape, the functionalities of different systems, and limitations in the interfaces	3	Yes
Information technology knowledge	Knowledge of available technology to support back-end logistics processes, e.g., RFID for real-time data	2	Yes
Connecting logistics flows to IT	Understanding of how logistics flows are connected to and visualized in systems	4	Yes
IoT/AI/ML understanding and knowledge	Understand what these solutions mean and how to work with the developed tools in day-to-day operations	4	Yes
Requirement setting	How to set requirements on system suppliers to cater to customization needs	2	Yes
Automation understanding	Knowledge of automation solutions, how they can be leveraged to increase efficiency, and what customizations are necessary	2	Yes
WMS expertise	Understand how to utilize WMS for optimizing replenishment, pick rounds, etc.	1	No
Integration of automation and information systems	Knowledge of how to integrate purchased automation solutions with existing systems	0	Yes
Technological solution development	Develop solutions that support the customer offering in apps, the e-commerce platform, or through self-service technology	0	Yes
Advanced engineering competencies in warehouse workforce	Ability to customize, service, maintain, and improve automation solutions	0	Yes