



LAPPEENRANTA-LAHTI UNIVERSITY OF TECHNOLOGY LUT

School of business

Master's degree programme in supply management

Master's thesis

2021

Olli Viitikko

Omni-channel logistics in the Finnish retail market

1st supervisor: Professor Katrina Lintukangas

2nd supervisor: Professor Mika Immonen

ABSTRACT

Author:	Viitikko, Olli
Title:	Omni-channel logistics in the Finnish retail market
Faculty:	LUT University School of Business and Management
Master's program:	Supply Management
Year:	2021
Master's thesis:	Lappeenranta-Lahti University of technology, 82 pages, 4 figures, 10 tables, 1 appendix
Examiners:	Professor Katrina Lintukangas, Professor Mika Immonen
Keywords:	Omni-channel retail, Logistics integration, Business model, Warehouse automation, Distribution management

The purpose of this master's thesis is to examine logistics decisions in the context of omni-channel retail. The main objective is to determine the current state of omni-channel logistics in Finnish retail markets. Study aims to gain more understanding the current challenges and future trends in the framework of omni-channel logistics. Focus is on warehousing and distribution concepts. Previous studies and research create comprehensive view from the literature perspective and empirical findings are analyzed based on them. Study identifies omni-channel retailing as an customer orientated, competitive and complex business concept that requires flexible and agile processes which aims to greater integration of business activities. The research has conducted by using qualitative research method and multiple case-study structure. Five different experts from five different Finnish retail companies were interviewed. The empirical findings discovered different logistic strategies in warehousing and distribution areas. It was highly noted logistic practices among the Finnish retailers are greatly influenced by resources, current facilities, technological capabilities, expertise, product characteristics and customer expectations. Challenges was identified in central warehouse operations in which mainly referred to large product size, barcoding, low level of IT-integration and manual processes. Future trends were seen in sustainable delivery modes, optimized warehouse processes and separated mini-fulfillment centers or dark-stores.

Tiivistelmä

Tekijä:	Viitikko Olli
Tutkielman nimi:	Omnikanavainen logistiikka suomalaisessa vähittäiskaupassa
Tiedekunta:	Kauppatieteellinen tiedekunta
Pääaine:	Supply Management
Vuosi:	2021
Pro-gradu -tutkielma	Lappeenrannan-Lahden teknillinen yliopisto LUT, 82 sivua, 4 kuvaa, 10 taulukkoa, 1 liite
Tarkastajat:	Professori Katrina Lintukangas Tutkijaopettaja Mika Immonen
Hakusanat:	Logistiikka, varastonhallinta, toimitusmallit, integraatio, automaatio, omnikanavaisuus.

Tämän Pro-gradu -tutkielman tarkoituksena on selvittää, miten omnikanavainen näkökulma on vaikuttanut logistisiin ratkaisuihin Suomalaisten vähittäismyyjien keskuudessa. Tutkimus pyrkii luomaan kattavan kuvan omnikanavaisen logistiikan ominaispiirteistä ja peilaamaan sitä nykyisiin logistiikka ratkaisuihin. Tutkimuksen keskiössä on verkkokaupan kasvaneen roolin vaikutukset ja niihin reagointi. Tavoitteena on tunnistaa omnikanavaisen mallin logistisia valintoja ja haasteita, sekä selvittää tulevaisuuden suuntia. Tutkimuksessa keskitytään varastointiratkaisuihin automaation, integraation ja käsittelyprosessien kautta. Toimitusmalleja käsitellään eri vaihtoehtojen kautta. Tutkimus on toteutettu kvalitatiivisena tapaustutkimuksena. Tutkimukseen osallistui viisi suomalaista vähittäismyyntin osajaa viidestä eri yrityksestä. Tutkimus toteutettiin semi-strukturoidulla haastatteluilla. Tutkimus tunnisti erilaiset logistiset ratkaisut varastoinnissa ja jakelussa osallistuvien yritysten kesken. Logistisiin ratkaisuihin nähtiin vaikuttavan vahvasti, resurssit, olemassa olevat myymälät ja varastot, teknologiset kyvykkyydet, tuote ominaisuudet ja asiakaskysyntä. Haasteina tunnistettiin keskusvarasto toiminnot, jotka viittaavat suurien tuotteiden koko haasteisiin, alhaiseen IT-integraatioon ja manuaalisiin prosesseihin. Tulevaisuuden trendeinä nähtiin vastuulliset kuljetusvaihtoehdot, optimoidut varastoratkaisut ja erilliset pienvarastot ja dark-store tyyppinen varastomalli.

ACKNOWLEDGEMENTS

It has been a huge relief finally to finalize this thesis and I have to say I am very proud of myself. Finalizing this thesis was not easy and first, I would like to thank my supervisors Katrina Lintukangas and Mika Immonen for their great feedback and guidance. If I needed any help or if I had questions, I got instant reply which helped me a lot. Secondly, I would like to thank all LUT professors that gave me valuable learning experience through these years. Additionally, I would like to express my great gratitude for case company representatives who were willing to participate and helped me giving their great insights for the research findings. Thank you so much for taking part of this research.

Finally, I want to thank my parents who supported me during my studies and my girlfriend Aino who gave me her time and made this possible. Special thanks go to my fellow student who supported me in my studies and gave me these great years at LUT. I feel so grateful for the education, and I am honored to be able to graduate from LUT. I am wistful for ending this chapter of my life. Hopefully, it opens a new one and I am eager to move towards new challenges.

Sincerely,

Olli Viitikko

21st of June 2021, Helsinki

TABLE OF CONTENTS

1.INTRODUCTION	1
1.1 Research questions and objectives	2
1.2 Conceptual framework	4
1.3 Research Methodology.....	5
1.4 Key concepts and definitions	6
1.5 Delimitations	8
1.6 Structure of the thesis	9
2. OMNI-CHANNEL LOGISTICS AND DISTRIBUTION.....	10
2.1 Retail transformation.....	10
2.2 Sales channels	12
2.2.1 Single channel	13
2.2.2 Multichannel.....	14
2.2.3 Cross-channel	15
2.2.4 Omni-channel	16
2.2 Logistic studies towards omni-channel retailing.....	18
2.3 Distribution and warehousing	22
3. OMNI-CHANNEL STRATEGY	24
3.1 Warehousing	27
3.2 Visibility.....	30
3.3 Distribution	31
3.4.1 Level of integration	32
3.5 Level of centralization.....	34
3.6 Dispatching locations	35
3.6.1 Retailer stores	35
3.6.2 Suppliers DC	36
3.7 Delivery Mode	38
3.8 Return logistics.....	41
3.8.1 Return modes.....	42
3.8.2 Return processing locations.....	43

4. RESEARCH METHODOLOGY AND DATA COLLECTION	44
4.1 Qualitative multiple case-study	45
4.2 Data collection and analysis	45
4.3 Reliability and validity	47
5. EMPIRICAL FINDINGS	48
5.1 Delivery service	49
5.1.1 Click and Collect	49
5.1.2 Click and Reserve.....	50
5.1.3 Home delivery	51
5.1.4 Advanced concepts	53
5.2 Distribution settings	54
5.3 Fulfillment strategy	60
5.4 Return management	62
6. DISCUSSION AND CONCLUSION	65
6.1 Managerial implications.....	69
6.2 Limitation and direction for future research	69
REFERENCES	71
ELECTRONIC REFERENCES	79
APPENDIX	81

LIST OF FIGURES

Figure (1) Research framework.

Figure (2) Last mile distribution options.

Figure (3) Warehouse processes

Figure (4) Backwards distribution options

LIST OF TABLES

Table (1) List of differences between single-channel options

Table (2) Characteristics of Multi-channel, Cross-channel, and Omni-channel retail

Table (3) Omni-channel strategies

Table (4) Level of integration

Table (5) Level of centralization

Table (6) Advantages and challenges of dispatching locations

Table (7) Advantages and challenges of return modes and locations

Table (8) Case company interviewees

Table (9) Logistic selections based on interviews

Table (10) Main empirical findings based on interviews

1.INTRODUCTION

The past ten's years the development of new technologies have risen the need of traditional "brick and mortar" stores to extend their sales channel to online and move global. Customer preferences have changed during this time from traditional consuming towards online shopping. Last year the global pandemic has accelerated this transformation. Consumers value different things than before, and easiness have become a competitive advantage. (Akbar et al, 2014, Eroglu, 2014, Sheth, 2020; Tran, et al, 2021; Nasseri et al, 2021) This has raised concern among the traditional retailer stores and retailers have started to build optional marketplaces to their market portfolio. Multichannel system has replaced the single channel and new business environment has brought new challenges. The need for coordinating and creating the efficient logistic structure to meet the demands of changing customer expectations and environment has gathered studies. Product variety has been multiplied and warehousing services increased. Same time customer expectation towards faster delivery times and wider product selection has increased. (Fisher et al, 2019)

Big businesses like Amazon and Ali Baba have become a world leaders of fast e-commerce market because of their ordinary logistic solutions to serve their customers. (Rodrique, 2020, Cui et al, 2020) Advances in technology have blurred the boundaries between physical and virtual environments, giving rise to the rapid development of new businesses. Technology has built more channels for customer and retailers. The newest transformation in retail industry is called omnichannel. It combines existing retail channels together and offers comprehensively improved experience for customers. Term "omni-channel" is initially connected to marketing management but later it has changed the shapes of different business areas. (Hubner et al, 2016) This study focuses on logistics side and its capabilities. In omni-channel context it means a strategy that synchronize inventory, logistics and distribution processes across all sales channels to meet consumer demand.

Main idea of this study is to understand the current state of logistic integration between different channels in Finnish retailer market. This study will focus mainly on distribution, warehousing, and transportation. Paper will examine the basic differences of traditional logistics and e-commerce logistics. In addition, the transformation from single channel to multichannel and finally to omni-channel concept. Literature overview is purposed to show, what has changed in past years based on previous cases and global studies. Gain understanding of the determinants beyond the logistic and see how omnichannel thinking have affected to operational logistics and distribution. In addition, to see what kind of forces makes companies to adapt and how the companies see the trends as a reason for change. Study will focus on Finnish companies and markets. Their ideology and solution about various bottlenecks of e-commerce logistics and integration. Key findings are based on perspectives collected from different companies and purpose is not to find right way to do business. It is a comprehensive overview for the current situation in Finnish market.

1.1 Research questions and objectives

The main goal of this work is to visualize the changes in supply chain process due the evolving e-commerce markets and determine the existing distribution models and best practices for daily products bought in e-commerce platform. Purpose is to see how distribution structures variate within different retailers and what are the reasons behind selected models. Goal is to see how the selected companies see the current state of omni-channel logistics and integration and draw a comprehensive overview based on that. In addition, the paper tries to see how companies see the future and how they have prepared for upcoming trends.

Omni-channel have gathered increasing interest in terms of conducted research. Previous studies have been focusing omni-channel as a combination of sales channels which leads to and seamless shopping experience. Despite high interest there is only a little focus on logistics and supply chain issues. (Saghiri et al, 2018) Therefore, this study aims for filling this gap. In addition, current pandemic has led to an increasing role of online channel and customer have preferred more online shopping than before. Postnord, (2020) conducted survey, where Finnish

consumer were asked how much pandemic has influenced their consumer behavior. 27 percent of Finnish consumers felt that pandemic has increased their online shopping behavior. Research have shown that this has led to rapid increases of volumes, additional pressure of logistic and need for additional studies.

The selected companies are focusing to offer multichannel and omni-channel retail services for consumers. The focus was initially on business to consumer (b2c) environment but based on research findings, business to business (b2b) model will not make difference in omni-channel logistics. The research plan was to do an interview for several companies in same business sector. This means retailers who have general merchandises in their product offerings. In this study, term “general merchandises” are used to describe limited product category. Product category consists of all utility goods except food and clothing. Food and clothing are excluded due their special treatment in the supply chain. Purpose is to interview different expert from the various field of omni-channel logistics. It means experts who has experience about supply chain processes from different perspectives and persons who are well known about subject and company processes.

The existing models that this research will present are based on current literature and previous research. To gain more understand of research phenomena, term omni-channel has been introduced and its characteristics in terms of logistic. Existing logistic models will be presented by analyzing their weaknesses and advantages. Practical examples of successful businesses will be presented and compared to research findings to give support and acknowledgement of general developments in the retail industry. This means real-companies and business examples around the globe. This research will focus only on Finnish suppliers and their deliveries inside Finland.

The main research question is:

What are the most common omni-channel logistic practices adopted by Finnish omni-channel retailers?

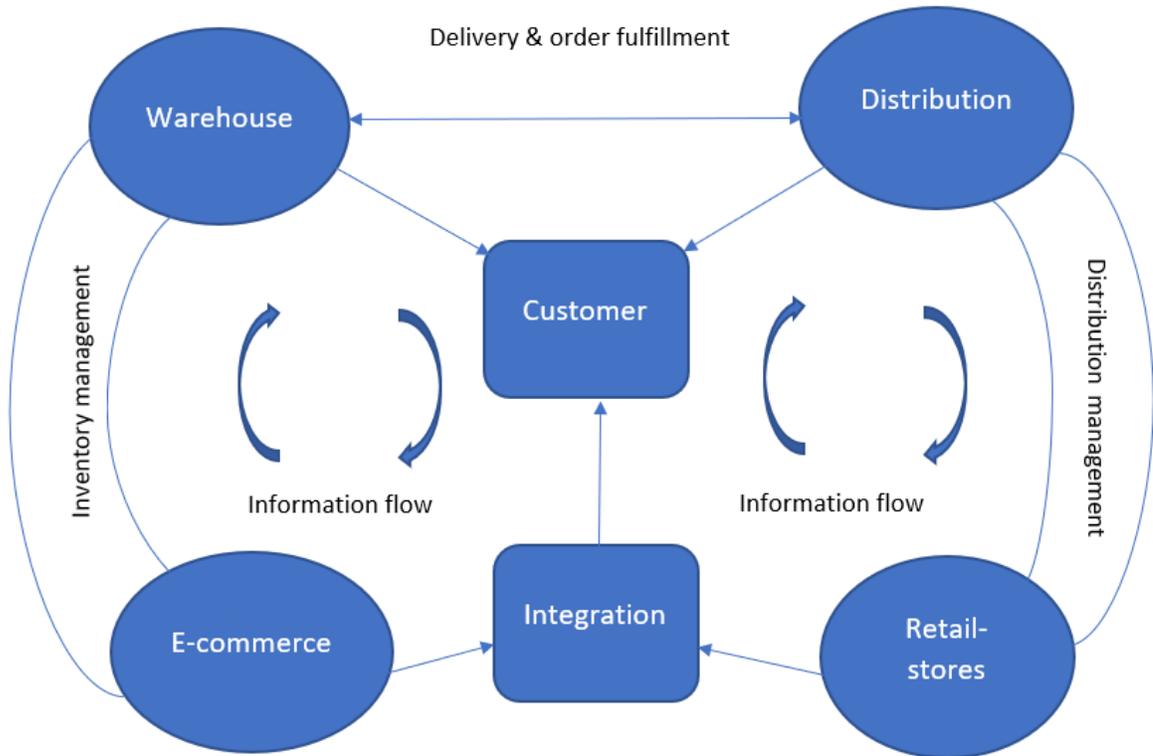
Minor questions are:

What are the main challenges of omni-channel logistic decisions?

How Finnish retailers see future trends of omni-channel logistics?

1.2 Conceptual framework

The framework of this this thesis consists of main variables in omni-channel logistics. Figure (1) represent the conceptual framework of this research. It displays the main entities and their connections with each other. The framework lies on the hypothesis that main purpose for omni-channel thinking is towards integration. Different logistic variables have their own specific areas that should be managed towards integration. Customer is in the circle and the logistic structures are around it. Logistic variables on top (warehouse and distribution) are the cornerstone of achieving successful omni-channel experience. These two variables, warehousing and distribution are divided into more specific themes which will be presented further. To gain understanding what these two logistic variables warehousing, and distribution serves for, main sales channels are added. E-commerce and traditional brick and mortar store channel represents the main sales channels of this study. Each interviewed retail company fulfill below framework with their own way but for this study it is important to understand that fulfilling each component is requirement to be described as an multi -or omni-channel retailer. Two variables on down (e-commerce and retail-stores) create the main source of the challenge for each omni-channel retailer. Having more than single channel provides options but also creates challenges in terms of logistics. Previous research has implicated that integration in all means is a key term for successful omni-channel retailer. (Hubner et al, 2016, Marchet et al, 2018) Purpose of this framework is to visualize connections between logistics variables and gain understanding of research concept.



..

Figure (1). Research framework.

Business-model define how omni-channel logistics is created to respond for customer demand. The framework demonstrates the connectiveness of retailer and consumer. Main changes in consumer preferences have impacted to strategic management and management is purposing for increased customer satisfaction. It requires data exchange throughout different logistic areas as well as suppliers. Suppliers are not part of the research framework, but their role can be seen essential in logistic integration. (Hubner et al, 2016)

1.3 Research Methodology

This thesis consists of two supplementary sections, theoretical and empirical part. The theoretical part is based on existing academic literature related to main concepts of this thesis.

Purpose of theory part is to define main topics, give insights and different perspective for omni-channel logistics. It structures the theoretical basis of the topic and defines the background of current developments. Academic research has been chosen based on their reliability and time of publication. Study is conducted by using qualitative research method. Qualitative research methods aim at finding connections among phenomena where research context has major role. (Roller & Lavrakas, 2015) Research method was chosen in the planning stage and its role as gathering new insight from experts is essential. Research method aims to explain how the context of omni-channel retail has impacted to logistic activities.

The empirical part was conducted through semi-structured interviews with multiple case companies operating in omni-channel retailing. Multiple cases were chosen to get holistic overview and different perspective from different setting of omni-channel retail. Interviews were suitable option to examine complex phenomena with practical examples. Semi-structured interviews lead to an open discussion which required pre-knowledge from author. Open discussion allowed more in-depth discussion in which “why” and “how” questions can be asked and the reasonable reasons behind can be explained. (Kähkönen, 2011) Final conclusion of thesis were formed by reflecting the empirical analysis against the presented theory and studies.

1.4 Key concepts and definitions

In this section all the key-concepts of this study are listed. These concepts are relevant for the study to gain better understanding of research findings and theory.

Omni-channel retail

Omni-channel retailing means integration of different sales channels which are physical store, catalog, online shop, and mobile phone. Omni-channel retail has emerged through technological development it has been built for better efficiency. Omni-channel refers to seamless shopping experience across all available channels. It aims for coordination of multiple processes and technologies across all channels and to provide consistent and reliable services for customers. (Verhoef et al, 2015) From the logistic perspective it means that customer enables to receive

and return products through any channel regardless of where they bought it from. (Beck & Rygl, 2015)

Business model

Business model can be defined in many ways but is mainly employed in trying to address and explain three phenomena: 1) strategic issues, such as competitive advantage, value creation and performance 2) e-business and the optimal use of information technology, and 3) innovation and technology management. (Zott et al, 2011) In omni-channel concept business model can be modified based on these three phenomena to focus 1) a seamless customer experience 2) integrated analytics system and 3) an effective supply chain and logistics. (Jocevski et al, 2019)

Channel integration

Logistic operation aims for cost-effective business model where the key aspect is integration of different channels. Channel integrations requires investments and management skills. Channel integration in logistics means challenges in product availability, inventory management, capacity management and delivery option which need to be addressed. (Pietrowicz and Cuthbertson, 2019) Channel integration may occur in a variety of IT (information technology) and distribution system configurations. (Gallino & Moreno, 2014) Omni-channel retailers may use their existing channels and resources such as stores and personnel for serving both online and traditional channels. (Marchet et al, 2018)

Logistic automation

Logistics automation consists of computer software or automated machinery to improve the efficiency of the logistics operations. Mainly it refers to warehouse operations where the potential for using automation is highest. Automation can also be used in transportation, but the most advanced innovations are still to become. Automation requires advanced data processing and previous years have shown how it have influenced on the development of the modern automation technology. (Hompel & Schmidt, 2006)

Transportation

Transportation within the context of commerce is the movement of products and goods from place A to place B. It can be considered to be a sub-unit of logistics. Transportation covers many different modes such as air, sea, and land, but this study mainly focuses on land. Logistics transportation covers many areas that should be managed, but in general we can divide these into three categories: 1) Vehicle and fleet, 2) Operations management, 3) Infrastructure management. (Hall, 2012) In the perspective of this study we focus mainly on operations management which covers tracking, modes, warehousing, and cargo handling.

RFID-technology (radio frequency identification technology) has developed already in early 20's and it has moved to mainstream application that aims for faster material handling. Technology is developed to replace barcoding technology that is mostly in use. Technology is based on identification concept which enables to identify products from a distance and unlike barcode technology, without requirement of a line of sight. It has the capability to incorporate additional data such as product type, manufacturer, or even environmental factors such as temperature. (Want, 2006)

1.5 Delimitations

This thesis is limited regarding empirical source of data but also on its theoretical framework. Previous studies have focused on omni-channel retailing from various perspectives, but this thesis focuses only on logistic perspectives. Study is fully based on retailer side and viewpoint, and therefore supplier viewpoint is out of consideration. Logistic side is examined in connection between all different logistic areas. Logistic management and different logistic areas are discussed in general level and the most detailed logistic activities and solutions are delimited. Focus is on "how different areas should be managed". Study aims for better acknowledgement of logistics activities where retailer is in the circle, but consumer preferences and perspective has taken consideration when different decisions have been justified.

This study will focus on logistic concepts of specific retailers that resale general merchandises. General merchandises mean products that do not require cold chain management or product that are not manufacturer retailer by itself. Clothing and food are also excluded. Main criteria for

choosing retailers were having operations in more than one channel with one of the channels being e-commerce. Prerequisite was a wide brick and mortar store network around Finland. Study has been conducted among the Finnish omni-channel retailers and is thus limited to the retail market of Finland. The purpose of this limitations does not aim to form generalized evidence or model in statistical sense but strives to understand the context of omni-channel retail, logistic, challenges and trends in limited market. Characteristics of Finnish market environment has been geographically taken consideration but otherwise findings can be generalized to other business environments.

1.6 Structure of the thesis

This thesis has been divided into six different chapters. Theoretical part consists of two following chapters. Firstly omni-channel retailing and logistics from general view and then logistic strategies in more detailed level. Chapter four introduce the research methodology and benefits and adequacy of qualitative case study related to this thesis. Chapter five introduce the main empirical finding based on different logistic areas. These are discussed between previous research and studies. The final section presents the summary of the research findings and the conclusion.

2. OMNI-CHANNEL LOGISTICS AND DISTRIBUTION

This chapter consist of four stages: first the definition of the scope of the relevant research from the perspective of omni-channel logistics. Second, previous studies and literature to understand the development of the latest research. Third, the transformation from single channel to omni-channel in terms of sales channels. Fourth, the main concepts of two main logistic variables. Chapter is aiming for better understanding omni-channel logistics in general and introduce the main themes and demand for this study.

2.1 Retail transformation

In the new economy, which is characterized by globalization and information intensive, the focus has been on core competencies, globalizing service demand, providing real-time information, visibility in key performance indicators, collaborating in supply chain operations, and developing e-logistics (Gunasekaran et al, 2007). Developed technology and infrastructure has increased service level standards to the point where traditional service providers have been forced to re-organize processes. Same time development has rapidly moved forward, and technological capability has become necessity. E-commerce has been the first outcome of this adaption and it has tightened the competition. Thereafter, e-commerce has become significant sales channel and the integration of e-commerce and traditional brick, and mortar stores has risen interest. Transformation from single channel to multichannel and now recently to omnichannel has been visible. (Hubner et al, 2016) Current literature has introduced different perspectives related integration of e-commerce and traditional stores. This paper will examine the most essentials.

When online platform firstly became, it was predicted that e-commerce would have completely replaced traditional stores. (Zhang, et al. 2010) Instead, the industry adopted to complex system which encompasses multiple channels integrated with each other (Yrjölä 2014). Chen, et al (2013) describes e-commerce as a product of the network economy and logistic integration. The study continues by saying that theoretically logistics has become the bottleneck of the development of electronic commerce and that the development of logistics requires the

development of e-commerce. This perspective supports the need for more logistic studies as omni-channel logistics perspective is relatively new phenomenon, but it highly contributes for overall efficiency. (Saghiri et al, 2018) Omnichannel model was created due the advanced technology and customer-driven changes. (Ishfaq et al, 2016 Chen, Cheung & Tan 2018) Previously the challenge for retailers was to find the right and the most competitive and cost-effective distribution channel. (Ishfaq et al. 2016) Nowadays the issue is how to integrate all the channels together in most efficient way. It is believed that technological improvements can make the biggest difference. (Mitronen & Yrjölä 2014; Von Briel 2018) Traditional “brick and mortar” retailers are eventually forced to move into omni-channel retailing in order to compete in markets. (Ishfaq et al. 2016; Von Briel 2018)

Competition in global retailing market is more than price, it means several factors that which are important for customer satisfaction such as delivery time and customer service. Customer oriented perspective can be seen influenced by the implementation of modern methods in logistics. Modern methods and developments in logistics are ways to increase overall capability towards agile and flexible logistics structure. (Rodrique et al, 2017) New ways to execute requires higher information change and collaboration. It has created a new term for logistic field such as e-logistics. E-logistics can be defined as the application of Internet based technologies to traditional logistics processes or web-based applications and services dealing with the efficient transport, distribution, and storage of products along the supply and demand chain. The term e-logistics has become more frequently used since it gives concepts for information flow within supply chain and partners. (Erceg & Damoska, 2019.)

Term e-logistic and more precisely e-commerce has made the biggest impact on transportation services. Transportation is meaningful because it is an ending point of supply chain and touchpoint between consumer and retailer. The impact of e-commerce to transportation can be divided into two parts: the increase in demand for freight services and the decrease in demand for customer journeys. More people prefer online shopping to traditional shopping. In traditional business, the distribution of products is usually shipped and packaged in units. In e-commerce the package size variate more often and package size have become smaller and complex. For

retailer it means higher operating costs and lower efficiency (Qin, Z. et al. 2014; Hubner et al, 2016; Lim et al, 2018) Traditionally transportation has been kept as an own business sector by providing movement for goods. Nowadays information, automation and networks are considered as a feature of transportation. The development of e-commerce transportation is aimed at achieving the following three requirements: 1) Break boundaries between transportation and all other sub-sectors such as planning, offerings, marketing and production. 2) focus on transport process management and high-tech information technologies. 3) to put customer satisfaction priority ahead of traffic capacity. (Qin, Z. et al. 2014)

The increased role of transportation has increased the number of logistic partners specially in last-mile transportation. For the last two centuries the most popular strategy in last-mile transportation has been outsourcing logistics services to third-party logistics (3PL) firms. (Gibson and Cook, 2001.) 3PL company can perform any logistic activity in any stage of supply chain. Mainly they are used by manufactures and merchandisers who do not have own resources or its unprofitable to arrange by their own. Mostly outsourced activities in 2020 were domestic and international transportation, warehousing, customs brokerage, and freight forwarding. (E. Mazareanu, 2020.) Third party logistic is a key component specially in outbound logistic and important aspect in logistic integration (Lang & Bressolles, 2013). The involvement of third-party companies in this study, involve last-mile transportation and their available options.

2.2 Sales channels

Sales channel is a platform for retailers to sell products and services for customers. Traditionally sales channel means sales through physical stores, but technological evolution has developed optional marketplaces such as e-commerce. Purpose of this chapter is to introduce different channels in more detail, presentate the motives, challenges of each channel and it impact to company's supply chain while trying to adapt omni-channel retailing. The following chapter will introduce single channel, multichannel, cross-channel and omni-channel.

2.2.1 Single channel

Previously many retail business has started by building physical retail store. In literature this is called as brick- and mortar store. A single channel distribution model means a channel which includes all the product moves to customers. Single channel model could be recognized in two instances: 1) only brick- and mortar store channel and 2) only online channel (Swami & Shah 2013, Chen & Bell 2013, Xia & Zhang 2010, Huang et al. 2013) Brick- and mortar channel is defined as a channel in which customer need is met with on-hand inventory. (Tetteh and Qi, 2014) It is a physical marketplace, and it has been the most common way to purchase goods. Physical access provides retailers the platform where they can access the customer in person and gain instant satisfaction (Agatz et al, 2008). Customer do not have to wait for product and customer can receive products right after purchase. Physical stores allow retailer share acknowledges and information about the products in person. Physical store provides possibility to minimize transportation costs of delivering to customers door. (Zhang et al, 2010)

Online channel is defined as a direct marketplace where customer is satisfied with on-hand inventory. Orders are placed through online and delivered right to customers door. The digitalization has allowed online channel to growth, and it has created a new type of retailers, which solely focuses on the online channel (McCormick et al, 2014) Online channel has opened business opportunities also for manufacturers and third-party providers (Cattani et al, 2006) The transformation has not only increased competition but also driven the margins down on the products. This is because online retailer can focus more on products and minimize other costs which lowers the cost for customer. Independent online channel is also an easier option in terms of inventory for retailer. Retailer can more easily detect inventory shortage by having only one channel to monitor. Online based selling is fast, convenient, challenging and it involves less storage of goods. (Huang et al, 2013) Studies have shown that manufactures operating single channel have gain easiness of launching, monitoring, and controlling new products. (Xia & Zhang, 2010) Below table (1) show the basic differences of two different single channel options.

Differences	Physical channel	Online channel
Products	Ability to touch and feel	Wider selection
Delivery	Instantly	Delivery time
Service	Face-to-face	Online
Access	Opening hours	24/7
Prices	Hard to compare	Easy to compare
Decision making	In store	At home

Table (1) List of differences between single-channel options.

Physical store and online channel imply different cost structures that influence transactions in these channels. The major differences occur in areas of shipping costs, price setting costs and operation costs. For instance, operating costs which refer to the costs of maintaining physical store, including rent and personnel costs. Both are lower when having online store which enables different pricing opportunities. (Trenz, 2015)

2.2.2 Multichannel

Many businesses begin with single-channel distribution. The advantage of a single-channel distribution is simplicity. When single channel gives customer only one way to buy a product, multi-channel system is a strategy which provides customer multiple ways to purchase the same product. Levy & Weitz (2013) define multi-channel system as a set of activities which are involved in selling products through more than one channel. Practically it means that multi-channel involves both physical stores as well as an online store. The main concept of multi-channel retailing is that the different channels are working individually. This is explained by the aim of improving their own productivity and lower the costs, regardless of the other channel operations within the company. (Saghiri et al, 2017) Separated channels are mostly seen as a separated management function as well. (Zhang, et al, 2010) Separation in logistic chain may cause problems with inventory management, pricing, fulfillment, and information sharing. (Saghiri et al, 2017) Multi-channel retailing can suffer from the lack of synergies among the

different channels because it does not benefit from cross-channel consuming. (Gallino & Moreno, 2014)

There are many benefits and motivators moving from single channel to multi-channel. Increased competition has been a challenge but also one motivator to become a multi-channel retailer. It has been a way to gain greater market share but also way to maintain the existing one. (Kushwaha & Shankar, 2013) Previous researched have showed evidence that customers who use multiple channels spend more money in customer lifetime than single-channel customers. (Neslin & Shankar, 2009) In addition, multi-channel approach has increased consumer engagement, conversion rates, positive brand experience and long-lasting relationships. (Liu, et al, 2018) On the contrary, retailers have faced challenges when it comes to multi-channel offerings. New channels have resulted in confusing pricing policies, promotions and brand building between channels and in the worst cases two channel might even compete directly with each other. (Wilding, 2013, Piotrowicz and Cuthbertson, 2014) Multiple channels automatically increase cost structure compared to single channel. Multi-channel strategy is more complex and multi-channel retailer must have several strategies. Customer base is wider and company must target multiple customer segments to fulfil different needs (Zhang et al, 2010)

2.2.3 Cross-channel

Cross-channel can be defined from the retailer's point of view as a partial integration through all widespread channels or full integration through limited number of channels (Beck and Rygl, 2015) Cross-channel strategy indicates the possibility for consumer to switch between two channels, but not between all available channels. Simple example of cross channel strategies include ordering online and picking up in-store, ordering in-store and getting the product delivered to the home and returning online purchases in-store (Chatterjee, 2010b). Cross-channel retailing has been built up to respond the possibility of losing synergies across the channels. (Zhang et al., 2010) A crucial point of cross-channel approach is the certain degree of interaction and integration among individual channels (De Faultrier et al, 2014) Cross-channel interaction means interaction between physical store and online store but also different

touchpoints. (Beck & Rygl, 2015) A touchpoint means any point of contact between retailer and customer and is not marked by interaction. The most common examples are TV, radio or billboards (Verhoef et al, 2015) The difference between cross-channel and the following represented omni-channel is the level of integration. The full integration across all available channels and touchpoints is lacking. Therefore, the management and goal setting has set up per channel or per touchpoint and comprehensive strategy across all channels is missing. In addition, it means that data cannot be shared through all channels, and therefore cross-channel can be seen as an intermediate step between multichannel and omnichannel management. (Mirsch et al, 2016)

2.2.4 Omni-channel

Omni-channel is an evolutionary step of the cross-channel and multi-channel concept. It represents open concept with no barriers between the channels and touchpoints. (Hübner et al, 2016) Free moving and switching by consumers among the touchpoints is not only anticipated but favored. (Verhoef et al, 2015, Piotrowicz & Cuthbertson, 2014) Main difference between previously presented channels and omni-channel is the degree of channel integration and coordination. Channel integration refers to the degree to which different channels interact with one another. (Bendoly, 2005) Integration between all channels allow retailers to share unique brand image, data, and comprehensive management across different channels. (Verhoef et al. 2015)

Omnichannel management is defined based on Verhoef et al (2015) research. Verhoef et al, (2015) describes omnichannel management as “the synergetic management of the numerous available channels and customer touchpoint, in such a way that the customer experience across channels and the performance over channels is optimized”. Beck and Rygl, (2015) states that retailer can only be described as omni-channel actor if all channels are fully integrated. Omnichannel retailing and its meaning might be easier to visualize from customer point of view. Retailer can be referred to as omni-channel retailer if all the channels are integrated form customer perspective. (Hubner, et al, 2016) The synergetic approach implies that the channels and touchpoint are managed as a whole unit. Whole unit of touchpoint, physical and online

stores build the interaction and linkage among all channels and the simultaneous use of them. The aim is to provide customer experience to not only concern one channel but the brand as a part of whole concept. (Piotrowicz & Cuthbertson 2014, Verhoef et al, 2015)

Customers have option to choose the most preferred channel in all possible situations. For example, Consumer may be attracted by a promotion showed in TV and decide to go retailers online store to get more information about the product. Customer may add the product to basket but decide to not purchase product immediately. Next day customer may open retailers phone application and the same product can be found in the shopping basket. Customer can easily purchase product by using app and decide whether to get it delivered home or pick-up from store. This example represents the buying process which it not interrupted if customer decide to change the purchasing channel. If channels are not integrated buying process begins again and buying decision may be different because of the interruption. Omni-channel strategy aims at unique and seamless purchasing experience. s (Brynjolfsson et al. 2013, Piotrowicz & Cuthbertson 2014)

Characteristics	Multi-channel	Cross-channel	Omni-channel
Integration	Separated channels. No switching	Switching between channels and touchpoint is possible	Fully integrated
Management & Goals	Own strategy and goals for each channel	By channel or connected channels	Management across all channels
Customer experience	Multiple independent touchpoints	Multiple touch point of same brand	Simultaneous channel interaction
Interaction	Two-way	Any type	Any type
Data	Separate data collection	Partially shared across channels	Fully shared
Retailer capability	Channel centric view	Customer centric but operates in silos	Seamless operations across all channels

Table (2) Characteristics of Multi-channel, Cross-channel, and Omni-channel retail.

Moving towards omni-channel retail creates challenges since it is not only about adding online- and physical channel together but understanding the organizational change. (Hansen et al, 2015) One important challenge is integrated IT-systems. Multichannel and cross-channel approaches do not create as much data as omni-channel does. New opportunities for data mining are provided by mobile and social channels. Retailer must have resources to gather and analyze data from all channels. Only this way retailer can respond to customer needs and expectations. (Brynjolfsson et al. 2013; Trenz 2015). The following table (2) represent the basic differences and characteristics of multichannel, cross-channel and omni-channel.

2.2 Logistic studies towards omni-channel retailing

The purpose of this section is to review the previous research conducted inside the research framework. Literature review is purposed to give better understanding of trends and detect existing gaps in the literature. (Lagorio et al., 2016) The purpose of searching through relevant literature and articles is to create a comprehensive picture of core contributions to the research questions. (Denyer and Tranfield, 2009) Study involves many different perspectives and research from different countries. It investigates multiple databases and avoids limiting itself to any timeframe. However, taking consideration the fast-growing market environment, the research will prefer research conducted in 20th decade. Literature review will consistently use defined keywords as the search criteria.

Omni-channel retailing in literature refers mostly to customer's perspective and marketing initiatives. Key point is that there is no longer a distinction between traditional and online channels (Beck and Rygl, 2015; Verhoef et al., 2015). The concept of omnichannel logistics is not widely researched yet in literature but few concepts has been emerging in past few years. (Beck & Rygl 2015, Shen et al, 2018) Song et al, (2019) were on one of the first who study the relationship between logistic integration capability, supply chain integration and performance in the context of omni-channel retailing. Hubner et al (2016) studied transformation from multi-channel to omni-channel retailing and in another research, last-mile fulfillment and distribution in omni-channel grocery retailing. However, different logistic areas without having omni-

channel perspective have been studied widely in past decades and these studies are used to determine the most relevant logistic factors.

Distribution network has faced re-designing after online market made a real breakthrough. For traditional brick/mortar companies this has created pressure to re-organize business structure and especially add online channel into existing channel mix. The biggest concern has been the growing competition and integration between online and traditional stores. New systems such as drop-shipping or designated online distribution centers have become a side of existing distribution models. (De Koster, 2003, Hovelaque et al., 2007) Key design for last years has been the level of automation. Companies have invented new management technology to fully-automate their processes, but still manual and semi-automated systems are widely in use. (Hübner et al., 2016b) However, technology has allowed better data usage, and this has created innovation which have started to fulfill the need of improvements. Different studies have been conducted in early stage to support transformation. Hu and Chang, (2009) proposed an innovative model for long-distance deliveries which was an automated multi-floor distribution center which was conveniently accessed by online customers.

Transformation from multichannel network to integration has been relatively slow. The previous studies have claimed that the main reason for separation between online and traditional distribution has lied in the lack of preconditions for integration. Resources, infrastructure, know-how and requirements for picking has been insufficient (Hübner et al. 2015). De Koster (2003) demonstrate on his research that when the number of online orders becomes significant, the most efficient way is to have a warehouse focused and designed only for the online channel. De Koster (2003) highlights the separation of different channels. Bendoly et al. (2007) continues that it is possible to identify a threshold as a percentage of online demand which should indicate need for warehouse only for online goods.

Later on, several researchers have started to highlight the integration and synergy benefits. Bretthauer et al. (2010) proposed a model to determine how many facilities are needed to handle both traditional and online sales together to minimize logistics costs. Jeanpert and Pache, (2016)

demonstrated the need to have professional sales personnel with tablets, introducing an “everything, all the time, everywhere” approach that allows staff members to sell and offer products through online store or in other stores. Products would have been delivered either to customer’s home or to the store. Mirsch et al, (2016) states that integration of existing infrastructure and online distribution process means restructuring the whole distribution network. They highlighted the technology as a primary driver of change.

Traditional distribution models have faced changes and traditional warehouse processes has risen more studies. Integration has reviewed decisions taken at warehouse. For instance, whether to have common or separated picking areas for different channels, simultaneous or dedicated picking time slots for each channel and dedicated or shared staff member for each channel. (Hübner et al., 2016c). Ishfaq et al, (2016) have studied the role requirements of transformation from traditional to online based model. Study states that retailers whose store-replenishment process is structures similarly to what is required in online based system will find it relatively easy to integrate online orders into their existing warehousing operations by developing a last mile delivery capacity.

The other highlighted key elements in literature are the different logistics facilities in the distribution process. When traditional and online sales are integrated, important factor is to determine how sales should be allocated. In the most existing literature, the assumption is that the location for online sales facility is prioritized to as close to the customer than possible and this cannot be modified. (Chiang and Monahan, 2005; Bretthauer et al., 2010) Another key study area in omni-channel logistics is the role of existing stores. Lee and Whang (2001) have studied the role of physical stores in part of the distribution. Mahar et al (2009a) identified the optimal subset of stores for in-store returns and pick-up. In addition, warehouse management has gathered different studies. Agatz et al (2008) studied the multi-channel distribution and electronic fulfillment. Mahar et al. (2012) presented policy that makes use of real-time store inventory information, demand forecasts and customer location.

Past years have shown that customers demand for shorter delivery times has increased. In literature this is called as the issue of the last-mile delivery. The traditional online sales model implies that customer place orders online and then receive products delivered to home. The basic idea is simple and main design choices are the speed and the delivery area (Agatz et al., 2008) Retailers can offer different time frames for their deliveries from one day to two, or more days and cover more or less wider delivery area. (Hübner et al., 2016b) Home delivery can be attended or unattended (Kämäräinen and Punakivi, 2002). Agatz et al, (2011) has analyzed the time slot management issue and Boyer et al. (2009) the impact of the length of a delivery window on performance. Technological improvements have also changed the planning by providing real-time access to information along the supply chain. It has provided better requirements to use decision models during the execution phase. (Swaminathan and Tayur, 2003, Chen et al, 2018) Same time it has supported the transformation and reduced inventory costs. (Mahar & Wright, 2009)

The growth of online market has raised interest in return logistic channels because of its high returns rate (Bernon et al., 2016). In traditional grocery store model where less than one percent of orders are returned, the typical strategy is to offer money-back guarantee. (Hübner et al., 2016b) In non-food retail the process is much more complicated than in food retailing. (Bernon et al., 2016) The literature has highlighted two management strategies related to return process, return modes (courier delivery, in-store returns) and integration across different channels. (Bernon et al., 2016). Studies discuss whether to use the traditional stores as the collection point for all returned products or to have dedicated facility aside as well. (Widodo et al. 2011)

New innovations deliver online orders have built recently. One of the first invention was the option to collect goods at specific locations. (Lang and Bressolles, 2013) Hübner et al. (2016) showed that the higher the store density, the more beneficial it is for retailers to have specific collection locations. Weltevreden (2008) showed two types of pick-up points on his research, locker and service points. Later, click and collect mode was developed. Saskia et al. (2016) continued by presenting of a drive through delivery mode and Aurambout et al (2019) showed the possibility of drone delivery.

2.3 Distribution and warehousing

Distribution and warehousing are the key concepts of this research. Both variables face pressures in the fast-evolving markets. Shipment's size has decreased, and order frequencies has increased. Same time, technology and its use have brought a new perspective for a whole supply chain thinking. (Hubner et al, 2016) The purpose of this chapter is to introduce main framework of distribution and warehousing. The below figure (2) draws a picture of first main theme of this study which is the movement of goods from retailer to end-customer. Figure illustrates end of the supply chain by showing the product moves along the delivery process. This is one of the main aspects of this research. How companies face the last mile delivery issue. Picture is a raw example of simple delivery chain, and the purpose is to illustrate the optional ways to deliver goods. It only illustrates the product moves after product has bought from agent or manufacturer.

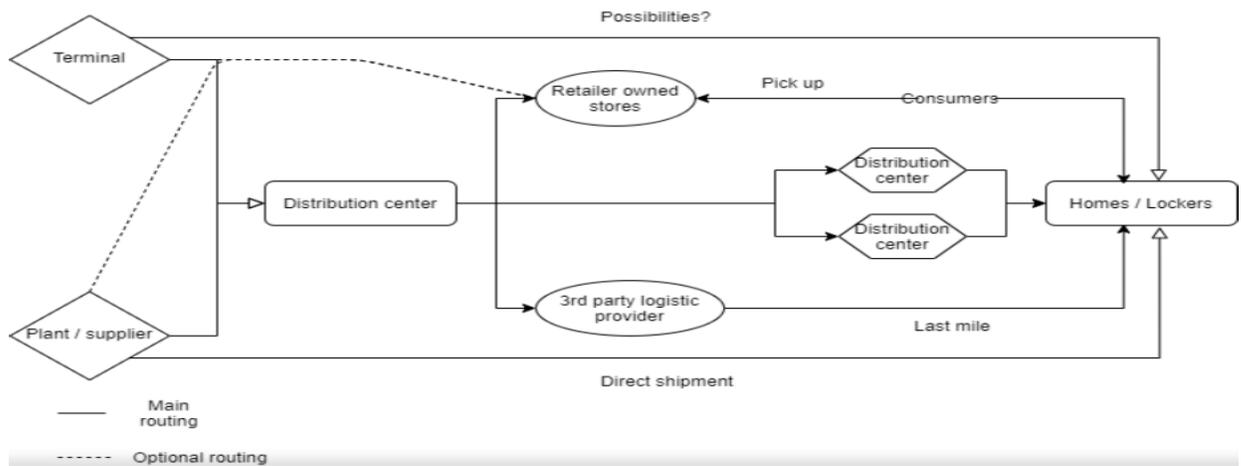


Figure (2) Last mile distribution options.

Picture shows how single item or order moves through logistic chain and what are the basic alternatives to transport it. First of all, item can be produced locally or imported to the country. Once item is shipped to local port or bought from local actor it is ready for distribution. When product is at port or at plant, there are optional ways to transport the goods to the final customer. Company can use either direct shipment to customer by using own resources or third-party providers. Company can store the goods to distribution centers or ship them directly to stores.

If goods are stored at distribution center, warehouses or stores, goods can be delivered to end-customer by using different options. Main options are ltl-carriers, own delivery, and free pick-up from store or from secured lockers.

Second key element in omni-channel logistics is warehousing. Figure (3) illustrates main operations in the warehouse process and design. According to Bartholdi and Hackman (2016), warehouses can be described as “the points in the supply chain where product pauses, however briefly and is touched”. Every point in the process includes different processes which are organized differently in different companies. When products arrive at the warehouse, they are checked for amounts and quality before registering to the IT-system. There are different ways to do it, and these are discussed later. After checking, goods will be stored to assigned storage which are determined by company strategy and level of automation. When retailer receive order or stores needs to be fulfilled, goods will be picked from the shelves. Picking represents the most-researched topic in warehousing, (De koster, 2005) Picking efficiency is key for shorter lead times and efficiency can be improved by putting fastest moving products in the most convenient locations (Gu et al, 2007) The most common picking methods include single, batch, wave and zone picking (Bartholdi and Hackman, 2016) Lastly orders are packed and shipped. Cross docking is a method which minimize the storage time. Products are unloaded, sorted, and loaded to new destinations without storage and picking. (Bartholdi & Hackman, 2016)

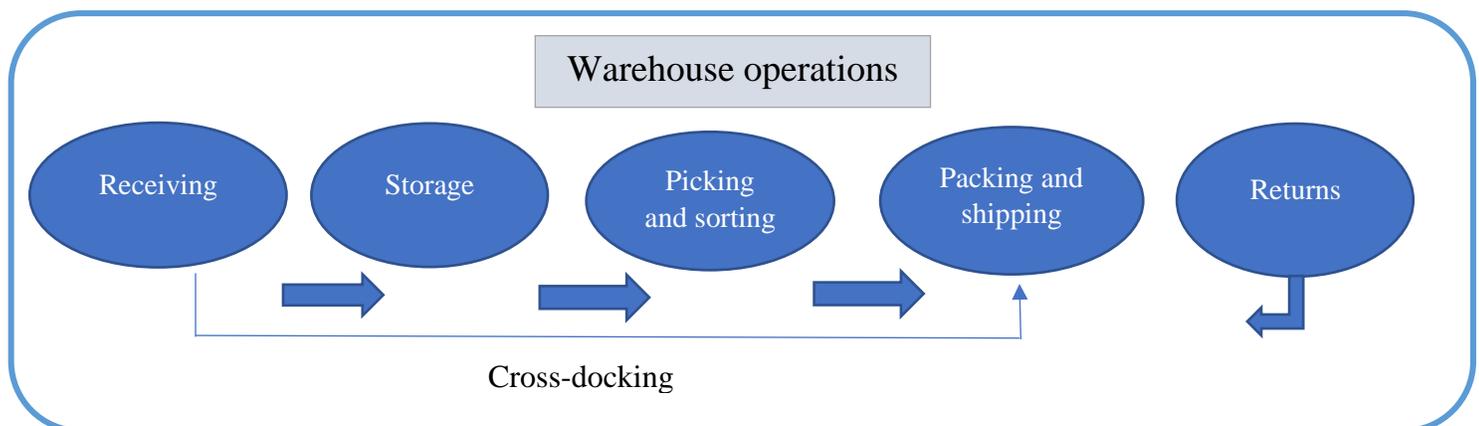


Figure (3) Warehouse processes (Kembro et al, 2018)

3. OMNI-CHANNEL STRATEGY

In this section, we introduce in detail the insight of omni-channel retail and logistic. Section will introduce motives of moving from multi-channel to omni-channel. Research indicate that operating in multiple channels can lead to improved performance. (Zhang et al. 2010, Xia & Zhang 2010) The objective of omni-channel management is to maximize total sales of all channels and provide an overall satisfying customer experience for customers. (Verhoef et al, 2015) Financial potential is proven to be high but it requires efforts from the operating part. Purpose of this chapter is to give a comprehensive overview of general challenges among the different logistic activities and represent omni-channel logistic strategies and initiatives.

Omni-channel strategy can be complex concept and questions for many retailers is, what does strategic integration means and how it can be put in practice? Literature has different perspectives to it. It is not clear to what extent the various activities should be separated or integrated. (Kembro and Norrman 2017). There is discussion whether or not integration means identical characteristics of offers across different channels. In other words, can the customer experience still considered to be consistent or seamless if channels have different strategies? (Cao 2014; Beck and Rygl 2015; Hübner et al. 2016). Can boundaries be blurred without consistent and identical prices, offers, delivery, promotions, and payment methods? (Verhoef et al. 2015) Is it possible to have identical channels with similar offers and how channels would be treated in equal and integrated position? Agreement to what exactly implementation of omni-channel strategy involves for companies is important. (Abrudan et al, 2020) Complexity further arises from information system integration. Heightened need for coordinating external and the internal resources, the likely existence of online versus offline silos, and the likely necessity of internal cultural change that may be met with resistance. Without a clear strategic planning and concept, omni-channel initiatives can easily result in unbeneficial investments. (Yrjölä et al, 2018)

Omni-channel strategy literature focuses on the strategic aspects of the omni-channel approach and the requirements for an omni-channel strategy. Muller-Lankenau et al, (2004) classified four types of multichannel strategies and one of them describes as an omni-channel strategy.

Strategies differs in channel interdependence and differ from the complete isolation to full integration. Later, De Faultrier et al, (2014) adopted same view with eight retail channel strategies. Many authors have applied a broad variety of different strategies even when the integration is described as key motivator. Based on this view, there is no way to create single best approach to multi and omni-channel retailing. (Mueller-Lankenau et al, 2006 Faultrier et al, 2014) Beck and Rygl, (2015) made advanced classification between channels. They categorize channel strategies based on retailer perspective and customer perspective. They made conclusion that omni-channel retailing differs in terms of level of integration and number of channels (retailer's view) and level of channel integration (customer's view).

Omni-channel is purposed to be a seamless integration of customer touchpoints or different channels of which will give different value creating opportunities to different customer segments. It must be recognized that some channels are outside of own control such as price comparison websites. Collectively purpose of these is to lead a way to purchasing decision. Customer can be assumed to use multiple channels simultaneously. Channel silos are inconsistent with omni-channel marketing. This why decision makers must be careful to consider the unique characteristics of omni-channel retailing prior to investing in major initiatives. (Yrjölä et al, 2018) In progression towards this, is important to consider the following factors: 1) the content of the decision 2) the objectives of the decisions 3) the decision-making process. Content of the decision involves acquiring, leveraging, and developing company's capabilities and resources to chase strategic advantage in constantly changing environment, including a shift from product-centric to service dominant thinking. (Vargo and Lusch, 2008, Bettencourt et al. 2014) In this framework the focus is on the value than can be created through company interaction with the customer in the whole purchasing process from initial trigger to after purchase experience. Focus is to encourage loyalty and encourage thinking "it is not about what is sold, but how is sold" (Yrjölä et al, 2018).

Omni-channel retailing was firstly defined by Rigby, (2011) as "an integrated sales experience that melds the advantages of physical stores with the information-rich experience of online shopping" This definition was later adopted by various researchers. Fairchild, (2014) highlighted the idea of integration by "combining traditional commerce with e-commerce by

integrating processes in a harmonious and complementary way throughout the organizational and IT chain and including external logistics partners in these processes” In addition to previous definition external partners such as third-party providers were added. Hubner et al, (2015) Identify, that retailers with several channels operate warehouses either separated or integrated across channels. Integration result in advantages for inventory pooling, allow to afford a broader product assortment, but requires solutions for capacity management and aligned picking processes for store and direct to customer shipments. (Zhang et al., 2010, Bhatnagar and Syam, 2014, Lang and Bressolles, 2013, Xie et al., 2014)

Strategic planning can be divided in two different sections. First concept is back-end fulfillment which concentrates on all warehouse operations and second concept is last mile distribution which focuses on delivery design options. Hubner et al, (2016) summarized both concepts and parameters to in one table (3).

Picking	Location	In-store	Separated Fulfilment Centres	Central Warehouse
	Automation	Manual	Semi-Automated	Fully-Automated
	Integration	Separated	Integrated	Capacity Optimized & Integrated
Back-End Fulfilment				
Delivery Mode	Home Delivery		Click & Collect	
	Attended	Unattended	In-Store	Attached Solitary
Delivery Time	Velocity	Same Day	Next Day	Two or More Days
	Time Slot	Specific		Undefined
Delivery Area	Local	Regional	National	International
Returns	No Return but Money-Back	Check & Return at Reception	CEP Return	Accept & Refund in Retail Outlets
Last Mile Distribution				

Table (3) Omni-channel strategies. Hubner et al, (2016).

Vertical aspects of last mile distribution such as delivery mode, delivery time, delivery area and returns constitute distinct planning areas for retailers to set up strategic fulfillment and logistic

structure. All items on horizontal area such as home delivery or click & collect are independent of each other but retailers may or mostly use more than one design options. (Hubner et al, 2016)

3.1 Warehousing

An omni-channel retailer has the flexibility to choose the fulfillment way between warehouses and physical stores. (Gallino & Moreno, 2019) Huber et al, (2016) stated in their research, that main channel for retailers was to use central warehouse for store and door deliveries. In warehouse the fulfillment process has been optimized to provide maximum efficiency using automation and warehouse technology. In brick and mortar stores the fulfillment is mostly conducted manually by picking up from shelves. (Gallino & Moreno, 2019) According to Huber et al, (2016) central warehouse structure can be differentiated within two different aspects, 1) the degree of integration of distance retailing and brick and mortar stores, 2) the level of centralization within the retailer's omni-channel network. Hubner et al, (2016) conducted another survey which was participated 30 retailers from different sector of logistics industry. Survey showed that more than half of the retailers operate integrated inventories for direct deliveries and store deliveries. Integrated inventory means common central warehouse for both, online retail and brick and mortar. Reason for its use is the gained leverage of inventory pooling and flexibility which comes from the allocation of inventories to stores and distance retailing. Pooled warehouses support the product availability and unpredictability of online orders. (Huber et al, 2016)

A major problem for warehousing is the increasing number and types of warehouses and the growing mix of channels. (Marchet et al., 2018). Relevant example is the trend where large-branded retailers have started selling their products through giant marketplaces such as Amazon.com. This trend may imply new scenarios of increased drop-shipment where the retailers deliver consumer orders directly to another e-commerce provider's customers and omni-channel warehouses will be required to coordinate and handle wide range of incoming and outgoing flows. (Bartholdi and Hackman, 2016; Hübner, et al, 2016). In order to handle increased amount of incoming goods from multiple suppliers as well as customer returns,

retailer must improve planning and consider time windows for arrival of goods and the possibilities of pooling the warehouse workforce and space. (De Leeuw and Wiers, 2015) Additional requirement for incoming goods include larger areas and dedicated staff with new skills and competencies to handle registering and sorting of products into warehouse. (Hubner et al, 2016)

Integration of multiple channels in the same warehouse will have implications to shipping and packing. Integrated storage must adapt to mixing picking and sorting methods (single vs batch picking) which are common for each channel. Different channels may also require different packing requirements such as equipment, staff expertise, specialized areas and there might be unique features such as labeling that need to be integrated to existing operations. (Kembro et al, 2018) The multiple flows need to be coordinated and integrated to avoid separated deliveries to e-customers and stores. (Larke et al., 2018) Sorting of goods can be complex because of increased customer expectation for home deliveries and time windows. (Hubner et al, 2016) Complexity of sorting activities increase the need for sophisticated WMS's and functionalities and may require automation alternatives such as conveyer belts. (De Koster et al, 2007) Warehouse management system (WMS) means software that allow retailer to control warehouse operations from the time goods or materials enter warehouse until they move out. Its role in inventory is to track inventory data that comes in from barcode readers and tags, and update inventory management module in the ERP system. (Techopedia, 2021) All systems should be integrated with each other to enable data sharing of inventory and order information. (Napolitano, 2013)

Another challenge for warehousing is the customer expectations for shorter lead times. This is the total time required from order placement to it being picked, sorted, packed, and shipped. (Hubner et al, 2015) Omni-channel warehouse may experience an increase in cross-dock flows where storage and picking operations are removed and products instead move directly from receiving to packing and shipping. (Bartholdi and Hackman, 2016) This lowers the pressure and weight of lead times. The increased level of automation can be another implication to enable reduced lead times. (Hubner et al, 2016) Wide range of new technologies such as video

technology has tested to make material handling more effective. (Kembro et al., 2017) Considering the high increase in demand, primarily driven by e-commerce, retailers seek ways to maximize capacity utilization in their existing premises. Sometimes it might be difficult and expensive as the trend of urbanization has led to omni-channel warehouses being located close to cities where land-space is more restricted and expensive. (Michel, 2015)

Practical challenge for many retailers in long-term will be warehouse space if demand and capacity are not balanced. Integration of inventory and storage will help retailer to overcome capacity issues. It avoids multiple and separated stock positions for e-commerce and store replenishment in the same warehouse. (Marchet et al, 2018) Literature highlights the positive impacts of integrating capacities related to using same warehouse, joint safety stock, similar processes and shared workforce for handling e-commerce and store replenishment. Integrated warehouse inventory system allows retailer to keep less inventory and take advantage of pooling. (Hubner et al, 2016) It could result in higher service level but also be more complex due the multiple channels. (Hubner et al, 2015) Warehouse need also to cope with changing demand. Yearly, weekly, and daily demand fluctuation can be familiar if retailer has active campaigns or seasonal goods in offerings. Online demand is often harder to be forecasted and it puts pressure on warehouse to be able to quickly decrease or increase capacity. (Hubner et al 2015, Agatz et al, 2008)

Flexibility in terms of capacity has become more difficult to achieve in streamlined warehouse operations but its meaning for efficient omni-channel logistic is important. To respond the increased amounts of SKUs (Stock-keeping unit) due the larger assortment and new product launches, the amount of storage and picking equipment has increased. (Hubner et al, 2016) Picking creates in fact about 50 percent of total warehouse costs. (Bartholdi & Hackman, 2016) Integrated picking operations have several advantages such as flexibility, capacity allocation and economy of scale. (Hubner et al, 2015) However, integrated picking process must consider strategy based on characteristic of product assortment, order sizes, store sizes and replenishment frequency. (Huber et al, 2016, Marchet et al, 2018) In generally the more differences there are between online and brick and mortar channel, the harder is to integrate picking processes.

(Hubner et al, 2016) Considering the high demand for flexibility and complexity of doing it, companies evaluate if and what warehouse operations should be carried out in-house versus outsourcing. (Napolitano, 2013, Bernon et al, 2016) Retailers need to measure whether integrated warehouse locations bring too much complexity of handling the orders and evaluate the gains of integrating inventories. (Hubner et al, 2016)

3.2 Visibility

Important factor to consider for omni-channel retailers is to which extent their assortment should be offered in each channel and how transparent the whole inventory is for customers. Physical store often limits retailer ability to have wide assortment at store level while online channel offers much broader options. It is, therefore, common that omni-channel retailers' storage the most selling products to store whereas online channel is used to sell more specialized products that might be less profitable to have in the physical stores. (Melacini et al, 2018) There are different perspectives how the assortment should be divided. According to Bhatnagar & Syam (2014) goods with high inventory carrying costs is cost effective to have in warehouse located outside cities and exclusively offered online. Li et al, (2015) states that products that can be quickly delivered with low costs is preferred to be sold at the online channel and products with high delivery costs is preferred to be sold in the store.

Omni-channel retailing is based on easiness for customer to buy products from different channels. One key area that is enabling customer to move between channels, is inventory availability. Customer should be able to see the available inventory simultaneously from stores and online store and inventory should be updated in real time. To make this happen, requires retailer to implement robust information technology system where they can manage and integrate inventories and to make physical and information flows consistent. (Melacini et al, 2018) Integrated inventory and visibility allows to see all necessary information from goods with single view. These are location, delivery, stock, and dispatch information across the whole chain. Consistent visibility makes the flow of the products between and within the channel

possible without conflicts and retailer may benefit it by having improved resource utilization and customer experience. (Saghiri et al, 2017)

3.3 Distribution

Many research highlights the complexity of distribution and return process which needs to serve diverse requirement from omni-channels. Key question is whether the products are transported to one point and from there locally distributed. Single-channel retailer with physical flow can more easily optimize its distribution to described locations compared to multi-channel retailer which has various locations and drop-points to cover. (Hubner et al, 2016) The process and decision where an order should be picked from is complex. There are several dispatch options such as retail store, suppliers, and distributions centers. Every decision must be planned in terms of lead time, transportations costs, handling costs, holding costs and backorder costs. (Hubner et al, 2016, Ishfaq et al, 2016) In addition, previous years have highlighted the role of environmental elements and attempts to lower carbon footprint. (Melacini & Tappia, 2018) Shipping costs have showed greatly affects consumers decisions to buy. Based on Postnord (2019) research 55 % of Finnish consumers was interrupted their purchased multiple times and 25% of these claimed reason as too expensive delivery options. Move towards online distribution has also impacted to return flows and their role have increased highly after online market was launched. (Bernon et al, 2016) Traditionally product return has conducted directly to store but several options such as direct return to supplier, post return to distribution center and dedicated return points has raise the question of optimal distribution model with high accessibility and low logistics costs. (Hubner et al, 2016)

Hubner et al, (2016) created comprehensive overview of several different forward distribution concepts based on literature, primary data, practitioner reports and their own interviews. This concept includes six different concept which are described in following. Concepts are distributed in three different categories, 1) store delivery, 2) home delivery 3 different store pick-up concepts. Store delivery and store pick-up concept have brick and mortar store as final

destination while home delivery serves customers directly to home or alternative pickup locations.

Retailer physical stores constitute the traditional part of retailing by serving customer in-store. Brick and mortar store are served by distribution centers or suppliers. Home delivery concept illustrate the traditional form of forward distribution for online retailing. Home delivery can normally be done by using three different concepts. Firstly, delivery from distribution center, secondly drop-shipment where customer order is directly served by suppliers and thirdly home delivery directly from the store. (Hubner et al, 2016)

The third concept concludes different store pick-up concepts. The first type is click and collect where customer orders are shipped in ready picked parcels collected from retailers or suppliers DC to the stores. In multi-channel system the parcels are dispatched at the distance retail DC and shipped to stores as in standard home delivery. When integrated DC are used, then click and collect shipments can be shipped as part of the standard store delivery from the DC depending how often stores are fulfilled. If retailer can use real time data in in-store inventory, then click and reserve concept is possible. Here online orders can be served directly from the available store inventory. (Hubner et al, 2016) Postnord research (2020) showed that Finnish customer were characteristic of collecting orders from parcel lockers (35%) compared to other Nordic countries. Pick up from distribution point (33%), home delivery in daytime (7%) and delivery in evening (4%) followed in next preferred options. When Finnish consumers were asked about the importance between fast delivery, option to choose when delivery occurs, and option to choose place of delivery, place of delivery was most preferred factor (52%) and then fast delivery (24%). In addition (22%) of Finnish online consumers were willing to pay extra for faster delivery and the most acceptable delivery time was 3-5 days (66%). (Postnord, 2020)

3.4.1 Level of integration

Retailers DCs are the basic ways for omni-channel retailer to forward distribution. They are normally used for home deliveries, click and collect and classic in-store deliveries. (Hubner et al, 2016) As earlier mentioned distribution center can be integrated or separated. Integrated DC means that both brick and mortar and online channel sales are distributed from same warehouse.

Main benefit of integrated distribution center has been explained with the achievable synergies across the supply chain that enable better coordination of inbound logistics and fast allocation of products with one inventory system. (Hubner et al, 2016) Integrated DC offer benefits while using click and collect concept. Orders can be shipped as part of the regular store delivery. Therefore, it offers cost advantages if there are high share of store pickup because shipment fees can be saved. (Hubner et al, 2016)

Online retailers have gained advantage by having integrated DCs from their strong knowledge about the process itself. This have happened especially cases where the products have been applicable for handling in semi-automated picking and sorting machines. However, this has required certain types of products which are easy to be sort because of their similarities. For instance, shoe retailing. (Hubner et al, 2016) On the other hand Hubner et al, (2016) research showed that participant with separate DCs highlighted the advantages of simplifying picking process because of separation between pallets and packets. This happened mostly among the retailers that had high variety of volumes and items within one order differs greatly compared to brick and mortar store replenishment.

The store order size depends on store shelf space, delivery frequency and the trade-off between transportation costs and inventory holding. One retail store can replenish their stores daily and another weekly and the shipment size can vary a lot. Consolidation of store replenishment orders minimize costs, but it requires storage space whereas small order size saves the inventory holding costs. The customer order size usually depends on the product type. (Hubner, et al 2016) For instance, basket sizes of consumer electronic mainly consist of few items, whereas grocery or fashion retailers need to handle bigger orders and pick several items for one customer order. It complicates picking and retailers have argued that store logistic system is not capable of additional customer picking. This indicates need for investments towards automated picking systems to execute integrated DCs. Mostly if retailer wants to avoid additional investments, separated warehouses are the logical consequence. Another argued benefit of separated DC is shared risk between channels. Some retailers have used separate legal entities for each channel and external service providers. (Hubner et al, 2016)

To sum up the different distribution models, there are two different ways to set up warehouse distribution structure, 1) separated multi-channel DC 2) integrated omni-channel DC. Main benefits and challenges of different strategies are showing in table (4)

Integration level	Separate DC	Integrated DC
Benefits	Simplified operational processes.	Higher service level, lower average inventory levels, no transshipments, lower transportation costs,
Challenges	Higher inventory levels, Additional transportation costs for click and collect, transshipments.	Higher process complexity, High investments, Higher space requirement at DC, Ability to execute similar products efficiently.

Table (4) Level of integration.

3.5 Level of centralization

Level of centralization means the area in which a DC is responsible for supplying customers or stores. Area distinction can be made between regional DC and centralized DC. Regional DC is responsible to serve customers for specified area whereas centralized DC is responsible for large part or all the customers. The common goal for both concept is to serve customer with minimal time. According to Hubner et al (2016) the lead time cannot be improved for direct shipments via decentralization by using several regional DC's that are located closer to customers. Omni-channel retailers argue that late cut-off points are more important for short lead times than building regional DC's. Hubner et al survey (2016) showed that nine out of ten retailers use single DC for direct online orders. This was mainly due the fact that single DC capacity was sufficient to meet distance retail demand. DC structure for brick-and-mortar stores were different. Most of the surveyed retailer had multiple DC's for store replenishment. Closer DC's were able to respond more faster to demand variation and stores were benefited of having shorter replenishment cycles. (Hubner et al, 2016) Table (5) summarizes the challenges and advantages of centralized and decentralized DC's.

DC type	Decentralized DC	Centralized DC
Advantages	Lower transportation distance. -> Shorter lead times for customer and store delivery, higher delivery frequency,	Higher overall service levels through inventory pooling. Single centralized DC efficient for next-day deliveries.
Challenges	Decentralized inventories. Complex transshipment.	Higher distance for home and store deliveries. Higher lead time.
Characteristics	Brick and mortar channel, high number of stores or high distance sales volume.	Distance channel. Limited number of stores. Geographically concentrated delivery area.

Table (5) Level of centralization.

3.6 Dispatching locations

Dispatching location are places where customer orders are dispatched to third party logistic providers or couriers own by retailer. Retailer warehouse was already presented but purpose of this chapter is to shortly present the benefits and challenges of retailer stores and supplier warehouses.

3.6.1 Retailer stores

Omni-channel stores or outlets are showrooms and DC's at the same time. Stores used as a dispatching location are relevant for store pickup concept click and reserve as well as for home delivery. Main benefit compared to online retailers is shorter delivery times. Same day delivery is possibly to arrange through physical store which is located closer to customer. Same day delivery in today's business environment is something to foster as people might need products immediately. However, different industries have different expectation and customer

preferences. Also, high courier service fees can lower the profit margins. (Hubner et al, 2016) Postnord, (2020) research showed that 67 % of Finnish consumers were expecting 3-5 delivery time, whereas only 2 % expected 1–2-day delivery time which was relatively low compared to other European countries.

Large store network might occur additional cost and transshipment between stores is required specially times when retailer wants to reduce inventories, avoid stockouts and move high discount leftovers. According to Hubner et al (2016) home delivery from stores were not popular among the omni-channel retailers. It was mostly used in case where customer wanted to have heavy products or bulky products shipped from store to destination A. Another type of omni-channel retailer operating from the stores was the retailers with large outlets. These stores represent simultaneously stores and warehouse. Good examples are do it yourself (DIY) stores and electronic stores which has capability to offer large assortment stored only at outlets. Challenge for distribution from the outlets is increased amount of handling at stores and new processes for distance orders. Making processes at same efficiency level with DC is a very challenging. DC are specialized on parcel handling and volumes that must be handled are much higher. Shipments from store requires live inventory data, dedicated storage and packing space and integrated resource planning system (ERP). (Hubner et al, 2016)

3.6.2 Suppliers DC

Third main dispatching option for customer and store orders is a supplier's DC. Order is placed at retailer's online platform by customer or at store by retailer. Strategy can be used for all kinds of delivery modes and omni-channel retailer can use this strategy for many different reasons. Direct-store delivery is commonly used when retailer wants to save inventory at DC's and save processing costs. Direct shipments to customers and to stores in click and collect concept are used by retailers due the special treatment of certain products. Product may require high storage space, or it may have a special characteristic and direct shipment is the most efficient solution. Direct delivery from supplier is also called as drop-shipment and for retailer it offers other benefits such as possibility to keep low volume products in assortments and avoid economical storage inefficiency. Challenges are longer lead time, real-time data availability and transportation costs. Strategy can lead challenges of consolidating order parts from different

suppliers and customer satisfaction can decrease. Table (6) summarizes all different dispatching location and their benefits.

Location	Retailer DC	Store	Supplier DC
Advantages	Economies of scale in picking and warehousing: reduced in-store handling, larger assortment	Same day delivery, leveraging store inventory, click and reserve option	Lower inventory cost, possibility to larger assortment.
Challenges	Efficient picking processes and economic inventory holding. Minimizing shipment costs	Manual picking not dedicated. Store space requirement, real-time data exchange, IT requirements.	High lead times. Customer satisfaction. Separated orders. No real time data. Potentially higher transportation costs.

Table (6) Advantages and challenges of dispatching locations.

The last mile delivery optimizing is the main driver for developments in omni-channel forward distribution. In non-food retailing all the delivery concepts applies which means more complicated concepts. Home delivery is main preference in e-commerce platform, but store pick-up is also growing its head. (Hubner, et al, 2016) It increases customer convenience, and it can be alternative option for parcel stations in advanced omni-channel concepts. Especially, omni-channel retailers mostly begin with brick-and-mortar sector consider store pick-up an essential concept of omni-channel distribution. System allows retailers to use existing store network and generate higher frequency at their stores. Normally pick-up from stores is free of charge for customer but if stores are fulfilled separately per order from DC, retailers should bear the shipment fees. Retailers with large inventory at stores can leverage their inventory with adequate IT system. On the other hand, retailers focusing purely direct shipments, the cost from additional in-store pick-up is higher and pick-up option is less advertised. Same is with new modes that do not offer direct home delivery. They are costly and retailer is in bad position to apply shipment fees. In most companies' shipment fees depend on the value of single order. (Hubner et al, 2016)

3.7 Delivery Mode

Choosing a right delivery mode can be a complex process but there are general guidelines for different concepts. Online retailing delivery is the only part where customer comes into personal with the retailer, indirectly or directly. Mainly delivery mode decision is based on the geographic situation. The relative efficiency of various modes differs depending on the local competition as well as population density. This section will represent mainly used delivery modes which are, 1) attended and 2) unattended home delivery, 3) click and collect. (Gallino & Moreno, 2019) In addition, this section introduces click and reserve and more advanced modes.

Attended home delivery means direct delivery to customers door where customer must be at the point of reception within selected time frame. Attended home delivery concept has been the first available delivery concepts and in most European countries it accounts for the largest share of last-mile delivery. (Gallino & Moreno, 2019) However, despite the popularity of concept home attendance creates challenges for both, customer, and retailer. Given time frame for delivery can cover multiple hours which leaves no choice for customer than be at the agreed place for the whole time. Same time given time frame can create challenges for retailer because of the time restrictions and several other deliveries. Balance between minimizing transportation cost and maximizing customer satisfaction rate is on test and to meet the objectives retailer must done planning work carefully. Set delivery time slots by taking account routing and possible schedule. Klein et al, (2017) argue that time slot capacity can be used better, and delivery process can be more effective if pricing per time slot is differentiated. Practical issue is the lack of IT development and coordination. (Marchet et al, 2018) Unsuccessful delivery leads to returned package which creates additional expenses for transportation, handling, storage space and extra work for retailer to schedule another delivery time window. (Gallino & Moreno, 2019)

Unattended home delivery enables retailer to deliver online order no matter if customer is not at home. Theoretically this means placing the order in front of customers door. Practically common solutions are delivery boxes, reception boxed and shared reception boxes. Customer can receive small orders inside normal letter or then by driving to designated shared point. For

retailer this eliminates tight time slots and trucks can cover shorter distances, avoid re-deliveries and minimize transportation costs. (Gallino & Moreno, 2019) Based on Kämäräinen et al, (2001) research unattended home delivery can reduce cost up to 40 % compared to attended home delivery. Still cost of maintaining shared reception boxes will rise additional cost compared to attended deliveries.

Popular delivery mode in omni-channel retailing is click and collect. In this mode the customer places order in online and receive the goods from the selected store. Customer covers the last mile delivery cost but at the same time concept is more convenient. Customer saves time while it can choose the time of picking the product. In retailer's perspective, concept is efficient as the mode can reduce logistics costs by up to 70% percent. (Gallino & Moreno, 2019) There are several ways to conduct click and collect delivery. Customer pick-up can be realized in a) pick-up point in-store b) Pick-up point that is attached to a store c) a solitary pick-up station at another location. Pick-up station in-store is solution in which retailer initial purpose is to conduct distribution at low costs. No major changes needed to store design or additional investments. Pick-up in-store offers retailer opportunity to cross-sale products. Pick-up station attached to a store means collection point which is attached but not inside the store. Main benefits are same than in-store concept, but out-store option allows drive-through solution. Solitary pick-up station is a combination of small warehouse and drive-through station. Stations are independent from other stores and are fulfilled separately from DCs. Solitary station simplifies demand planning and inventory control but increases logistics cost. (Gallino & Moreno, 2019)

Click and reserve concept can be considered as advanced version of click and collect. It is more convenient for customer, and it enables customer to try and see the product in live before purchasing. In this concept, customer can check the stock availability from online, reserve the product and then collect it conveniently from nearby shop. Concept is expected to growth its popularity among the retailers. It requires well integrated IT systems and real time data about the inventory levels. Click and reserve reduces the average transportation costs compared to click and collect and it enables shorter order-to-delivery cycles than click and collect. Model is restricted by retail industry in the way that retailers who has "moving" items on store shelves

cannot proceed with this type of mode. Fashion industry is good example where customers can fit clothes inside the stores and real time online stocks are vulnerable. (Hubner et al, 2016)

Crowdsourced shipping concept is further innovative home delivery concept. Crowdsourced shipping turns individual person on the street into couriers. (McKinnon, 2016) Individual persons can grab deliveries while they are shopping for themselves and deliver goods to right persons or act as a dedicated non-professional drivers who are willing to transport good to other customers. Crowdsourced shipping offers chance to reduce costs, be environmentally efficient and increase the speed of delivery. Concept includes many legal hurdles and thefts, and frauds are challenge of this concept. (Gallino & Moreno, 2019) New technology has brought new innovative ways to deliver products. Drones, autonomous ground vehicles and bicycles present the current developments. Development for drone delivery is on progress and several technological structures are tested. It has not reached mass-market yet, but different companies have actively tested capabilities of efficient delivery process and best fitted environment for different drone delivery designs. (Boysen et al, 2020)

Customer online orders can be delivered free of charge or at a cost to a customer's home address or to a store for pick-up. Retailer can use different strategies to offer different delivery options at cost or free of charge. Click and collect service, in which customer practically covers last mile distribution cost, can be used for boosting it as a free of charge delivery option. It depends on retailer if benefits of having integrated fulfillment processes are in use or if home delivery is as costly as store delivery. Retailer can modify and boost different cost strategies to get additional cross-sales income. High shipping cost can steer customer to visit at store instead of staying at home. The opposite steering direction is also possible by popularizing the online shop by offering free home delivery. In order to offer free delivery retailer, must ensure efficient processes at the warehouse to be able to compensate for the margin loss because of the missing revenues of the shipping fees. Retailers also must consider the basic requirement of home delivery, tracking of shipment.

3.8 Return logistics

Omni-channel retail distribution system requires backward distribution concept since online customers increasingly demand flexible options for returning the products. The difference between brick and mortar-store and e-commerce is the 14 days return policy that secures customer rights. Customer has 14 days after purchase to return the product to store (KKV, 2021) Return process is highly linked to forward distribution and its almost as important as forward distribution. Different sector has different customer demands but for example in fashion industry return process has significant role due the fact that purchased items may not be ideal. Return options are crucial for customer satisfaction as well as cost effective distribution. Their role in e-commerce has risen rapidly and some fashion retailers has reported return rates between 40-50 %. (Hubner et al, 2016)

There are different factors that should be consider when planning on backward logistics. The network that each retail will choose to depend mostly on industry and geographic matters. However, the first decision for all is to decide whether to centralize or decentralize reverse processes. Secondly, retailer must define if backward logistic is provided by third party logistic provider or if it conducted in-house. For insourcing, meaning conducting by itself, the entire reverse process is handled by retailer and all the responsibilities are on them. The process is not limited only to distribution, but it contains other aspects such as reuse of the recovered material. (Ang & Tang, 2018) Companies that do not have enough resources prefer to outsource their reverse logistics. This can be done by giving the whole process for third party provider or partial process (for example transportation and sorting). Actual need of outsourcing also depends on the characteristic of business sector. In some industries return percent is lower and items can be re-sell more efficiently after return. Outsourcing return process would require careful selection of third-party provider based on their capabilities and alignment of services with the outsourcing company's strategies. (Ene & Nursel, 2012) Successful outsourcing would enable third party producer to consolidate volumes and shipments and benefit from economies of scale. (Ang & Tang,2018)

3.8.1 Return modes

Return of the product usually happens if customer is not happy with the product. To maintain customer relationships after unwanted product the return options are crucial. The following figure (4) shows the commonly used backward distribution options.

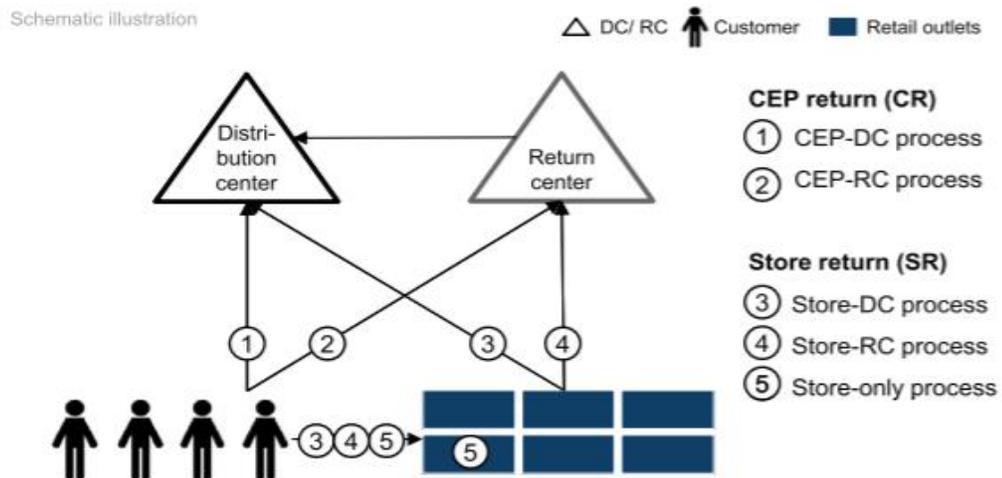


Figure (4) Backwards distribution options (Hubner et al, 2016)

There are five different scenarios. The standard return mode is called CEP (1), (2). In CEP mode goods are returned directly to retailers' distance DC or local specialized distribution centers. Costs of this transportations can cover either customer or retailer. For omni-channel retailer its obligatory to offer in-store return option for online orders. There are three different ways to do like this. In-store staff can send returned products back to central warehouse (3) or local specialized warehouse (4) for further processing. On the other hand, stores can also handle returned good in-house and minimize transportation and processing costs. Goods can be re-sell directly from the store. (Hubner et al, 2016)

Return modes can be separated in two main sections, CEP, and store return. The benefit of having CEP mode is less needed integration and less challenges across the channel. System is simple and returned goods are processed at warehouse. CEP mode as an only option is however, vanishing concept because customer requires option to walk into store and return the product

there. In-store return challenges are refunding issues, additional effort at store and IT integration requirements. In-store return option would require all of these but also result as higher convenience for customer. (Hubner et al, 2016) From the sales perspective, in-store return can bring advantages such as additional sales, physical contact with customer and data for decreasing return rates. In addition, it could also offer easier and cost-effective way to get product back to inventory (Frei & Krzyzaniak, 2019)

3.8.2 Return processing locations

Main goal for return process is fast and cost-efficient product flow from customer to retailer. Basic rule applies, “as faster the return processes as sooner the reworked products are available for resale”. The return processing location can be divided into different categories. One approach is to have dedicated area at DC for returned products. In this way returned goods can be quickly and effectively send to distance retail inventory. Workforce can be used effectively because picking distance orders usually peaks at the beginning of a week, while return arrive warehouse middle of the week. This way workforce can be balanced between both processes. Another way to approach returns processes is specialized and separate return center. This is mostly used in fashion industry where processing of returns become too work-intensive and DC capabilities are scarce. (Hubner et al, 2016)

Third option is in-store processing. In-store processing requires additional workforce and redesigned processes. Reusable items remain at the store, whereas other products are further sent to central return locations. In this model, transportation cost can be saved and in best case product can be resale quickly. System usually requires larger stores where is space for processing and well-integrated ERP system to get inventory updated. Strategy of resale returned products may vary a lot. Some retailers use only online marketplace for returned product whereas in-store returns can be only available at store. (Hubner et al, 2016) Below table (7) shows the main advantages and challenges of presented return modes and locations.

Return Mode	CEP return	Store return
Advantages	Dedicated and efficient. Reduced complexity for the retailer	Customer convenience. Direct feedback. Possibility to fast return to sellable inventory.
Challenges	Transportation costs. Longer return time to sellable inventory	Longer process if CEP needed. IT and staff requirements. In-store handling.
Return locations	Distance DC	Store
Advantages	Potential of workforce pooling and integration of processes.	Transportation costs savings. Possibility to fast return to sellable inventory.
Challenges	Space requirements. Additional transportation cost if shipped from store.	Space and IT requirements Higher processing costs than DC

Table (7) Advantages and challenges of return modes and locations.

4. RESEARCH METHODOLOGY AND DATA COLLECTION

The empirical part of this study is conducted by using qualitative research method. The aim of the empirical research is to answer research question introduced in the introduction chapter. Empirical research aims to verify and reflect to earlier introduced theoretical implications and discuss with them analytically. The purpose of this section is to introduce research methodology, data collection, reliability and validity, and research process.

4.1 Qualitative multiple case-study

A qualitative research can be conducted by using various research methods such as observation and interviews (Metsämuuronen, 2005) According to Yin et al (2003) appropriate selection of research strategy is the key decision of research and will set they ways to gather the data. The collection of qualitative data enables understanding of the research nature and complexity of the research phenomenon. (Kähkönen, 2011) There are three groups of strategies exploratory, explanatory, and descriptive (Saunders et al, 2003) Exploratory research is selected and considered to the most effective approach context of this study once there is lack of deeper insight of topic and insufficient understanding. Furthermore, the purpose of this thesis was to gain more knowledge about the challenges industry faces and find out improvement factors, during the omni-channel transition. Thesis is descriptive in nature and adopts multiple-case study research to address the research questions. Study was conducted by using interviews. All five interviews were conducted through semi-structured interviews and collected data was the primary source of data in the empirical research. Interviews as a research method gives additional information for researcher due the nature of open discussion. Researcher can repeat question to avoid misunderstandings and ask additional questions if answer were not precise. (Tuomi & Sarajärvi 2003) Researchers own observation from case company websites and published articles serve as a secondary data source.

Multiple case study was selected as the research subject was not limited to any single company. Multiple case study allows to explore research phenomenon comprehensively. Multiple-case design was chosen to construct reliability and validity of this research. Multiple-case design allow comparison, which may result in new insights and support the theory from different perspectives. Selected research has greater possibilities for empirical generalization than single case study if more cases support the same theory (Yin, 2009)

4.2 Data collection and analysis

Case companies were selected based on different criteria. The most important criteria were business environment. All contacted companies operated in retail industry. Companies were

preselected based on their websites and presented concepts. Focus was on delivery options and warehouse decisions. Interviewed companies offered multi or omni-channel services for their customers. This was important and necessary due the nature of research. Traditional grocery stores were excluded and focus on selection was on non-food companies. The interviews were conducted via Microsoft Teams and Skype meetings. Interviews lasted in average for 60 minutes. Meetings were audited and audio was generated into textual form by manually written in electronic format. The interview invitation was sent based on persons responsibility in the selected companies and purpose was contact persons from different responsibility areas to gain different perspectives to research phenomena. Only persons in executive positions were selected due the strategical context of research. All interviewees' responsibilities fall into area of supply chain planning, which ensures inclusive data from the wanted context. Below table (7) shows the positions of each respondent.

Case company	Position
Interviewee 1	Head of e-commerce
Interviewee 2	Development manager
Interviewee 3	Head of supply chain
Interviewee 4	Logistic manager
Interviewee 5	IT and development manager

Table (7) Case company interviewees

Case company interviews were divided into for different themes. Firstly, challenges and current state of omni-channel logistic in generally. Secondly, warehousing and its capabilities, thirdly to transportation and distribution and finally to future implications and trends. Same themes very used in all interviews. The main structure of interviews can be found in Appendix 1. Practically interviews did not follow precisely predefined interview structure and different themes was discussed in irregular order. Interviews were purposed to follow discussed flow and therefore different themes was discussed outside defined structure. However, structure was needed to maintain logical structure and to secure that all themes was discussed at some point of interview.

Interviews were conducted in Finnish and direct citations are translated by author. Analyze process was done by gathering the most relevant and main perspectives from each interview

based on research questions. Common ideas and similarities were gathered in Microsoft excel and these were connected to previous studies by pointing out main themes. The main themes were divided into different sub-section which had purpose to gather more detailed and common insight together. Sub-section was added to one big blank paper and the whole picture of each section made easier of acknowledge the comprehensive picture of findings. Finally, these notes were analyzed and processed.

4.3 Reliability and validity

Reliability can be defined as consistency of findings over time and accurate representation of population. (Joppe, 2000) Study is deemed to be reliable if findings can be reproduced under parallel methodology. (Golafshani, 2003) In this study reliability was ensured by taking interviews in person and by recording them. Recording allowed researcher to listen interviews multiple times and capture every needed detail. Recordings were written down in the electronical form and answers in same context were attached together. The source of gathered data can considered to be reliable. This was ensured by interviewing only experienced and executive persons. The research subject was presented beforehand and different logistic areas were mentioned. Interviews were conducted keeping omni-channel context in mind. Interviewed persons represented different positions in executive roles but the business area that they were responsible of was related to different areas inside the research context. Semi-structured interview enabled to free discussion and additional questions if discussed topic was highly interesting. Additional question was based on researchers own consideration. Now this being said, Hara (1995) points out that researcher's personal knowledge, own interest and research experience can influence the final findings and cater to the analysis and its results. Researcher's own experience and acknowledge on the chosen topic was applied to some extent within this research. The researcher personal strengths lie in the qualitative side, and therefore qualitative research methods were applied.

Validity means the external field to which research finding could be generalized. In this study, the research findings can be generalized to other similar area studies and studies in context of omni-channel logistics. The research was conducted in the field of Finnish retail market which

covers wide range of specialized business sectors. Sampling was relatively low (5) and only gave small overview to Finnish retail markets. Research findings can consider to be cover retail markets in general and companies operating or are planning to operate in omni-channel environment. Identified challenges might vary between different logistics structures and operational strategies. Each company has its own combination of operational choices and that why this sample only tries to understand phenomenon generally.

5. EMPIRICAL FINDINGS

In this chapter the empirical findings are discussed and analyzed. The research questions are acknowledged, and discussion is made in relation with theoretical framework and previous research. The below table (9) shows the main decisions discovered from the interviews related to different logistic areas. Research findings on general level showed that there was not a typical concept of omni-channel logistics among the interviewees. All case companies had slightly different concept although all interviewees can consider as omni-channel retailers.

Strategic area	Logistic variable	Options				
Delivery service	Delivery mode	Click and collect	Attended home delivey	Unattended home delivey	Click and reserve	Advanced concepts
	Delivery time	4-8 weeks	2-4 weeks	2-8 days	Same day	
Distribution settings	Picking location	Central warehouse		In-store		Separated fulfillment center
	Transport service	Outsourcing			Insourcing	
	E-commerce delivery pricing	Free HD		Flexible pricing	Fixed pricing	
Fulfillment	Automation	Fully automated		Semi-automated	Manual	
	Integration	Fully integrated		Semi-integrated	Separated	
Return management	Challenges	In-store		Central warehouse	Waste	

Table (9) Logistic selections based on interviews.

5.1 Delivery service

In this section the main delivery concept will be discussed. Delivery mode research results are divided into Click and Collect, Click and Reserve, attended and unattended home delivery and advanced concepts. Research showed that most discussed delivery mode was click and collect. *“Free Click and Collect have been leverage for marketing department in recent years but nowadays it’s have become a more of default than value-added service”*. Its role in past years have grown and the service is offered with free of charge in all interviewed companies.

5.1.1 Click and Collect

Click and Collect have steadily growth its popularity among the consumers despite the increased role of parcel stations that have been the most popular way to receive parcels among the Finnish consumers (43 %). (Posti, 2020) *“Click and Collect have been the newest delivery concept in omni-channel industry and its popularity keep increases after pandemic eases”* Basic requirement for convenient click and collect concept is large brick and mortar store network which serves major part of customers. This was mentioned in almost all interviews. *“Our wide brick and mortar store network enables us to be close to customer and offer relevant and cost-efficient way to deliver goods for major customer base”* Click and Collect has been developed and different versions of click and collect have added such as click and collect drive in. Drive in concept was mentioned from one the interviewee aside of in-store Click & Collect.

Click & Collect can be seen as a solution for question whether customer preferences will change towards online shopping. It combines parts of online shopping but allows customer to physically visit in-store. Click & Collect is a great way to drive revenue from online retailer without significantly increasing fulfillment costs and make more efficient use of existing vehicles. (Gielens et al, 2020) Click and Collect concept should be organized based on potential convenience for customers. Gielens et al, (2020) proposed on their research how one-size-fits-all approach is not advisable. Click & Collect concept can be organized mainly in three different ways in-store, drive-in and separated click and collect pick-up facility. Each of these requires

different logistical processes and each of them should be adjusted individually with company logistic resources. (Gielens et al, 2020) Cost-effective thinking should support Click and collect concept if order handling is centralized to central warehouse. Two respondents reply that Click and Collect orders are delivered to store with the same cost than orders for store fulfillment.

5.1.2 Click and Reserve

Click and reserve concept which connects the inventories in warehouses to in stores has not faced popularity among the retailers. (Hubner et al, 2016) Same was noted among the respondent who did not have Click and reserve in their offerings. One of the respondent replies *“Business risk is too high to launch this type of concept and we have decided to focus on Click and Collect”*. Click and reserve is further concept of Click and Collect which additionally leverages store inventory for online orders. (Hubner et al, 2016) We can see based on interviews that interest was more or less towards smaller in-store inventories rather than expanding them. High value, tailor-made or physically large items are challenge if customer decide to not purchase, and products are already delivered to store. Business risk especially in tailor-made products is too high and that’s why interviewees did not see its practical currently. It implies that respondent saw better opportunities in showroom type of model than Click and Reserve which support lower inventories. However, fully showroom type of model faced resistance due the fact that participants saw customer impatience too crucial to not support fully focused storage to warehouses.

Both models, Click and Collect and Click and Reserve contains physical interaction between retailer and the customer. Gallino & Moreno (2014) demonstrated how retailers prefer in-store deliveries as this increase in-store sales and allow retailers steer customers to their stores. Hubner et al, (2020) continued by stating that large retailer could benefit of steering while having wide store network. However, none of the interviewees see this as the reason for its use. Main message was highly focused planning based on customer perspective. *“Our plan is to offer comprehensively wide delivery options in order to meet customer demand”* Steering towards

any delivery was not seen sensible because customer preferences vary largely among the Finnish consumers and therefore strategy is to improve each mode on its own.

5.1.3 Home delivery

Second discussed topic was home deliveries. Customer promise about the home delivery time among the interviewed companies vary from 2 days to 8 days in standardized products. Delivery time was dependent of many different things. Firstly, geographical challenge which is highly present in Finland. Finland is not-even divided in terms of population and some areas cannot be served as frequently than others. Logistically this was not seen as major issue but eventually it has impact on last mile velocity in every company. Second key thing was industry characteristic. This means offered products which have been planned to be purchased in advance and preferences of receiving them within same day is lower than other industries. For example, same day delivery did not see mandatory compared to food industry where fast deliveries is considered a must. (Marchet et al, 2018) Interviewed experts stated same day deliveries to be something that industry will faced in some day but for now it is something that customer do not especially expect specially when retailing general merchandises. This perspective can be supported by consumer survey where the most acceptable delivery time was between 3-5 days. (Posti, 2020) *“Amazon has strongly marketed its capability to delivered products in few hours and their capability has been highlighted in media but in same time they can offer this service only for very high volume -and standardized products in limited areas. Highest expectations are usually set by media and aggressive marketing campaigns, and we should not put too much focus on that”*.

Home delivery was conducted by having mostly global but also local transportation partner. Strategies differed a lot how many transportation options customers should have and how many logistic partners is efficient to align with logistics processes. Prerequisite for multiple delivery partner was seen in standardized processes and well-developed IT systems. Convenience for customer was highlighted more than price which means that is better to have multiple partners than just one. Its support the theoretical thinking that logistic should be capable of providing different home delivery options in future. (Hubner et al, 2016) Outsourcing specialized and advanced home delivery concept would require multiple partners but same time it would add

customer satisfaction. For instance, one of the respondents reply that *“we have found logistic partner who can add specialized service with capability to integrate this service with our online market”*.

Home delivery pricing was paid service for consumers in each company and its future was seen as the same. None of the interviewed companies see the future in free of charge home delivery concept. Logistically free delivery would higher the amount of home deliveries and pressure for logistic facilities *“Free home delivery would lower the average value per sale and transportation costs would go up”*. Product prices would be included in transportation cost, and everyone would lose. However, home delivery and its convenience are trends that will grow in the industry. *“Shared mailboxes on customer doors or corridors could be the next step of improving home deliveries and especially unattended home deliveries”*. In Finland home deliveries are mainly attended due the fact that separate mailboxes are rare and parcel stations are near consumer in the most populated areas. Research showed that there was no further opinion regarding attended or unattended delivery service and their differences. Indications was that these services belong to courier partner and retailer itself is incapable of influencing time lost management planning. *“For our own delivery service, it would require too many resources and planning to develop concept that allows us to serve customer within small time gap.”* However, time slot management is something that is possible to conduct more conveniently and cost-efficiently with advanced planning and IT-systems. Challenge for development has been consumer behavior which is unpredictable in most cases. (Agatz et al, 2008)

Last mile distribution and home delivery was mainly outsourced to logistic partners, but company owned trucks and provided home delivery was seen important in some cases. *“Local transportation offer flexibility and it is cost-efficient in some stores and areas”* It was discovered that products are mainly delivered by giving time frame beforehand and then products were delivered inside that frame. Although, this was highly dependent on third party logistic services and retailers did not have leverage to change last mile transportation time slot to be more accurate. Literature has highlighted many challenges of successful time slot management and requirement for high level of integration with couriers. (Hubner et al, 2016) Therefore, we can see that development is currently too challenging and would require better integration and

cooperative with courier services. Price slot differentiation in transportation costs divided perspectives. Flexible system where transportation cost is calculated based on transportation length was in use in three out of five companies and others were using same price for all customer despite the location. *“In this same price for each customer system customer in southern Finland pays a part of deliveries to northern part”*.

5.1.4 Advanced concepts

Advanced delivery concept related to high technology were discussed in many ways. Different concept was presented based on global developments. Drone delivery is the most visible and advanced practical innovation in the industry. It is on its testing phase and the benefits are not yet utilized. There were different perspectives, but the general opinion was that *“drones and their capability is not on the required level”*. Finnish retail companies have made pilots for its use, but the results have not been successful. Concept is practically complicated to conduct. *“It is suitable for spare parts or small items but still the accuracy, technology and certain limitation in the use of airspace are obstructing the use”*.

Crowdsourced shipping did not come up in the research. Crowdsourced shipping idea is to activate mass of individuals to deliver parcels freely on behalf of courier service providers, but the most promising start-ups are relying on third-party involvement. (Qi et al, 2016) Crowdsourced shipping promises benefits such as convenience, affordability and improved use of resources which could replace the need of multiple local carriers but in same time crowdsourced shipping is under development and it has many challenges to overcome. (Ermagun et al, 2020) We can extend the purpose of crowdsourced shipping to be more restricted based on (Qi et al, 2016) research in terms of company involvement and compare it to food industry where barrier for offering courier service for individual person is relatively low. We can see that in this level its benefits have been in use grocery business, and we may see its use now when different courier services such as Wolt, Uber and Foodora are expanding their services to general merchandises (Ahamed et al, 2020). Some of the retail stores have piloted partnership with mentioned couriers recently. Service is only available through courier services

and customer do not able to order deliveries from retailer website. However, pure crowdsourced shipping is advanced delivery mode that should research more and its capability and scalability to Finnish markets. It would also have important influence on its environmental impact (Qi et al, 2016)

Delivery modes from environmental perspectives came up into discussion in two interviews. Click and collect has relatively suggested to be environmentally friendly mode for customer. (Hubner et al, 2016) *“Especially if customer can cover last mile transportation by using sustainable methods”*. Other discussed modes were electric bicycles, low carbon trucks and electric trucks. *“Their role in future is essential”* One company was taking part of piloting sustainable transportation innovations and saw their role meaningful in creation of building more sustainable transportation. Research conducted two years ago in Brussel showed that logistic service providers do not consider electric vehicles and cargo-bikes due their flexibility, reliability, and total cost of ownership. (Heleen, 2019) However, time has changed and recent updates from global carriers show that industry is moving towards electric vehicles. (NPR, 2021) Barrier for wider use, has been and is still the batteries, their costs and performance. (Sanquesa, 2021) In country like Finland where distances are higher and trucks need to be able to cover longer distances, this could be a beneficial improvement in future.

5.2 Distribution settings

In this section different distribution selections are presented. Main focus is on picking locations, transportation service and e-commerce delivery pricing. Distribution concept in omni-channel model can vary based on picking location. Large omni-channel retailers most often use central warehouses, while in-store picking is used mostly when volumes are manageable through stores. According Hubner et al, (2016) large omni-channel retailers have higher volumes of online orders and in-store picking becomes inefficient. Large investment is mostly reason and barrier for smaller retailers to centralize warehousing but when certain level of volumes increases, central warehouse enables to make crucial difference for efficiency. We can see many similarities based on conducted interviews. Large omni-channel retailers have already faced

relatively high volumes in their online channel. They have launched more advanced logistic structures and they have invested more resources to them. Smaller retailers have faced the increase in volumes rapidly and therefore need for integration has risen popularity. One of the respondents reply that *“Pandemic has showed that in-store picking can become very problematic if volumes increase rapidly. Business faces serious harm if orders cannot be handled in time and delivery times do not meet customer promise. Need for transformation towards integrated logistic has been realized in past two years”*.

Building omni-channel logistic structure brings option whether to build common DC for both channels. According Hubner et al, (2016) first step for retailers is to use separate fulfillment center for online orders to offer better information regarding product and inventory availability. *“We analyzed whether to get same warehouse for both channels but decided to focus optimizing online channel and build own warehouse for online orders”*. Reasons why integrated central warehouse was not created did not discussed further but there are many possible reasons such as, lack of IT, data sharing, lack of knowledge and cost of integration (Sabir & Irfan, 2014) *“There was instant increase in efficiency and after warehouse processes were optimized efficiency was two times higher. Operating without centralized DC causes issues sourcing and planning of optimal order flow. We were not able to get optimal products to the shelves in time”*. Kembro et al, (2018) highlighted the same issue when moving from multi-channel towards omni-channel. Management is challenging specially if the size of store orders varies a lot between channels. Research showed that each respondent has their own unique warehouse structure and therefore individual challenges. Different warehouse and distribution structures in this study can be divided to three different categories. Separated online warehouse, common central warehouse but separated online inventory, integrated central warehouse.

Dark-store or mini-fulfillment center have become into discussion in past few years. The idea of them is to put fulfillment centers in densely populated areas and shorten the delivery time and provide more convenient and faster customer experience. (Blake, 2020) Dark-store concept which is recently launched in Finland mainly among the food retailer is highly interesting topic. Dark store was discussed with one of the respondents who had piloted this concept earlier. Respondent did have relatively negative perspective to its profitability, but it was based mainly

on piloted version which led to failure. *“Technically concept was efficient but in cost-effectively it was not profitable”*. Survey made for Finnish food retailers showed that dark-store concept offers possibilities for online food retailers but inefficiency in product handling obstruct omni-channel retailers to take it for wider use. *“Globally, dark-store automation has developed to use robotics and it has reached achievable efficiency but in Finland we must aim for the same as currently handling and picking is manual”*. (Yle, 2020)

In-store picking in research companies was in use two out of five companies. Research have shown challenges of in-store picking but also benefits. According to one respondent, in-store picking is manageable with high volumes if processes are well planned, staff is prepared and educated to act efficiently. *“According to principles and books everything should be integrated and centralized, but we have tried it and it was not profitable”* In-store distribution capability rely on many facts such as, size of the stores, storage and handling space and staff expertise. In omni-channel strategy stores can be seen as mini “DC’s” and they can offer multiple benefit such as location near customers, reduced shipping costs, delivery speed, larger assortment available and decreasing pressure for central warehouse. (He et al, 2021)

Decisions of dispatch and picking location was highly studied and focused in each interviewed omni-channel company. Challenge that many participants faced was to determine which products or orders should be distributed from central warehouse, in-store, or supplier. One of the respondents issued the main question of distribution dilemma *“when is profitable to send product bought in-store from store or central warehouse to customer despite the possible delay of delivery time?”* Same question was analyzed with every respondent. High interest was on possibility of using stores located far from central warehouse as a dispatch location for single products.

We can make implications how Finnish retailers have made decisions based on their recent updates how warehouse structure has been built. The use of centralized and integrated warehouse enables important operations due the economy of scale and the use of most advanced technology (Hubner, et al 2016; Difrancesco et al, 2021) We can see from the small sampling that high volumes are connected to high integration. Fulfillment dilemma between central warehouse and in-store is complicated and each omni-channel retailer has its own strategy. We

can see from earlier case studies and from this study that creating efficient in-store process, in-store distribution can be efficient with high volumes. Several high-volume retailers such as Target, Walmart, Decathlon and Best buy have already implemented in-store e-commerce fulfillment concepts (Stelzer, 2017; Cain, 2018; Villaecija, 2019). We can see the benefits of in-store retailing and opportunities instead of high centralization. Specially retailers who have wide existing store network will benefit of flexible adaption of stores and decreases in delivery time and cost. (Hubner et, al 2016; Ishfaq & Raja, 2018)

Another discussed theme was the role of direct shipment from supplier warehouse, versus central warehouse deliveries. One respondent highlighted the role of omni-channel thinking where customer is in the middle and each decision is aiming to increase customer satisfaction. *“For us it means avoiding partial-shipments and finding the best and the most convenient solutions for customers.”* Another respondent replied to this question *“We do not have direct guidelines which products will be send directly from suppliers but mainly its money that matters”*. This dilemma has been studied and studies have shown the same implications that when certain volumes will be exceeded, product should be handled and storage centrally. (Ishfaq & Bajwa, 2019) However, customer centric perspective was highlighted, and main message was the same *“Our purpose is to combine orders together and avoid partial shipments, but in some cases, it is wiser in all standards to conduct direct shipment”*. This shows how customer centric perspective needs to be taken consideration together with profitability.

Picking location in geographically was also discussed in the research. Finland is a large country and transportations can be costly in certain parts. Two of the interviewed persons mentioned that warehouse needs to be in main market area. In Finland, the main market is mainly located in southern Finland. Helsinki is the biggest market area but very costly place to maintain warehouse structures. *“We thought separated warehouse for customer orders in Helsinki, but it was too costly due the high land prices. Central warehouse near customers is important but also near suppliers if possible and we have noticed that there are few optimal areas near main market which are optimally located in terms of minimizing transportation costs and warehouse costs”*.

Showroom model which emphasizes small inventory levels at store and encourage focus on central warehouse deliveries gathered different perspectives from participants. Three of the

participants kept showroom model a great way to minimize storage and optimizing inventory levels. Completely pure showroom was seen problematic for omni-channel retailer but the transformation towards smaller inventories and towards increased role of warehouse deliveries was seen sensible. *“Showroom is a great model for pure online retailer but for us showroom type of model would be optimal for example, having inventory only for high volume products and minimizing others”* Product category also determine if customer is willing to wait to get products delivered. In high value products Finnish customer is more willing to wait more than low value products. (Posti,2020) *“Basically we have operated by using model which is similar than showroom model. Customer can see the available assortment, try and order it in our stores and with efficient logistics we can deliver the products fastly to customers door”*. Another respondent said that *“is hard to predict what will happen but for sure in some retail industries and mainly with smaller items, customer wants to see and try the products before ordering. The most Important is to be close to the customer and some areas it is cost effective to build showroom type of model”*.

Implementing showroom type of model is challenging for traditional retailers as they have existing store network which might be built with high storage spaces. Omni-channel strategy called “endless aisle” was discussed in research. *“We have used this model and it refers to showroom model, but purpose is to delimit store shelves and provide larger assortment in our online store”*. Endless aisle model can include interactive kiosks in which customer and retailer can display entire product catalog and order products from stores to home by using self-service displays in-store. (Roggeveen, 2020) However, one issue was highlighted when planning was done towards integrated payment methods. *“We are evaluating the option for customer to order and pay online store products in our stores. Issue has been the purchasing technology between two channels”*.

Transportation service was divided into two categories, “outsourced” and “insourced”. “Outsource” which means the use of local and global carriers was dominant transportation service whereas own vehicles were mostly used in transshipments or occasionally in last-mile distribution. Strategy of using single carrier or multiple carries vary from single courier service to multi courier service. *“Integration of warehouse and transportation system is requirement*

for using multiple carriers. Otherwise, warehouse processes are too complex and manual handling commits too many resources. We must have different courier options to provide easiness of collecting the orders”. We can see that parcel and pallet deliveries has different approaches for how many couriers is needed but research showed that it was more dominant to have multiple partners for parcel delivery. It was clearly seen how the level of IT integration was impacted to question “what kind of challenge is to manage multiple courier services in terms of logistic?” Standardized process, well integrated IT systems and accurate picking slots enables efficient multi-courier offerings for customers. Online order should move through IT systems to picking process without manual work and labels per each courier service should automatically be available for printing.

E-commerce delivery pricing was discussing in the perspectives of free delivery and fixed pricing. Consumer research have shown that the second biggest factor after convenience affected to online shopping preferences is transportation costs. (Posti, 2020) Free delivery is expected already in many retail industries and especially among the pure online retailers. All participants felt that free home delivery is not cost wise, and customers are willing to pay delivery cost. Free click and collect strive the differentiation of these two concepts. Omni-channel retail research conducted in Sweden showed that many large omni-channel retailers in Sweden offer free home delivery if order value is over certain values. (Jonsson, 2020) This sort of concept was not in use among the interviewed companies but free delivery as promotion purposes have been tested. *“Free delivery increases online orders, but same time some sales might be unprofitable”* Perspectives to flexible and fixed delivery prices divided between participants. Flexible pricing was seen important to increase deliveries to main business areas and *“ability to combine orders in bigger cities lower the environmental impact as well”*. Fixed pricing which means same prices for all customers has also supporters. *“Our strategy is to use fixed pricing for home deliveries. Basically, consumer near main market area pays part of deliveries to consumer in urban areas. Fixed pricing makes marketing and information sharing clearer and more convenient.*

5.3 Fulfillment strategy

Automation was one of the mostly discussed topic and its role of making logistic processes more efficient was one of the top criteria. General opinion regarding role of automation was that automation level should be increased. Higher volumes in online orders have burden the weight of handling processes and it has become inefficient. Automation level among the interviewees has divided in three parts according on Hubner et al, (2016) research, manual, semi-automated and fully automated. The picking process was mostly manual in central warehouses, but one of the five interviewed companies had practical implications and development towards higher level of picking automation. Respondent replied that fully automated mini warehouses are rare in Finland, but trend is to go towards them. *“Especially the use of automation in parcel size product warehousing can increase efficiency rapidly”* Robotics or conveyor belts which could increase the efficiency and minimize lead times was faced practically challenging to conduct. Product size was main reason. *“Large products are too complex to handle in automated warehouse. We have separated Auto-store in use, but it can only handle smaller items. Greater challenge is to find adjusted warehouse for over height products that do not meet pallet measures. If we would have standardized large products the automation would have been already in use”*.

Two respondents have seen research benefits and possibilities of implementing automated pallet system, but practical solutions have been conducted differently. *“We noticed that is more efficient to use drive-in racks”* Drive-in pallet racks are one of the most common systems in non-automated warehouses. Pallet racks targets towards an efficient use of storage space. (Revillot-Narvaez et al, 2020) Another respondent replied that transformation towards fully automated warehouses in Finland has begun but product characteristics causes practical issues. *“Risk of badly designed automation system is high threat because flexibility is weak”*. *“It is challenging to build automated systems that is efficient over time and enables to renew over time”*. Kembro et al, (2018) discuss that, in the long-term warehouse space becomes and important constraint which require different thinking of how demand and capacity should be balanced over time. Tappia et al, (2017) had same implications in their research and they

highlighted the role of understanding each affecting factor in design phase. It is crucial that an automated warehouse can efficiently handle varying demand, avoid bottlenecks and overcapacity. (Ekren, 2011)

Automation can be used in several ways in what comes to warehousing. Warehouse management software has an important role of increasing efficiency in terms of effective space capacity and utilization. (Rebecca et al, 2007) The exact calibration of online fulfillment policy has been studied to significantly affect total costs and to warehouse and store space requirements. (Difrancesco et al, 2021) Same was noticed among the interviewed participants “*Warehouse management software’s needs to be integrated in all levels*”. This was a sentence that was highly acknowledged for all respondents and was the backbone of any optimization. The empirical findings gave deep sense how essential efficient WMS (warehouse management system) and ERP (enterprise resource planning), and their integration is for warehouse operations especially among the omni-channel retailers. Fast movement of data from customer order to picking is a requirement for fast deliveries and directly connected to faster lead times. “*The integrated ERP systems allow real time corresponding between IT-systems. Integrated ERP system can support multiple other software’s such as shipping tracking system*”.

Omni-channel warehouse configuration by using automation was a challenging task. Highlighted reasons such as product characteristics and high risk are correlating to Kembro et al, (2020) study where automation and design layout was stated difficult to be changed. Finnish retailers were more focused to improve performance in handling, labor expertise, information systems and product allocation. Three out of five participants who had integrated warehouses also had more advanced inventory management than two participants who trusted separated inventories. Marchet et al, (2018) pointed out that having integrated warehouse operations requires advanced inventory management. Some research highlighted the role of increased skills and competencies in staff members. We can see based on research that when moving from single channel to multi-channel itself requires advanced expertise and one respondent who had a separated online warehouse highlighted especially the skills and competencies of their staff.

More detailed technology was discussed lightly but RFID (radio-frequency identification) technology was highlighted and discussed with each respondent. RFID-technology offers advantages, regarding transmitting, gathering, and using product data. (Kaur et al, 2011) Technology is option for barcoding which can be seen the most sophisticated and common inventory management tool among the Finnish omni-channel retailers. Barcoding was used almost in each company, but challenges had with Finnish and Baltic suppliers who have not had it in use. “Many of our supplier is using old methods and technological capability is week” RFID technology was discussed with each interviewee and the reception was divided regarding the future implications. *“We have had planning and research regarding the use of RFID several years, but it is now practically buried. We have discovered that technology would be great in theory, but it is still draft, and the technology is insufficient”*. Another respondent replied that RFID technology could create new transformation in whole industry and omni-channel retailers could benefit it highly, but currently its use is impossible. *“Transformation begins from the technology itself and after that it firstly needs to spread towards manufacturers”* Other respondents were interested in its use and ready to be part of piloting, but challenge was lack of successful cases of its use and uncooperative manufacturers. *“Technological issues rely on accuracy of scanning items”*. RFID technology has been studied widely for many years but still has capability challenges. Current literature highlights the high potential and issues of propagation to available channels. (Skiljo et al, 2020; Elbasani et al, 2020)

5.4 Return management

High increase in returns especially in clothing industry have risen interest in past years. Studies have shown that return rates were higher for online originated sales than those clothes bought from physical store. (Bernon et al, 2016) General opinion based on interviews was not too concerned when asked how big challenge returns are in terms of logistics. *“Return volumes are low compared to clothing industry and it eases our logistical impact. Focus is to meet customer expectations and avoid “surprises” in product features”*. Other respondent replied that we have added more focus to minimizing uncollected orders instead of return management. Previous

studies (Lambert, 2004; mollenkopf et al, 2007) as well as interviews showed that there are “moderating effects” that impact to omni-channel returns. In interviews “try before you buy” behavior, returns charging and considered purchasing was mentioned. Return charging is factor where retailer itself has leverage but it was not considered important. *“Mostly returned products are broken or they have failure in functionality and in these cases, it is our responsibility to offer free return”* One respondent recognized the benefits of omni-channel concept in returns. *“We can offer in-store return option for customer which means that last mile cost is covered by customer”*. Ertekein (2018) pointed out same in his research and highlighted possibilities of cross-sales during returns. One respondent called return management as major challenge if volumes increase. *“Each return creates challenges of deciding whether returned product should be allocated to outlets, resale or to waste. It is inefficient in terms of cost and if value of the product is low, product would be cost-effective to put on waste”*.

Discussion regarding different return modes divided participants. Return was mainly available only for same courier service and CEP return was mainly offered. Return for customer in many cases required contacting customer service to evaluate each situation. The processes were simplified and return processes was focus only cover the need of returning broken items. The popularity of using CEP mode can be seen less challenging and less integration required return mode. (Hubner et al, 2016) This was mainly the way how return processes were organized. Only one respondent had direct in-store return option for all stores, and this was seen beneficial for retailer itself and customers. *“Our goal is to resale product from our store by minimizing transportation and handling costs”*.

The study also shows that most common for Finnish omni-channel retailers is to provide full product assortment through online channel. From previous contributions made by Melacini et al., (2018) it can be concluded because the physical store limit retailer’s assortment offering. Finnish retailers therefore choose to have the most selling and popular products in physical store, while products purchased less often or products with high inventory carrying costs as well as transportation costs is more beneficial to have stored in a central warehouse or distributed from supplier warehouse. Assortment visibility was integrated, which means that common inventory availability was visibly across all channels. Challenges had with real-time inventory and delay

of updating inventories. *“In the worst-case scenario, customer orders product from online channel and our inventory details has not updated from having product in stock to empty stocks. In these scenarios we have to find solutions in case by case, and this spend resources”.*

To sum up empirical findings and logistics practices adopted by Finnish retailer, below table (10) shows the main findings from each logistic category. Table is conducted by gathering the most common and discussed perspectives together and therefore singular opinions are not included. Logistic variables are divided into six main categories.

Variable	Findings
1. Delivery modes	<ul style="list-style-type: none"> • Main delivery concepts use in all OC retailer companies. • High interest in Click and Collect mode • Customized modes with specialized 3pl providers • Piloting of new innovations • Prepared perspective for higher online volumes in long-term • Differentiation in pricing decisions • Average delivey time 2-8 days -> No urgent pressure for same day deliveries
2. Transportation service	<ul style="list-style-type: none"> • Last-mile delivery mainly outsourced to courier companies • Divided practises from single courier partner to wide network
3. Picking facilities	<ul style="list-style-type: none"> • Picking location divided between participants • In-store picking versus central warehouse • Location important. Near customer
4. Inventory	<ul style="list-style-type: none"> • 3/5 integrated inventories • Real-time inventory visibility important
5. Automation	<ul style="list-style-type: none"> • Picking process manual • Level of automation should be increased • Optimization in centre instead of automation • Barriers for warehouse automation -> Product size, pallet shipments and economical risk • RFID-technology not in use • Autostore warehouse has increased popularity and benefits can be seen in parcel size product storage
6. Integration	<ul style="list-style-type: none"> • Efficient omni-channel experience can be achieved by optimizing logistic activities • Integration of inventories was mostly seen important. • Integrated IT softwares requirement for managing multiple carrier partners

Table (10) Main empirical findings based on interviews.

6. DISCUSSION AND CONCLUSION

This chapter introduces a summary of the empirical findings found within the discussion chapter. This study took the logistic view to omni-channel retail with the aim to investigate Finnish markets and retailers. Logistic practices played a central role throughout the research. The main goal was to understand how omni-channel retailers has faced the increased role of e-commerce and how it has influenced to logistic practices. Secondly, determine the main challenges and future trends based on interviews. The main objectives were examined through previous studies and research findings. Research was conducted as a qualitative multiple case study. Five of the Finnish omni-channel retailers were interviewed by using semi-structured interviews.

Study recognizes vastly changing retail environment where single- and multi-channel is development is pushing for omni-channel strategies. Study recognized the need of logistic studies related to omni-channel transformation. Finnish companies have different strategies and different challenges based on their size, industry, facilities, resources, and many other factors. However, common interest towards constant development of logistic management was clear and similarities in different logistic areas was recognized. To conclude this thesis, this chapter summarized and discussed the findings by answering the research question presented in the first chapter.

What are the most common omni-channel logistic practices adopted by Finnish omni-channel retailers?

Main practices adopted by Finnish omni-channel retailers have been mainly gathered to table (10), but in this section these are discussed generally. The use of internet-based sales channels has developed rapidly in globally. These business activities, better known as e-commerce, have managed to increase sales significantly. Global increase in volumes can be seen similar in Finland. All Finnish retailers had similar experience, and this was easily justified by economical numbers. Challenges in logistics between Finnish omni-channel retailers vary highly, but in this

section, we point out the most common or similar issues. Generally, omni-channel logistic as a new phenomenon gathers interest from all the interviewed persons. Resources have been used to respond the increased volumes and customer expectations. Omni-channel was seen customer centric approach where operations are flexible, and development are based on customer preferences. Different logistic areas gather different strategies and logistic practices.

The current state of omni-channel logistics can be viewed from many perspectives and compared to many countries and companies. However, relatively small sampling showed that optimization has been made highly based on individual capabilities and characteristic of products and customer base. We can see that in Finnish retail market, as everywhere else based on case studies the high-volume retailers have the most advanced concepts in use. Mostly due the high volumes and need for high integration. Omni-channel logistic requires advanced technology but we can see that Finnish retailers see the possibilities of optimizing current resources instead of creating the most sophisticated systems. We can see that food industry where requirement for delivery times is relatively high is transforming towards newest innovations. We can see that for retailers who offer general merchandises this might be seen as a case study and an example of the possibilities moving towards more sophisticated concepts. It can be seen as risk minimizing but also recognizing that Finnish customers are willing to wait longer for their general merchandises than groceries.

We can see that moving from multi-channel towards omni-channel is currently developing. Different logistic modes and warehouse optimization methods that aims for better channel integration have been launched and are widely in use. Comprehensive management questions how logistic facilities should be arranged and how online channel inventory should be integrated with traditional brick and mortar store has divided perspective and adopted different practices. Current trend among the global retailers has been the increased pace of implementing various automation solutions and testing new material handling processes (Hubner et al, 2016). Same trend can be seen happening in Finland, but main focus is on optimization rather than automation. Visible trend is that customer satisfaction and increased logistic performance can be achieved also other ways than integrating all logistic variables. This research was an implication towards comprehensive optimization in all logistic sectors instead of logistic

integration. Each of the participated company has their own role of creating this picture and we noticed that each company were in the different stage of development. Study showed how crucial impact product size has for practical solutions and perspectives. Pallet size products are challenge in terms of automation, picking and delivery costs. Pallet size warehouse automation concepts are expensive, and their capability and flexibility are not proven to profitable in long-term. Despite challenges, efforts of using more efficient processes among Finnish omni-channel retailers has been launched.

Finnish omni-channel retailers highlighted the role of being near customer. Some of the participant answered that wide store network allows operating without local warehouses and it is beneficial for use them as a distribution centers to achieve faster delivery times. Even if customer was seen to accept longer delivery time, main goal was to minimize them. Challenge that omni-channel retailers faced was the wider assortment in online store than brick and mortar store. Therefore, picking and handling becomes more complicated when products are firstly processed at central warehouse and then transshipped to stores. However, this was mostly optimized by fulfilling stores simultaneously with online and store fulfillment orders. Delivery modes was developed together with global innovations. Click and collect was in use and more advanced concept in piloting stage. Customer added value was achieved from local carriers who were able to provide additional services.

What are the main challenges of omni-channel logistic decisions?

Respondent faced challenges in material handling and especially packing and picking. One of the main challenges was fulfilling dilemma between in-store and central warehouse. How goods should be distributed in the most efficient way? On the other hand, dilemma was same with direct deliveries from suppliers. Which products should be taken to central warehouse and which products should be send directly from the supplier? Finding the right transportation mode was challenging to provide seamless customer experience. Manual processes were seen problematic in many logistics areas. In-store handling, central warehouse picking and labeling, and automation. Research findings did not discuss the product availability issues but recently

Finnish retailers have faced challenges of importing products to Finland. Issues are mainly related to current pandemic and individual accidents but they are mentioned here due to their influence on product availability. Product size was seen problematic in terms of different automation solutions. Pallet size orders are more complex and costly to store and distribute than parcel size orders. Omni-channel literature is based on comprehensive integration between inventories, and it has proven to increase efficiency. Literature is still shaping its format and omni-channel logistics has not been studied widely. Therefore, any defined concept for the right way to do business cannot be issued.

How Finnish retailers see future trends of omni-channel logistics?

Future trends are analyzed based on research findings. The first trend was seen in delivery modes. The purpose for participating retailers was to offer products in the most convenient way and the future was seen in more convenient and faster ways. Home delivery was seen to develop towards more convenient ways where products are carried to customers' doors and shared mailboxes. Products that required assembly or need to be recycled can be arranged more efficiently and conveniently. Sustainable delivery modes will replace the current delivery concepts and more sustainable and advanced modes will be launched. The second dominant trend was the role of automation. Each respondent saw the demand for a higher level of automation and few of them had made planning and evaluation for its use. We can see that in a few years the role of automation in warehouse processes will increase but many will still handle material manually. Errors in planning and launching stages might impact highly on overall performance and therefore major updates in the future related to integration will be no longer considered.

Finnish retailers' opinions about the future are divided, and some participants saw that orders will flow with higher volumes through central warehouses and in-store inventories will be minimized. A future trend, especially in the biggest market areas, can be mini-fulfillment centers or dark-stores which can serve customers with lower in-store costs. When automated processes gain development, the performance of dedicated warehouses and picking locations can be seen to become more efficient and more profitable. The most sophisticated warehouse solutions will be imported to Finland and small adjustments in the near future can be expected. Omni-

channel retailing was seen remarkable in return processes. Finnish retailers saw that in future when online volumes possible keep increasing also return volumes will increase. In-store return will become more popular and traditional return by using couriers will transform into in-store returns.

6.1 Managerial implications

The empirical contribution of this study displays the most adopted logistics variables among Finnish omni-channel retailers and can thereby be used to support management when designing and configuring their logistical strategies. The presented framework can be used as a guide for single channel retailers who are willing to include online sales or traditional sales into their business. It provides an overview of the logistical variables that must be considered. For current omni-channel retailers this study can introduce new perspective for the base of management and act as a basis of benchmarking. The study reveals the different types of logistic approaches and perspectives within studied subject. Trend towards fast integration cannot be seen corresponding with gathered perspectives. Process optimization and creation of clear processes are seen more important currently. Demand for faster delivery times in specialized retail industry did not see crucial. Next day delivery is achievable but in certain limits. Sustainable choices and options should be seen important as customer demand is becoming more demanding. Warehouse location issue rely more on global retail than local but location near biggest customer was seen important.

6.2 Limitation and direction for future research

Although interesting results occurred limitations related to this study exist. The study has analyzed logistic variables in separately and logistic features are divided into different areas. The connection of each variable and influence of each did not identified. Therefore, it would be interesting for future studies to create more holistic overview of connection between different variables. Sustainability can be seen as the future trend in retail industry and study showed different innovation that has been piloted and are in piloting stage. This study only has mildly covered the topic of sustainability. Future research could take deeper insight to sustainable

omni-channel distribution options and study how important retailers see the sustainability in their logistics processes.

Sampling of this research was relatively low, and results were based solely on qualitative data. Future research could be organized by using quantitative research methods and bigger samplings. This approach could give better insights how different approaches are actually divided among the certain group of retailers. This study discovered available options from five retailers and focus more on their perspective than numerous data. Industry specialization could change research findings and it would be interesting to research Finnish grocery business which was discovered to aim for faster deliveries. Challenges are obviously the small sampling of operators in Finnish grocery markets, but results could be compared to studies conducted in globally. This study did not carry out differences of smaller retailers and larger retailers in deeply. Future research could explore how the conditions between smaller and larger retailers differ in terms of logistic possibilities. Another future research could be related to automation processes and specially for bigger products. It was noted that product size was seen challenging when evaluating possible options.

REFERENCES

- Abrudan I.N., Dabija DC., Grant D.B. (2020) Omni-channel Retailing Strategy and Research Agenda. In: Sroka W. (eds) Perspectives on Consumer Behaviour. Contributions to Management science. Springer, Cham.
- Agatz, N., Fleischmann, M. & van Nunen, J. (2008). E-fulfillment and multi-channel distribution - A review. *European Journal of Operational Research*, 187(2), 339-356.
- Agatz, Niels AH, Moritz Fleischmann, and Jo AEE Van Nunen. "E-fulfillment and multi-channel distribution—A review." *European journal of operational research* 187.2 (2008): 339-356.
- Ahamed, Tanvir, et al. "Deep Reinforcement Learning for Crowdsourced Urban Delivery: System States Characterization, Heuristics-guided Action Choice, and Rule-Interposing Integration." arXiv preprint arXiv:2011.14430 (2020)
- Akbar, Saad, and Paul TJ James. "Consumers' attitude towards online shopping Factors influencing employees of crazy domains to shop online." *Journal of Management and Marketing Research* 14 (2014): 1.
- Ang, Alvin, and Albert Tan. "Designing reverse logistics network in an omni-channel environment in Asia." *Logforum* 14.4 (2018)
- Aurambout JP., Gkoumas, K. & Ciuffo, B. Last mile delivery by drones: an estimation of viable market potential and access to citizens across European cities. *Eur. Transp. Res. Rev.* 11,30 (2019)
- Bartholdi, J.J. III and Hackman, S.T. (2016), *Warehouse and Distribution Science*, Georgia Institute of Technology, Atlanta, GA.
- Beck, N., and Rygl, D. (2015), "Categorization of multiple channel retailing in Multi-, Cross-, and Omni-Channel Retailing for retailers and retailing", *Journal of Retailing and Consumer Services*, Vol. 27, No. 170–178.
- Bernon, M. et al. (2016) Online retail returns management: Integration within an omni-channel distribution context. *International journal of physical distribution & logistics management.* 46 (6/7), 584–605.
- Bernon, M., Cullen, J. and Gorst, J. (2016), "Online retail returns management: integration within an omni-channel distribution context", *International Journal of Physical Distribution and Logistics Management*, Vol. 46 Nos 6/7, pp. 584-605

- Bettencourt, L.A., Lusch, R.F., and Vargo, S.L. 2014. "A service lens on value creation: Marketing's role in achieving strategic advantage." *California Management Review* 57 (1): 44-66.
- Bhatnagar, A. and Syam, S.S. (2014), "Allocating a hybrid retailer's assortment across retail stores: bricks-and-mortar vs online", *Journal of Business Research*, Vol. 67 No. 6, pp. 1293-1302.
- Blake, M. "Dark stores are the future of post-pandemic retail. *Forbes*." (2020): 199-202.
- Bowersox, D., Closs, D. and Stank, S. (2000), "Ten mega-trends that will revolutionize supply chain logistics", *Journal of Business Logistics*, Vol. 21 No. 2, pp. 1-16.
- Boysen, N., Fedtke, S. & Schwerdfeger, S. Last-mile delivery concepts: a survey from an operational research perspective. *OR Spectrum* 43, 1-58 (2021).
- Buldeo Rai, Heleen. (2019). Environmental sustainability of the last mile in omnichannel retail.
- Cao, L., 2014. Business model transformation in moving to a cross-channel retail strategy: A case study. *International Journal of Electronic Commerce* 18 (4), 69–96
- Cattani, Kyle & Gilland, Wendell & Heese, Hans & Swaminathan, Jayashankar. (2006). Abstract Boiling Frogs: Pricing Strategies for a Manufacturer Adding a Direct Channel that Competes with the Traditional Channel. *Production and Operations Management*.
- Chatterjee, P. (2010b), "Multiple-channel and cross-channel shopping behavior: role of consumer shopping orientations", *Marketing Intelligence & Planning*, Vol. 28 No. 1, pp. 9–24.
- Chen, J., P.C. Bell. 2012. Implementing market segmentation using full-refund and no-refund customer returns policies in a dual-channel supply chain structure. *International Journal of Production Economics*, 136:56–66.
- Cui, Ruomeng, Meng Li, and Qiang Li. "Value of high-quality logistics: Evidence from a clash between SF Express and Alibaba." *Management Science* 66.9 (2020): 3879-3902.
- Daniels, E. and Klimis, G. (1999), "The impact of electronic commerce on market structure", *European Management Journal*, Vol. 17 No. 3, pp. 318-25.
- De Faultrier, B., Boulay, J., Feenstra, F. and Muzellec, L. (2014). Defining a retailer's channel strategy applied to young consumers. *International Journal of Retail & Distribution Management*, 42 (11/12), 953-973.
- De Koster, R., Le-Duc, T. and Roodbergen, K.J. (2007), "Design and control of warehouse order picking: a literature review", *European Journal of Operational Research*, Vol. 182 No. 2, pp. 481-501.

- De Leeuw, S. and Wiers, V.C.S. (2015), "Warehouse manpower planning strategies in times of financial crisis: evidence from logistics service providers and retailers in the Netherlands", *Production Planning & Control*, Vol. 26 No. 4, pp. 328-337.
- Difrancesco, Rita Maria, Isabelle M van Schilt, and Matthias Winkenbach. (2021), "Optimal in-Store Fulfillment Policies for Online Orders in an Omni-Channel Retail Environment." *European journal of operational research* 293.3 (2021): 1058–1076.
- Elbasani, Ermal, Pattamaset Siriporn, and Jae Sung Choi. "A Survey on RFID in industry 4.0." *Internet of Things for Industry 4.0*. Springer, Cham, 2020. 1-16.
- Ene S., Nursel Ö., 2012. Open Loop Reverse Supply Chain Network Design. *Procedia - Social and Behavioral Sciences*, 109, 1110- 1115.
- Erceg, Aleksandar, and Jovanka Damoska-Sekulowska. "E-logistics and e-SCM: how to increase competitiveness." *LogForum* 15 (2019).
- Ermagun, Alireza, Aymeric Punel, and Amanda Stathopoulos. "Shipment Status Prediction in Online Crowd-Sourced Shipping Platforms." *Sustainable cities and society* 53 (2020): 101950.
- Eroglu, Elif. "The changing shopping culture: Internet consumer behavior." *Review of Business Information Systems (RBIS)* 18.1 (2014): 35-40.
- Ertekin, Necati. "Immediate and Long-Term Benefits of In-Store Return Experience." *Production and Operations Management* 27 (2018): 121-142.
- Fairchild, A. M. (2014). Extending the network: Defining product delivery partnering preferences for omni-channel commerce. *Procedia Technology*, 16, 447–451.
- Fisher, Marshall L., Santiago Gallino, and Joseph Jiaqi Xu. "The value of rapid delivery in omnichannel retailing." *Journal of Marketing Research* 56.5 (2019): 732-748.
- Gallino, S & Moreno, A. (2014). Integration of online and offline channels in retail: The impact of sharing reliable inventory availability information. 60(6), 1434-1451
- Gallino, Santiago., and Antônio Moreno. *Operations in an Omnichannel World*. 1st ed. 2019. Cham: Springer International Publishing, 2019. Web.
- Gielens, Katrijn, Els Gijbrecchts, and Inge Geyskens. "Navigating the Last Mile: The Demand Effects of Click-and-Collect Order Fulfillment." *Journal of Marketing* (2020)
- Golafshani, N. (2003). Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report*, 8 (4), 597-607.
- Gu, J., Goetschalckx, M. and McGinnis, L.F. (2007), "Research on warehouse operation: a comprehensive review", *European Journal of Operational Research*, Vol. 177 No. 1, pp. 1-21.
- Hall, Randolph, ed. *Handbook of transportation science*. Vol. 23. Springer Science & Business Media, 2012.

- He, Yi, Qingyun Xu, and Zhen Shao. "“Ship-from-store” strategy in platform retailing." *Transportation Research Part E: Logistics and Transportation Review* 145 (2021): 102153.
- Hompel, Michael, and Thorsten Schmidt. (2006), *Warehouse management: automation and organisation of warehouse and order picking systems*. Springer Science & Business Media.
- Huang, Y-S., S-H. Chen, J-W. Ho. 2013. A study on pricing and delivery strategy for e-retailing systems. *Transportation Research Part E*, 59: 71–84.
- Hübner, A., Holzapfel, A. and Kuhn, H. (2016), “Distribution systems in omni-channel retailing”, *Business Research*, Vol. 9 No. 2, pp. 255-296.
- Hübner, A., Wollenburg, J. and Holzapfel, A. (2016), “Retail logistics in the transition from multichannel to omni-channel”, *International Journal of Physical Distribution and Logistics Management*, Vol. 46 Nos 6/7, pp. 562-583.
- Hubner, A.H., Kuhn, H. and Wollenburg, J. (2016b),”Last mile fulfillment and distribution in omni-channel grocery ” retailing: a strategic planning framework”, *International Journal of Retail and Distribution Management*, Vol. 44 No. 3, pp. 228-247.
- Ishfaq, R., & Raja, U. (2018). Evaluation of order fulfillment options in retail supply chains. *Decision Sciences*, 49(3), 487–521.
- Ishfaq, R., Gibson, B., & Defee, C. (2016). How retailers are getting ready for an omnichannel world. *Supply Chain Quarterly*, 2, 1–6.
- Ishfaq, R.; Bajwa, N. Profitability of online order fulfillment in multi-channel retailing. (2019), *Eur. J. Oper. Res.* 2019, 272, 1028–1040.
- Jack, Lisa, Regina Frei, and Sally-Ann Krzyzaniak. (2019), "Buy Online, Return in Store." *ECR Community Shrinkage and On-shelf Availability Group*.
- Jocevski, Milan, et al. (2019), "Transitions towards omni-channel retailing strategies: a business model perspective." *International Journal of Retail & Distribution Management*.
- Joppe, M. (2000). *The Research Process*.
- Kähkönen, A-K. (2011) *Conducting a Case Study in Supply Management*. *Operations and supply chain management*, 4, 1, 31-41.
- Kawa A., 2017. Fulfillment service in e-commerce logistics. *LogForum* 13 (4), 429-438.
- Kembro, J., & Norrman, A. (2017). Trends in omnichannel logistics: A survey study with Swedish retailers. In D. Hellström, J. Kembro, & H. Bodnar (Eds.), *The 29th Nofoma conference taking on grand challenges conference proceedings* (pp. 410–425). Lund: Lund University.

- Kembro, Joakim Hans, Andreas Norrman, and Ebba Eriksson. "Adapting warehouse operations and design to omni-channel logistics." *International Journal of Physical Distribution & Logistics Management* (2018).
- Klein, Robert & Neugebauer, Michael & Ratkovitch, Dimitri & Steinhardt, Claudius. (2015). Differentiated Time Slot Pricing Under Routing Considerations in Attended Home Delivery. *SSRN Electronic Journal*. 10.2139/ssrn.2674061.
- Kushwaha, T & Shankar V. (2013). Are Multichannel Customers Really More Valuable? The moderating role of product category characteristics. *Journal of marketing*, 77(4), 67-85.
- Lambert, D.M. (2004), *Supply Chain Management: Processes, Partnership, Performance*, Supply Chain Management Institute, Sarasota, FL.
- Lang, G. and Bressolles, G. (2013), "Economic performance and customer expectation in e-fulfillment systems: a multi-channel retailer perspective", *Supply Chain Forum: An International Journal*, Vol. 14 No. 1, pp. 16-26.
- Lang, G. and Grégory Bressolles. "Economic Performance and Customer Expectation in e-Fulfillment Systems: A Multi-Channel Retailer Perspective." *Supply Chain Forum: An International Journal* 14 (2013): 16 - 26.
- Larke, R., Kilgour, M. and O'Connor, H. (2018), "Build touchpoints and they will come: transitioning to omnichannel retailing", *International Journal of Physical Distribution & Logistics Management*, Vol. 48 No. 4, pp. 465-483.
- Leung, K.H., Choy, K.L., Siu, P.K.Y., Ho, G.T.S., Lam, H.Y., Lee, C.K.M. 2018. A B2C e-commerce intelligent system for re-engineering the e-order fulfilment process. *Expert Systems with Applications* 91
- Levy, M, & Weitz, B. (2013). *Retailing management* (9.th ed.). New York: London: McGraw-Hill Higher Education; McGraw-Hill.
- Li, Zhaolin and Lu, Steven Qiang and Talebian, Masoud, Online versus Bricks-and-Mortar Retailing: A Comparison of Price, Assortment, and Delivery Time (July 18, 2014). *International Journal of Production Research*, Volume 53, Issue 13, 2015.
- Lim, Stanley Frederick WT, Xin Jin, and Jagjit Singh Srari. "Consumer-driven e-commerce: A literature review, design framework, and research agenda on last-mile logistics models." *International Journal of Physical Distribution & Logistics Management* (2018).
- Liu, Huan, Lara Lobschat, and Peter C. Verhoef. *Multichannel retailing: A review and research agenda*. Now Publishers Incorporated, 2018.
- Marchet, G., Melacini, M., Perotti, S., Rasini, M. and Tappia, E. (2018), "Business logistics models in omni-channel: a classification framework and empirical analysis", *International Journal of Physical Distribution & Logistics Management*, Vol. 48 No. 4, pp. 439-464

- 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.
- McCormick, H., Cartwright, J., Perry, P., Barnes, L., Lynch, S. & Ball, G. (2014). Fashion retailing - Past, present and future, *Textile Progress*, 46(3), 227-321.
- Melacini, M., Perotti, S., Rasini, M., & Tappia, E. (2018). E-fulfilment and distribution in omni-channel retailing: a systematic literature review. *International Journal of Physical Distribution & Logistics Management*, 48(4), 391–414.
- Metsämuuronen, J. (2005) Tutkimuksen tekemisen perusteet ihmistieteissä. Jyväskylä, Gummer Kirjapaino Oy.
- Michel, R. (2015), “2015 Warehouse/DC operations survey: industry tackles omni-channel and growth dynamics”, *Modern Materials Handling*, November 1, pp. 52-58,
- Mirsch, Tobias, Christiane Lehrer, and Reinhard Jung, (2016) "Channel integration towards omnichannel management: a literature review."
- Mohapatra, S. (2013) *E-Commerce Strategy Text and Cases*. Boston, MA: Springer US.
- Mollenkopf, D., Russo, I. and Frankel, R. (2007), “The returns management process in supply chain strategy”, *International Journal of Physical Distribution & Logistics Management*, Vol. 37 No. 7, pp. 568-592.
- Mueller-Lankenau, C., Wehmeyer, K. and Klein, S. (2006). Strategic channel alignment: an analysis of the configuration of physical and virtual marketing channels. *Information Systems and e-Business Management*, 4 (2), 187-216.
- Napolitano, M. (2013), “Omni-channel distribution: moving at the speed of ‘now’”, *Logistics Management*, Vol. 52 No. 6, pp. 42-46
- Nasari, Roszi Naszariah Nasni. (2021), "Issues And Challenges Of Online Shopping activities On The Impact Of Corona Pandemic: A Study On Malaysia Retail Industry." *Turkish Journal of Computer and Mathematics Education (TURCOMAT)* 12.10 (2021): 7682-7686.
- Neslin & Shankar. (2009). Key issues in multichannel customer management: current knowledge and future directions. *Journal of interactive marketing*, 23(1), 70-81.
- Piotrowicz, Wojciech, and Richard Cuthbertson. "Exploring omnichannel retailing: Common expectations and diverse reality." *Exploring Omnichannel Retailing*. Springer, Cham, 2019. 1-10.
- Qi, W. et al. (2016) ‘Shared Mobility for Last-Mile Delivery: Design, Operational Prescriptions and Environmental Impact’, *Manufacturing & Service Operations Management*, pp. 1–42
- Qin, Z. et al. (2014) *E-Commerce Strategy*. Berlin, Heidelberg: Springer Berlin Heidelberg.

- Ramanathan R., George J., Ramanathan U., 2014. The role of logistics in e-commerce transactions: an exploratory study of customer feedback and risk, in: Ramanathan, R., Ramanathan, U. (eds). *Supply Chain Strategies, Issues and Models*, Springer London, 221-233.
- Revillot-Narváez, David, Francisco Pérez-Galarce, and Eduardo Álvarez-Miranda. (2021), "Optimising the storage assignment and order-picking for the compact drive-in storage system." *International Journal of Production Research* 58.22 (2020): 6949-6969.
- Rigby, D. (2011). The future of shopping. *Harvard Business Review*, 89, 65–76. Saghiri, S., Wilding, R., Mena, C., & Bourlakis, M. (2017). Toward a three-dimensional framework for omni-channel. *Journal of Business Research*, 77, 53–67.
- Rodrigue, Jean-Paul, Brian Slack, and Claude Comtois. "Green logistics." *Handbook of logistics and supply-chain management*. Emerald Group Publishing Limited, 2017.
- Rodrigue, Jean-Paul. "The distribution network of Amazon and the footprint of freight digitalization." *Journal of transport geography* 88 (2020): 102825.
- Roggeveen, Anne L., and Raj Sethuraman. "Customer-Interfacing Retail Technologies in 2020 & Beyond: An Integrative Framework and Research Directions." *Journal of Retailing* 96.3 (2020): 299-309.
- Sabir, R. I., & Irfan, M. (2014). Levels & barriers to supply chain integration: A conceptual model of Supply Chain Performance. *International Journal of Management Science and Business Administration*, 1(1), 52–59.
- Saghiri, S., Wilding, R., Mena, C., & Bourlakis, M. (2017). Toward a three-dimensional framework for omni-channel. *Journal of Business Research*, 77, 53-67.
- Saghiri, Soroosh & Bernon, Michael & Bourlakis, Michael & Wilding, Richard. (2018). Omni-channel logistics special issue. *International Journal of Physical Distribution & Logistics Management*. 48. 362-364.
- Saghiri, Wilding, Mena & Bourlakis. (2017). Toward a three-dimensional framework for omni-channel. *Journal of Business Research*, 77, 53-67.
- Sheth, Jagdish. "Impact of Covid-19 on consumer behavior: Will the old habits return or die?." *Journal of Business Research* 117 (2020): 280-283.
- Škiljo, Maja, et al. "Analysis of passive RFID applicability in a retail store: What can we expect?." *Sensors* 20.7 (2020): 2038.
- Song, Guang, Shaohua Song, and Luoyi Sun. "Supply chain integration in omni-channel retailing: a logistics perspective." *The International Journal of Logistics Management* (2019).
- Swami, S., J. Shah. 2013. Channel coordination in green supply chain management. *Journal of the Operation Research Society*, 64: 336–351.

- Tetteh, Akyene, and Qi Xu. "Supply chain distribution networks: single-, dual-, & omni-channel." *Interdisciplinary Journal of Research in Business* ISSN 2046 (2014): 7141
- Tran, Lobel Trong Thuy. "Managing the effectiveness of e-commerce platforms in a pandemic." *Journal of Retailing and Consumer Services* 58 (2021): 102287.
- Trenz, Manuel. *Multichannel Commerce A Consumer Perspective on the Integration of Physical and Electronic Channels*. Cham: Springer International Publishing, 2015.
- Tuomi, J. & Sarajärvi, A. (2003) *Laadullinen tutkimus ja sisällönanalyysi*. 1st-2nd ed. Helsinki: Tammi.
- Vaithianathan, S. (2010) A review of e-commerce literature on Indian research agenda for the future. *Electronic Commerce Research* 10, 83-97
- Vargo, Stephen L., and Robert F. Lusch. 2008. "Service-dominant logic: continuing the evolution." *Journal of the Academy of Marketing Science* 36: 1-10.
- Verhoef, P.C., Kannan, P.K. and Inman, J.J. (2015), "From multi-channel retailing to omni-channel retailing: introduction to the special issue on multi-channel retailing", *Journal of Retailing*, Vol. 91 No. 2, pp. 174-181.
- Want, Roy. (2006), "An introduction to RFID technology." *IEEE pervasive computing* 5.1: (25-33).
- Wollenburg, J., Hübner, A., Kuhn, H. and Trautrim, A. (2018), "From bricks-and-mortar to bricks-and-clicks: logistics networks in omni-channel grocery retailing", *International Journal of Physical Distribution & Logistics Management*, Vol. 48 No. 4, pp. 415-438.
- Xia, Y., G.P. Zhang. 2010. The impact of the online channel on retailers' performances: an empirical evaluation. *Decision Science*, 41(3):517-546
- Xie, W., Jiang, Z., Zhao, Y. and Hong, J. (2014), "Capacity planning and allocation with multi-channel distribution", *International Journal of Production Economics*, Vol. 147 No. 1, pp. 108-116.
- Yin, R. K. (2009). *Case study research: Design and methods* 4th edition. United States: Library of Congress Cataloguing-in-Publication Data.
- Yrjölä, Mika, Mark T. Spence, and Hannu Saarijärvi. "Omni-channel retailing: propositions, examples and solutions." *The International Review of Retail, Distribution and Consumer Research* 28.3 (2018): 259-276.
- Zhang, J., Farris, P. W., Irvin, J. W., Kushwaha, T., Steenburgh, T. J. & Weitz, B. A. (2010). *Crafting Integrated Multichannel Retailing Strategies*. *Journal of Interactive Marketing*, 24(2), 168-180

Zhang, J., Farris, P.W., Irvin, J.W., Kushwaha, T., Steenburgh, T.J. and Weitz, B.A. (2010), "Crafting integrated multichannel retailing strategies", *Journal of Interactive Marketing*, Vol. 24 No. 2, pp. 168-180.

Zott, Christoph, Raphael Amit, and Lorenzo Massa. "The business model: recent developments and future research." *Journal of management* 37.4 (2011): 1019-1042.

ELECTRONIC REFERENCES

Cain, A. (2018). Target is doubling down on a key advantage as it gears up for a holiday-shopping battle with Amazon. [Online document] [Accessed 02 June 2021] available: <https://www.businessinsider.com/target-holiday-shopping-battle-with-amazon-2018-10?IR=T>.

Consumer rights when returning products, (2021) [Online document] [Accessed 18 March 2021] available: <https://www.kkv.fi/Tietoa-ja-ohjeita/Ostaminen-myyminen-ja-sopimukset/verkkokauppa-posti-ja-puhelinmyynti-etamyynti/tavaran-ja-maksun-palauttaminen/>

E.Mazareanu, (2020) Most outsourced services in global transportation and logistics industry 2020, Statista, [Online document] [Accessed 23 March 2021] available: <https://www.statista.com/statistics/660142/transportation-and-logistics-most-outsourced-services/>

Posti, (2020) E-commerce survey, [Online document] [Accessed 11 April 2021] available: https://minun.posti.fi/hubfs/Tutkimukset/Suuri-verkkokauppatutkimus-2020_Posti.pdf#_ga=2.241198593.2066173544.1620329004-708380281.1620329004

Postnords, (2020) E-commerce in Europe 2020 [Online document] [Accessed 28 april 2021] available: <https://www.postnord.com/siteassets/documents/media/publications/e-commerce-in-europe-2020.pdf>

PostNords. (2019) E-commerce in the Nordics six months report 2019. [Online document] [Accessed 11 May 2021] available: https://www.postnord.com/siteassets/documents/media/publications/en_e-handeln-i-norden_halvar_2019_highres.pdf

Stelzer, J. (2017). Ship From Store: Easier or Harder Than You Think...It Depends. [Online document] [Accessed 28 May 2021] available: <https://www.ibm.com/blogs/watson-customer-engagement/2017/04/17/ship-from-store/>.

Villaécija, R. (2019). Decathlon entregará pedidos en dos horas en toda España antes de que acabe el año. [Online document] [Accessed 11 June 2021] available:<https://www.elmundo.es/economia/ahorro-y-consumo/2019/06/13/5d02245b21efa085788b4581.html>

Warehouse management system, 2021 [Online document] [Accessed 18 may 2021] available: <https://www.techopedia.com/definition/28071/warehouse-management-system-wms>

Yle, (2020). Dark-store survey in Finland, [Online document] [Accessed 14 June] available: <https://yle.fi/uutiset/3-11859385>

APPENDIX

Background

- Name
- Title
- Main responsibilities

Omni-channel retail generally

- Challenges,
- Past years / updates
- Defining main omni-channel logistic areas

Warehousing and fulfillment

- Pls describe your warehouse structure. (Integrated / separated)
- Do you rely on integrated or separated warehouse locations?
- How was the inventory holding in the warehouse organized before and after the online channel was added? Why?
- How was the picking in the warehouse organized before and after the online channel was added? Why?
- Under what circumstances is an integration of operations (i.e., warehousing, inventory holding, picking) from different channels possible? What are the advantages and disadvantages?
- Inventory availability transparency for customers?
- Would you decide for or against further integration of warehousing operations if online sales increased to a certain amount of all sales?

Transportation and distribution

- How was the distribution network organized before and after the online channel was added (i.e., home delivery and click&collect/drive)? Why?
- What delivery modes exists? What are the advantages and challenges of these? (Delivery time targets? / How to achieve?)
- Any new modes under implementation?
- Under what circumstances is an integration of distribution (i.e., internal transportation and last mile delivery) from different channels possible? What are the advantages and disadvantages?

- Would you decide for or against further integration of internal transportation and last mile distribution if online sales increased to a certain amount of all sales?

Future

- What challenges and trends you will see happening in near future?