

THE IMPORTANCE OF ICT IN THE RETAIL INDUSTRY –

Fundamental Opportunities and Challenges in a Globalized World

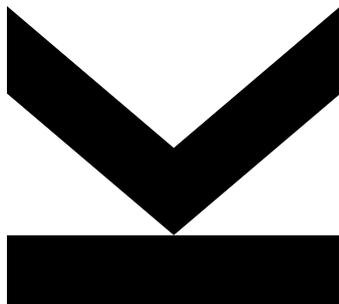
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STATUTORY DECLARATION

I hereby declare that the thesis submitted is my own unaided work, that I have not used other than the sources indicated, and that all direct and indirect sources are acknowledged as references.

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Linz, June 2018

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EXECUTIVE SUMMARY

Innovations and developments in information and communication technology (ICT) lead to significant and continuous changes in the retail industry. ICT has become crucial for the operations of retail companies and substantially influences their success. Retailers have to be aware of technological developments and have to manage related challenges and opportunities in order to stay competitive in the digitized retail market (Sorescu *et al.*, 2011, p. 3). Thus, this Master's Thesis discusses the influence of ICT on the retail industry and shows the importance of ICT for the success and survival of retail companies. An extended literature review is conducted in order to provide a holistic overview of the consequences of technological developments for the retail industry.

Basically, ICT includes every technology that deals with the acquisition, processing, transformation and distribution of information (Argandoña, 2003, p. 4). Some of the most important ICTs in the retail industry are: the Internet, e-commerce (electronic commerce) (Jahanshahi *et al.*, 2013, p. 849), electronic payment (Sumanjeet, 2009, p. 18), data mining (Bagga and Singh, 2012, p. 19), radio-frequency identification (RFID) systems (Jones *et al.*, 2005, p. 396), electronic point of sale (EPOS) systems (Lynch, 1990, p. 159), social media (Drury, 2008, p. 274), smartphones and mobile apps (Kang *et al.*, 2015, p. 210), the Internet of Things (IoT) (Gubbi *et al.*, 2013, p. 1645) and augmented reality (Martínez *et al.*, 2014, p. 27). These technologies substantially influence the business models, processes, strategies and operations of retail companies (Sorescu *et al.*, 2011, p. 3).

Furthermore, this Master's Thesis examines the interactions between ICT and globalization and the consequences of the globalization process for the retail industry. ICT substantially influences the globalization process. Technological innovations, such as the Internet, represent major drivers of globalization, as they accelerate global developments. Other drivers of globalization are also supported by ICT (Aggarwal, 1999, p. 84). These drivers include, for instance, multinational enterprises (Rugman and Verbeke, 2004, p. 3), multinational trade and production (Garrett, 2000, p. 942), international finance and foreign direct investment (Cho, 2003, p. 99). On the other hand, globalization also acts as a driver of technological developments by providing a favourable environment (e.g. rising international cooperation and interactions and telecommunication and technology infrastructure expansion) and by enhancing the diffusion of innovations in ICT. Therefore, the relationship between globalization and ICT can be described as mutually reinforcing (Aggarwal, 1999, p. 85). Through its influence on globalization, ICT also indirectly influences the retail industry. Besides, globalization trends, such as the liberalization of trade policies (Bishop *et al.*, 2011, pp. 120–121), global sourcing (Howlett, 2005, p. 25), urbanization and megacities (Kraas, 2007, pp. 80–81), natural resource scarcity (Curtis, 2009, p.

427) and global climate change (Bu et al., 2016, pp. 577–578) have important implications for the business environment of retailers. The increase of global supply chains and production networks and the fragmentation of production processes, for instance, are consequences of the globalization process, which is reinforced by ICT (Aydın and Savrul, 2014, p. 1267).

In general, developments in ICT have revolutionized the retail industry. ICT has a fundamental impact on the way companies operate. Retailers are significantly changing their business models due to technological innovations, such as the Internet and e-commerce. Besides, the role of the traditional physical retail store is threatened as a result of the emergence of online, omnichannel and multichannel retailers (Notomi *et al.*, 2015, p. 38). Customer centricity and the involvement of customers are also becoming more and more important for retail companies (Sorescu *et al.*, 2011, pp. 3-11). Furthermore, ICT influences and supports the supply chain and logistics operations of retail companies. Technologies, such as RFID (radio-frequency identification) systems, are crucial for the effective and efficient coordination and communication in (especially international) supply chains (Finnegan and Longaigh, 2002, p. 159). Another important technological development that affects the retail industry is social media. This technology has changed how interactions and communication between customers and retail companies take place and influences the shopping behavior of consumers (e.g. service and product reviews on social media websites) (Hennig-Thurau *et al.*, 2010, pp. 311-312). Moreover, ICTs, such as social media and e-commerce, enable retailers to gather valuable customer, sales and market information and data. Data mining technologies are able to analyze this data and the resulting insights can be used to personalize marketing activities and to enhance managerial decision-making and the logistics of retailers. Hence, the high-quality information that can be generated by ICT systems can lead to a competitive advantage for retail companies (Bagga and Singh, 2012, pp. 19-22).

E-commerce represents the most successful and important innovation with regard to ICT in the retail industry. It substantially changes how products and services are sold. Besides, e-commerce has consequences for the shopping behavior of retail customers, as it enables customers to shop at any time and at any place (Laudon and Traver, 2014, pp. 12–17). According to Laudon and Traver (2014, pp. 12–17), the unique characteristics of e-commerce are responsible for its success and popularity. These characteristics include, for example, global reach, interactivity and ubiquity (Laudon and Traver, 2014, pp. 12–17). In addition, the adoption of e-commerce leads to multiple benefits for retail companies, such as enhanced interaction and communication with customers (Hart *et al.*, 2000, p. 970), improved customer satisfaction and convenience (Notomi *et al.*, 2015, pp. 38-39), increased reach, enhanced overall efficiency (Sorescu *et al.*, 2011, p. 10), the extension of the product assortment and the reduction of fixed costs (Anderson and Swaminathan, 2011, p. 224). Therefore, the competitive position of retail

companies can be significantly influenced by e-commerce. However, there are also some problems and challenges with regard to e-commerce. Specific products (e.g. apparel and high-value products), for example, are difficult to sell online, as most customers want to physically try such products before they buy them. The increasing transparency (e.g. product reviews and price comparison websites) and the growing competition in the retail industry are also consequences of the emergence of e-commerce (Grewal *et al.*, 2004, pp. 704-710).

Furthermore, ICT is so widespread in the global economy that it has significantly changed the business environment of retailers. The Internet and its commercial use have revolutionized whole industries (Jetter *et al.*, 2009, p. 43) and developments in ICT have created new ways for companies to cooperate across national and corporate borders. Besides, information and communication technology links companies, suppliers, customers and other stakeholders of corporations all over the world and virtually eliminates geographical boundaries (Torre and Moxon, 2001, pp. 617-618). Alongside the increasingly global supply chains (Leidner, 2010, pp. 69–70), technological innovations and developments also lead to the growing importance of network externalities (e.g. digital services and products and e-commerce websites) (Goldenberg *et al.*, 2010, pp. 4-5), the dematerialization of consumption (e.g. music downloads) (Bourreau and Doğan, 2018, pp. 106–107), the increasing importance of services (Jetter *et al.*, 2009, pp. 38–39), the increasing transparency in the retail industry and the empowerment of customers (Notomi *et al.*, 2015, pp. 38-39).

Due to the continuous and rapid technological changes and their impact on the retail industry, it is crucial for the success of retail companies to be flexible with regard to business strategies, operations and structures (Deloitte, 2017a, p. 8). Besides, e-commerce has a significant impact on the competitive environment of retailers, as it facilitates the market entry for new competitors (e.g. online marketplaces) (Deloitte, 2017a, p. 4). The Internet and e-commerce also increase the power of the retail customers, as these technologies enhance and facilitate the access to information about products, services, prices and companies. Retail companies have to be aware of this change and have to adapt their business models and strategies to the increasing customer centricity (Abraham *et al.*, 2017, pp. 1- 3). In general, innovation and information are becoming the new competitive instruments in knowledge-based economies and retail companies need to revise their business strategies in order to maximize the benefits (e.g. enhanced logistics, communication and efficiency) that can result from the use of ICT (Chan and Al-Hawamdeh, 2002, p. 278).

ICT offers several fundamental opportunities for retail companies. According to the literature, the most important benefits and opportunities of ICT are: improved external and internal communication (Finnegan and Longaigh, 2002, p. 159), increased market reach (Grewal *et al.*,

2004, pp. 706–707), improved customer relationships (Flavián and Guinalú, 2005, pp. 417–418), improved managerial decision making (Grandon and Pearson, 2004, p. 197), facilitated access to information and knowledge (Pantano, 2014, pp. 348–349) and enhanced efficiency (Prater *et al.*, 2005, pp. 138-139).

However, there are also challenges of ICT that need to be addressed by retailers. These problems and challenges include: information overload (Jetter *et al.*, 2009, p. 43), privacy, security and trust issues (Chaparro-Peláez *et al.*, 2016, pp. 1278-1280), lack of ICT infrastructure (Jahanshahi *et al.*, 2013, p. 851-858), increasing transparency and competition (Ramanathan *et al.*, 2017, pp. 106-108), costs of ICT adoption and network externalities (Flavián and Guinalú, 2005, pp. 412–414), lack of trial and social experience (Varadarajan *et al.*, 2010, p. 103) and lack of training and knowledge (Smith, 2008, p. 115).

It is essential for managers of retail companies to be flexible and to be aware of technological developments in the retail industry in order to be able to react accordingly. The management of retail companies has to invest in new digital capabilities to benefit from the opportunities that ICT provides. Besides, it is important for retail managers to create and maintain a strong physical and digital (e.g. e-commerce and social media) presence of the retail store (Bain & Company, 2018, p. 4), to find ways to improve the trust of the customers with regard to online stores and electronic payment (Ernst & Young, 2016, p. 20) and to adapt their strategies to the growing customer centricity (Ernst & Young, 2016, p. 3).

To sum up, developments in ICT, especially the Internet, e-commerce, RFID systems, data mining and social media, are significantly influencing the supply chains, business models, marketing strategies, logistics and other important aspects of retail companies. As a result, the complexity, volatility, competition and transparency in the retail industry are increasing substantially. Retail companies can benefit from the opportunities that ICT offers, but also need to find solutions for the challenges and problems that come with ICT. It is crucial for the survival and success of retailers to recognize important technological developments and innovations, to understand them and to exploit them.

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List of Abbreviations

3D.....	Three-Dimensional
App.....	Application
AR.....	Augmented Reality
B2B.....	Business to Business
B2C.....	Business to Consumer
C2C.....	Consumer to Consumer
CD.....	Compact Disc
Ch.....	Chapter
DVD.....	Digital Video Disc
EAS.....	Electronic Article Surveillance
E-Commerce.....	Electronic Commerce
ECR.....	Efficient Consumer Response
e.g.....	exempli gratia (for example)
E-Mail.....	Electronic Mail
E-Payment.....	Electronic Payment
EPOS.....	Electronic Point of Sale
ERP.....	Enterprise Resource Planning
etc.....	Et Cetera
FDI.....	Foreign Direct Investment
GDP.....	Gross Domestic Product
GPS.....	Global Positioning System
ICT.....	Information and Communication Technology
IMF.....	International Monetary Fund
INC.....	Incorporated
IT.....	Information Technology
IoT.....	Internet of Things
LAN.....	Local Area Network
LTE.....	Long Term Evolution
M-Commerce.....	Mobile Commerce
MNEs.....	Multinational Enterprises
NGOs.....	Non-Governmental Organization
QR Code.....	Quick Response Code
RFID.....	Radio-Frequency Identification
ROI.....	Return on Investment
SBO.....	Sales-Based Ordering
SMEs.....	Small and Medium-sized Enterprises

U.S. United States
USD United States Dollar
VHB Verband der Hochschullehrer für Betriebswirtschaft

1. Introduction

1.1. Problem Statement

Information and communication technology (ICT) has become vital for the survival and success of business companies. Developments in ICT have dramatically accelerated innovations and have changed entire industries. The most popular example is the Internet, which has revolutionized business practices and the entire modern world. Hence, companies are constantly pressured to keep up with the latest developments in the field of ICT (Jetter et al., 2009, p. 37). As this topic is too broad to explore every aspect of it in detail, this Master's Thesis focuses exclusively on the importance of ICT in the retail industry. Moreover, this work deals solely with the users of ICT (retail companies and customers) and not with the producers of ICT.

ICT is also closely linked to a phenomenon called globalization. Technology is a catalyst for globalization, as technologies, such as the Internet, facilitate global networks, trade, information and knowledge sharing and communication and remove geographical boundaries (Pohjola, 2002, p. 138). At the same time, globalization is a driver of developments in the field of ICT, as the globalization process involves the increase of flows of information, ideas and knowledge, lower communication costs and the expansion of technology infrastructures (Argandoña, 2003, pp. 9-10; Aydın and Savrul, 2014, pp. 1268-1275). Thus, there are significant interdependencies between ICT and globalization. Furthermore, the globalization process substantially influences the retail industry, as it leads to reduced barriers to trade and to the internationalization of the economy. In addition, globalization trends, such as urbanization (Kraas, 2007, pp. 80–81), can have important consequences for the retail industry. It can also be stated that ICT indirectly influences the retail industry through its influence on globalization (Aydın and Savrul, 2014, p. 1267). Hence, this Master's Thesis also examines the complex interactions and relationships between ICT, globalization and the retail industry.

The main part of this Master's Thesis, however, deals with the impact of ICT on the retail industry. Technological developments and innovations, such as the Internet, e-commerce (electronic commerce) (Jahanshahi et al., 2013, p. 849), social media (Hennig-Thurau *et al.*, 2010, p. 311), RFID (radio-frequency identification) systems (Jones *et al.*, 2005, p. 395), data mining (Bagga and Singh, 2012, p. 19) and electronic payment (Sumanjeet, 2009, p. 18), have significantly changed multiple aspects of the retail industry and have become vital elements of the operations of retailers. E-commerce, for instance, is completely changing the way products and services are sold and it allows customers to shop at any time and at any place. This has important consequences for the shopping behavior of customers and for the business models of retail companies (Laudon and Traver, 2014, pp. 12–17). Technologies (e.g. search engines, social media, mobile devices and e-commerce) increase the power of the consumers by

improving and facilitating the access to information about services, products, companies and prices (Jahanshahi et al., 2013, p. 849). ICTs are also essential for the coordination and communication in global supply chains and play a crucial role for the logistics operations of retail companies (Finnegan and Longaigh, 2002, p. 159). Besides, social media has changed how retailers interact and communicate with their customers (Hennig-Thurau et al., 2010, pp. 311-312).

All these developments in ICT lead to changes in the business environment of retailers. The Internet and e-commerce, for example, have substantially increased the transparency in the retail industry. Customers can easily compare prices of different retail companies by using price comparison websites and can read product reviews from other customers on e-commerce websites. It is crucial for the competitiveness of retail companies to be aware of such developments. In general, ICTs have increased the complexity, competition and volatility in the retail industry (Notomi et al., 2015, pp. 38-39).

Moreover, retail companies face several challenges and problems with regard to ICT that have to be solved. Such challenges include, for instance, trust, security and privacy issues (Chaparro-Peláez et al., 2016, pp. 1278-1280), costs of ICT adoption (Tsai et al., 2010, pp. 259–260) and information overload (Jetter et al., 2009, p. 43). On the other side, retailers can also benefit from the opportunities that ICT offers. Advantages and opportunities of ICT are, for example, improved external and internal communication (Finnegan and Longaigh, 2002, p. 159), increased market reach (Grewal et al., 2004, pp. 706–707) and improved efficiency (Prater et al., 2005, pp. 138-139).

It is essential for managers of retail companies to understand the impact of technological developments on the retail industry and to be aware of the challenges and opportunities of ICT. Besides, managers need to stay flexible and have to be prepared to modify core elements of the business strategy and business model due to the continuous changes in the digitized retail market (Varadarajan et al., 2010, p. 108). Thus, the aim of this Master's Thesis is to examine the importance of ICT in the retail industry. In order to provide the reader with a detailed overview about the issue a broad literature review is conducted.

1.2. Objectives of the Thesis

The objectives of this Master's Thesis are to provide all the relevant information that is needed to understand the importance of information and communication technology in the retail industry and to inform about the fundamental challenges and opportunities for retail companies that are linked to ICT and e-commerce. Besides, the impact of ICT on the business environment and practices and the changed requirements for competitiveness in the retail industry are discussed. Thus, the following research question was formulated:

How does ICT influence the retail industry and how important is ICT, especially e-commerce, for the success and survival of retail companies?

After reading this Master's Thesis, the reader should understand why it is so essential for managers of retail companies to quickly identify developments and trends in the field of ICT and to react and adapt accordingly.

1.3. Structure of the Thesis

This Master's Thesis is structured into ten chapters. The first chapter is the introduction, consisting of the problem statement, the objectives of the thesis, the structure of the thesis and the research method. The problem statement introduces the reader to the topic and describes the problem. The next sub-chapter deals with the research question and the overall aim of this Master's Thesis. Furthermore, the structure and the research method of this scientific work are explained.

The main part of this Master's Thesis is organized as follows. The chapters two to six aim to provide the relevant background information that is crucial to the understanding of the main topic. The second chapter describes the characteristics of the retail industry and its different distribution channels in order to give the reader an overview of the industry. The third chapter presents some general information about information and communication technology and explains how ICT and especially e-commerce are used in the context of the retail industry. In the fourth chapter, the term "Globalization" is defined and explained. The fifth chapter covers the interaction of ICT and globalization and the sixth chapter investigates the impact of globalization on the retail industry. The chapters seven to nine deal with the core issue of this Master's Thesis, the importance of ICT in the retail industry. The seventh chapter examines the influence of information and communication technology and e-commerce on retail companies. This chapter discusses the role of ICT in the retail industry, the consequences of e-commerce for the retail industry and its customers, the impact of ICT on the business environment and the changes in the requirements for competitiveness in the retail industry that are related to the emergence of ICT. The eighth chapter takes a closer look on the fundamental opportunities and

challenges of ICT and e-commerce in the context of retail companies. In the ninth chapter, the implications for managers of retail companies are presented. The last chapter is the conclusion. In the conclusion, the research question is answered and the main findings of the work are presented.

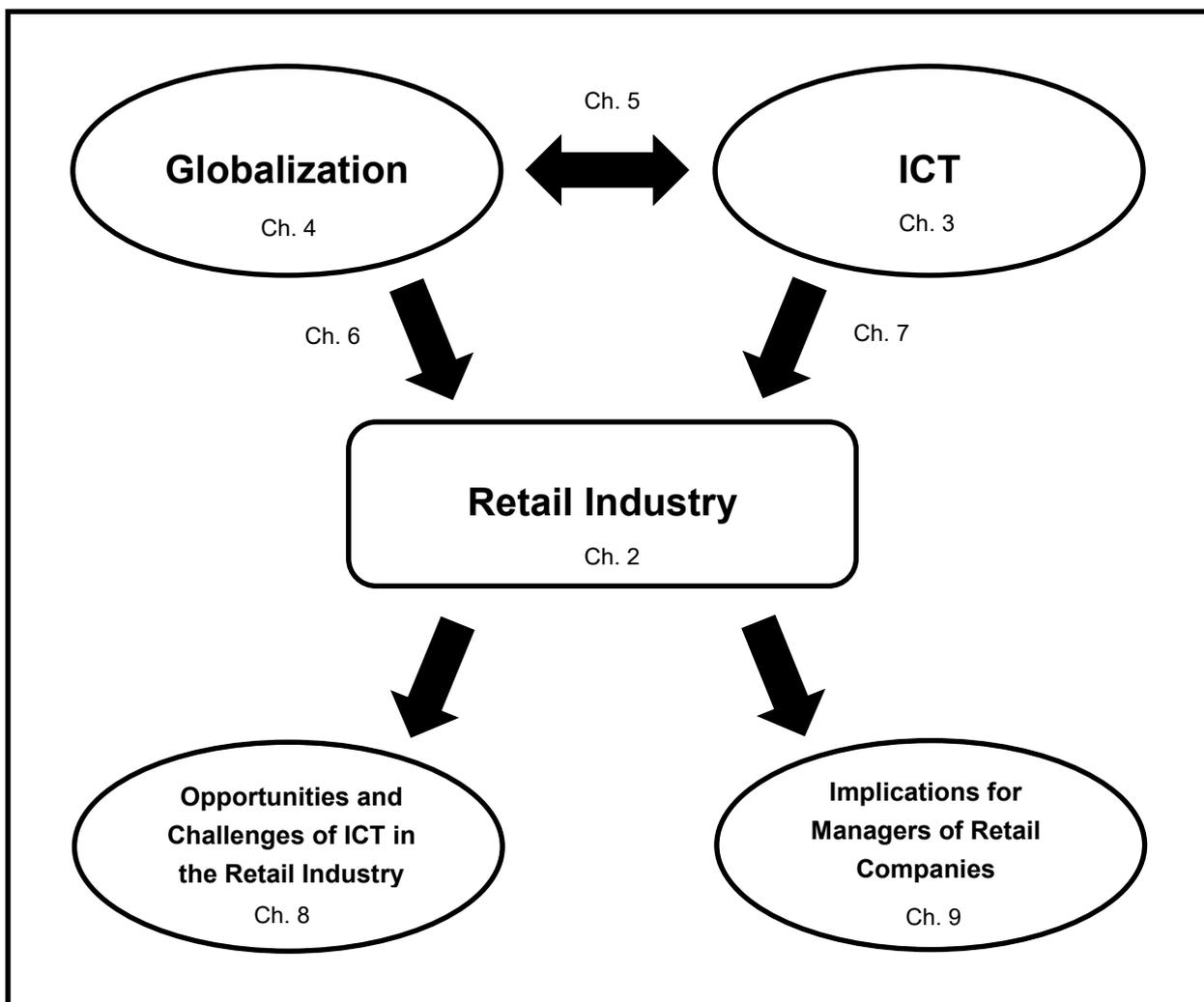


Figure 1: Structure of the Master's Thesis

Source: Own graphical presentation on the basis of Argandoña (2003, pp. 9-10); Aydın and Savrul (2014, pp. 1268-1275); Leidner (2010, p. 71) and Pohjola (2002, p. 138)

In order to provide an overview of the structure of this Master's Thesis, figure 1 illustrates the links between ICT, globalization and the retail industry. These three terms are defined and explained in the chapters two to four. There are important interactions between globalization and ICT that are examined in this Master's Thesis (chapter five). Moreover, the influence of globalization on the retail industry is discussed (chapter six). The main focus will be on the impact of ICT on the retail industry (chapter seven). Besides, the opportunities and challenges of ICT in the retail industry are presented in chapter eight. The last chapter, before the conclusion (chapter ten), deals with the implications for managers of retail companies (chapter nine).

1.4. Research Method

In order to answer the research question of this Master's Thesis, a detailed literature review (desk research) is conducted. The literature review is a continuous process throughout the writing of this scientific work that consists of literature collection, analysis, comparison and criticism. This research method is used, because it enables the creation of a well-structured overview of an issue or area where a vast amount of literature already exists. Besides, a literature review can also uncover areas that require more attention from researchers and provides a solid foundation for further research and advancing knowledge. It also helps to identify the major questions with regard to a specific topic and the current state of research can be assessed (Webster and Watson, 2002, pp. 13-21).

Scientific articles from recent journals are the main source of knowledge for this Master's Thesis. However, also books, internet sources and consultant and experts literature are used to find additional information, if needed. Recent literature from consulting companies, such as Deloitte, Accenture, Bain & Company, PwC, McKinsey & Company and Ernst & Young, is a valuable source of information, as the topic of this Master's Thesis is highly relevant for the research of these organizations. Besides, several databases, such as Google Scholar, EBSCO Business Source Premier, Elsevier Science Direct, Emerald, Springer, SAGE and JSTOR are used in the course of the literature research. The following topics and combinations of them are researched in particular:

- Retail Industry
- Globalization
- Distribution Channels and the Supply Chain of Retailers
- Business Models of Retail Companies
- Customer Centricity and Customer Relationships
- Communication and Decision Making
- ICT
- E-Commerce
- Social Media
- RFID Systems
- Data Mining, Information and Knowledge
- Mobile Devices

2. The Retail Industry

2.1. Overview

Chapter two deals with the general characteristics of the retail industry, its basic supply chain and the distribution channels of retailers. This Master's Thesis does not cover the wholesale industry. The aim of this chapter is to provide an overview of the retail industry. The retail industry includes all companies that sell products and services to end customers through different distribution channels. It does not include the wholesale industry. Retailers are the intermediaries between the wholesalers and the final customers. Retail companies purchase a wide range of goods from wholesalers and sell them in small quantities to the end customers for their personal, family or household use (Babu, 2012, p. 55). Besides, retailers do not only offer tangible physical products, they also sell intangible services to customers. These can be services that are bundled with products or pure services. Retailing does not involve the sale of goods to customers that want to resale them. It does only cover the sales to the end consumers. The buyer's purchase reason is important. It is not a retail sale if a customer purchases goods for resale purpose; instead, this is called a business sale. The retail industry represents the last step in the procedure of moving the services or products to the customers (Pasnoorwar, 2016, p. 216). In other words, "*a retailer is the last link in the chain of intermediaries*" (Saravanakumar and Muthupandi, 2013, p. 140). Furthermore, retailing includes marketing and promotional activities. Retailers engage in such activities in order to increase the awareness and image of the company and its products and to raise sales and profits. The marketing operations of retail companies involve, for instance, print advertising campaigns and advertisements in other media (Martínez *et al.*, 2014, pp. 33–34).

Supermarkets, car dealers, local coffee shops, gas stations, department stores, drug stores, grocery stores, furniture stores, computer stores, online shops, such as Amazon, and many more all belong to the retail industry. Two prominent examples are the companies Wal-Mart and Best Buy (Babu, 2012, p. 55; Saravanakumar and Muthupandi, 2013, pp. 139-140). According to Statistik Austria (2017) the retail industry can be subdivided into the following segments:

- Motor Vehicle & Parts Dealers
- Grocery Retailers
- Specialist Retailers (Food, Beverages)
- Gasoline Stations
- Mixed Retailers
- Retailers for Pharmaceutical and Medicinal Products
- Clothing and Footwear Retailers
- Electronics and Furniture Retailers

- Other Retailers
- Mail Order and Internet Retailing

The different segments of the retail industry are becoming increasingly difficult to distinguish, as many segments overlap. Grocery retailers (beverages and food), for instance, have started to offer products from other retail segments, such as office supply, furniture and sporting goods (non-grocery retailers). This product range diversification results into the blurring of the boundaries between the different retail industry segments. Besides, this diversification trend is further intensified by the competition for revenues and the emergence of omnichannel retailing (Euler Hermes, 2017, p. 2).

The most common channels of distribution are brick and mortar stores (physical stores) and online sales channels. In chapter 2.3., the different distribution channels of retailers are discussed in more detail. Retailers used to operate in the local areas where their stores are located. Retail shops are mostly situated in suburban areas or city centers in order to attract customers that are passing by (Saravanakumar and Muthupandi, 2013, pp. 139-140). However, the emergence of e-commerce and the use of other distribution channels, such as mail order, have substantially increased the reach of (local) retail companies and have decreased the importance of the location of the stores of retail companies (see chapter seven) (Babu, 2012, p. 55; Srinivasan *et al.*, 2002, p. 41).

The majority of the retail market is controlled by some major retail chains (e.g. Wal-Mart and Best Buy – U.S. market). These companies have higher revenues and are larger in size than most manufacturers. They also offer multiple product categories with various brands. The different brands in a specific product category are competing and are substitutes for each other. Besides, the objectives of retailers are often conflicting with the manufacturer's goals. Retailers have an essential influence on the prices of goods and determine how they are distributed. Hence, large retail companies have a higher bargaining power than most manufacturers (Babu, 2012, p. 55; Choi, 1996, p. 117).

The retail industry is a substantial part of the economy. In the United States, retail represents the second biggest industry with regard to the number of employees and the number of establishments (Pasnoorwar, 2016, p. 216). According to Deloitte (2017b, p. 14), the world's largest retail company (in the fiscal year 2015) is Wal-Mart Stores, Inc., with a revenue of approximately 483 billion U.S. dollars. The second largest retailer worldwide (2015) is the Costco Wholesale Corporation, with a revenue of approximately 116 billion U.S. dollars. In the fiscal year 2015, Amazon.com, Inc. only takes the tenth place, with a revenue of approximately

79 billion U.S. dollars. Furthermore, the revenue of the global top ten retail companies accounts for 30.4 % of the total revenue of the top 250 retail companies (Deloitte, 2017b, p. 14).

2.2. Supply Chain

The structure of the supply chain of retail companies can vary depending on the type of products they are selling. Figure two shows the basic retail supply chain that consists of three stages. The figure on the top (figure two) illustrates the general steps of the supply chain, which include manufacturers, distributors and retailers. The figure at the bottom (figure two) shows a supply chain structure with four retailers, two distributors and one manufacturer. Certainly, there exists a multitude of other supply chain structures (Huang *et al.*, 2008, pp. 50-52). However, for the purpose of this Master's Thesis, it is sufficient to discuss the basic supply chain of the retail industry that is illustrated in figure two.

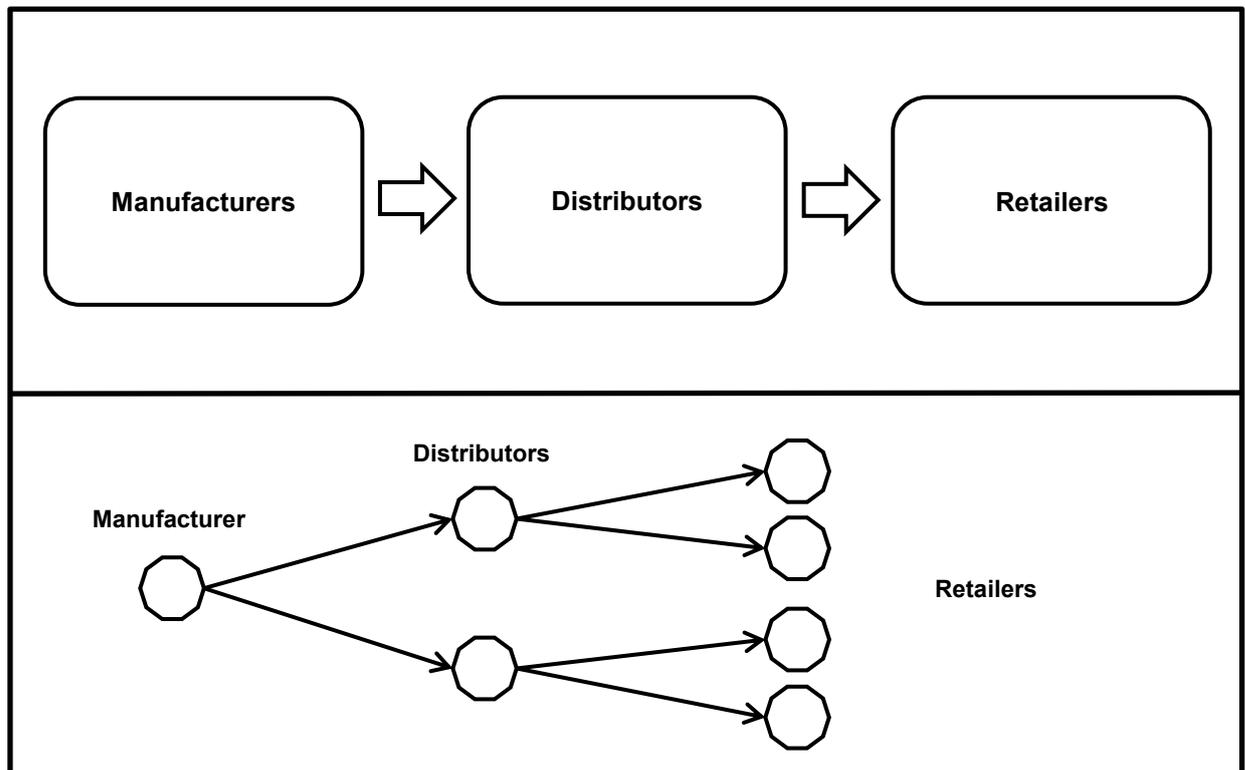


Figure 2: Basic Supply Chains of Retailers

Source: Own graphical presentation on the basis of Huang *et al.* (2008, p. 50)

In this basic retail supply chain, the retailers and the distributors are replenishing their inventory from the upstream companies (manufacturers and distributors). The manufacturers are producing the products that are later sold by the retailers. Distributors are the intermediaries between the manufacturers and the retailers. Wholesalers, for instance, are distributors that are supplying the retailers with goods. The retailers are then selling the products to the end consumers. As can be seen in figure two, the number of manufacturers, distributors and retailers

in the supply chain can vary. It is also possible for retail companies to directly source goods from manufacturers and to bypass distributors (Huang *et al.*, 2008, pp. 47-52).

In order to give a concrete example of a retail supply chain, figure three shows the processes and actors in the milk supply chain. Nga (2017, p. 426) states that the milk chain involves the processes of milk production, milk collection, processing and distribution. These operations are performed by dairy farmers, collectors, dairy plants, wholesalers and retailers. All of these actors have specific functions in the milk supply chain. Dairy farmers are the most important actors in this chain, as they produce the milk. The milk collectors collect the milk from the dairy farmers and deliver it to the dairy plant that processes the milk and packages it. Then wholesalers and other middlemen distribute the milk to retailers (and in some cases to end consumers). The retailer (e.g. supermarket) then sells the milk in small quantities to the final consumers. Moreover, other stakeholders, such as NGOs, banks and the government, influence the milk chain from outside (Nga, 2017, pp. 426-427).

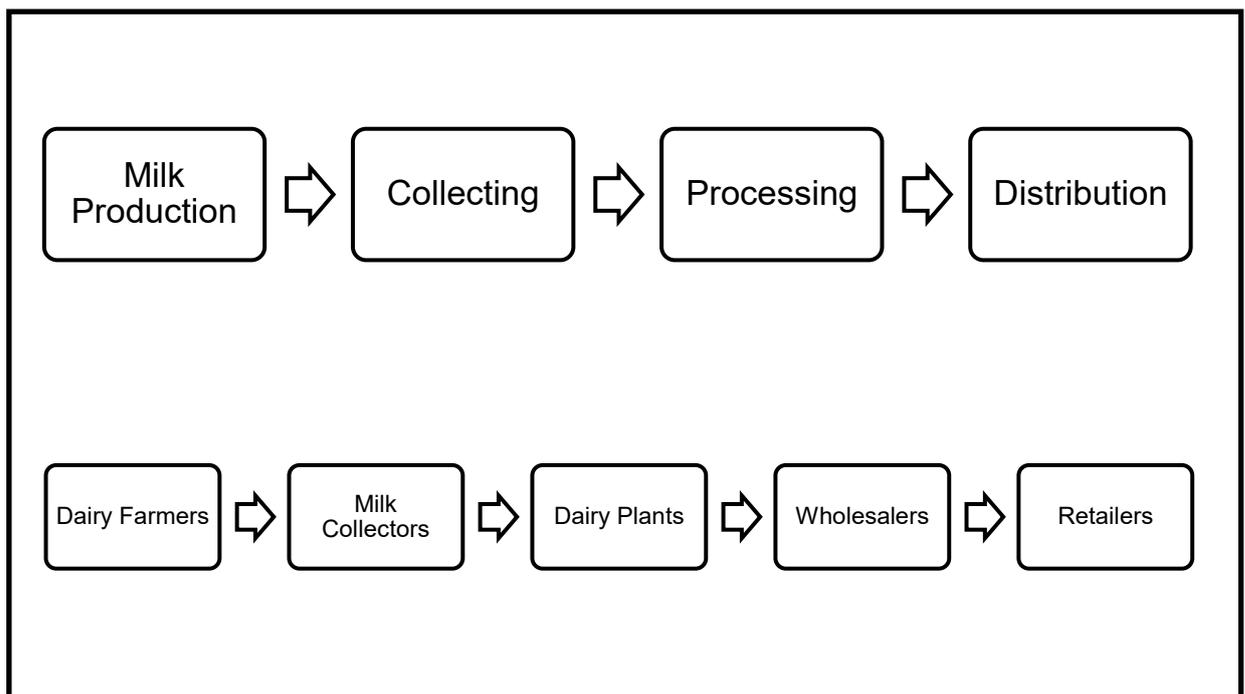


Figure 3: Milk Supply Chain

Source: Own graphical presentation on the basis of Nga (2017, p. 427)

In the retail supply chain, effective and efficient communication and information sharing is crucial for the success of all involved business actors. Factors, such as the lack of trust or information privacy, can act as barriers to efficient information sharing between the different actors. Hence, companies often share local information only with their immediate suppliers. This can result into overproduction or supply bottlenecks (Bandyopadhyay and Sen, 2011, p. 66; Huang *et al.*, 2008, pp. 47-52).

Furthermore, the question arises why consumers are buying products from retailers and not directly from the manufacturers or wholesalers. In general, retailers are providing superior value to the final consumers compared to wholesalers and manufacturers. The business operations of retail companies focus on adding value to the services and products that they are selling and on improving the total customer experience (Pasnoorwar, 2016, p. 216). First of all, most non-food merchandise is only offered by retailers and is not directly sold by the manufacturers. In the U.S., for example, most non-food products that are sold by retailers are imported from other countries, such as China or Canada. Thus, in most cases, U.S. consumers cannot purchase small quantities of these imported goods directly from the manufacturers (Ganesan *et al.*, 2009, p. 85). This example illustrates one aspect of how retailers create value for customers, namely accessibility of location. Furthermore, retailers offer other advantages over manufacturers and wholesalers, such as convenience of timing, sale of small quantities, a broad product range, customer support and lifestyle and information support (Pasnoorwar, 2016, p. 216).

2.3. Distribution Channels

The distribution channels of the retail industry are of particular importance for this Master's Thesis, as ICT has a fundamental impact on the way retail companies sell their products and services. There are various distribution channels that are used by retail companies. According to Barlow *et al.* (2004, p. 157), these channels can be divided into offline and online retail distribution channels. Traditional stores, telephone, mail order and direct selling are offline distribution channels. Online distribution channels include smartphones, tablets, interactive television and the Internet (Barlow *et al.*, 2004, p. 157; Notomi *et al.*, 2015, p. 38).

According to the global retail sector report from Euler Hermes (2017, p. 2), the brick and mortar store (traditional physical store) is still the most common distribution channel with regard to the retail industry. However, the importance of online distribution channels is rising. Retail companies that are relying on traditional stores have to develop new distribution systems and have to use multiple channels in order to satisfy the changing customer needs (Hübner *et al.*, 2016, p. 255).

Consumers are choosing retail channels according to the company's reputation, the channel's characteristics, the type of products and own personal factors (Black *et al.*, 2002, p. 170). Food and beverage products, for example, are less likely to be ordered online than non-food products. Besides, the direct delivery of food products to the home of the final consumers involves different requirements (e.g. temperature-controlled vehicles and same-day home delivery) than the delivery of non-food products, such as electronic goods (Hübner *et al.*, 2016, p. 291). Personal channels and channels that involve personal interaction are used by customers that want to buy products that are complex and that have a high perceived product risk (e.g. motor

vehicles and televisions), as the purchase of such goods implies high involvement decision making processes. The perceived accessibility, risk and cost of distribution channels also influence the channel selection of customers. Another factor is the consumer and his or her confidence with a specific channel, shopping motives, age and lifestyle. Younger customers, for instance, are more likely to use distribution channels that involve ICT. Furthermore, the reputation and image of a retailer impact the channel selection of consumers, especially with regard to new innovative distribution channels, such as e-commerce (Black *et al.*, 2002, pp. 170–171).

Multi-channel distribution enables retail companies to reach different customer groups and can create synergies. Nevertheless, companies need to be aware of the trade-off between process separation and integration with regard to the different distribution channels (Agatz *et al.*, 2008, p. 339). Moreover, omnichannel retailing is an emerging strategy in the retail industry. These omnichannel strategies combine all available distribution channels (e.g. online sales, traditional stores, telephone and mail-order) in order to create a seamless customer experience. However, the omnichannel approach leads to several difficulties and challenges for retail companies. Retailers are facing considerable costs due to omnichannel retailing, as it requires the development and maintenance of multiple supply chains (to the shops and direct-to-home), inventory pools and support networks (PwC, 2017, p. 6).

Furthermore, the different forms of distribution (home delivery, store pickup, in-store buying) all have their own advantages and disadvantages. In-store buying involves direct customer contact, lower risk of product returns (e.g. shoes can be tried on in stores) and higher efficiency (e.g. transportation of goods). On the other hand, traditional stores imply high fixed costs (e.g. rent, location), limited shelf space and limited item range. Home delivery has the benefit of increased customer convenience, as the goods are directly delivered to the home of consumers and no effort is required from the customers. In addition, there is no limit with regard to shelf space and product range. However, this form of distribution includes challenges, such as the handling of larger items, potential shipping fees and lead time. The mixture of these two types of distribution is the store pickup, where consumers can order products online and pick them up at the store. This distribution method has the advantages of additional store frequency, reduced risk for returns, direct customer contact, enhanced customer convenience and virtual shelf extension. It also comes with disadvantages, such as in-store handling effort and increased IT requirements (Hübner *et al.*, 2016, pp. 282-283).

3. Information and Communication Technology

3.1. Overview

Information and communication technology can be defined as technology that enables the acquisition, processing, transformation and distribution of information (Argandoña, 2003, p. 4; Jetter *et al.*, 2009, p. 38). ICT has an essential impact on how people communicate, work and spend their (free) time. Furthermore, ICT investments have the potential to significantly influence the structure and growth of emerging and industrialized economies (Jorgenson and Vu, 2016, p. 381). Advances in ICT, such as the Internet and the availability of cheap mobile data storage, have revolutionized entire industries (e.g. telecommunications, photography, retail and media) and have also accelerated the pace of innovation essentially (Jetter *et al.*, 2009, p. 37).

Knowledge is one of the main requirements for the development and growth of companies, individuals, regions and countries (Grzanka, 2012, p. 14). Moreover, knowledge, ideas and information are indispensable resources for any decision. ICT is so important in the modern world, as it helps to manage these resources effectively and efficiently (Argandoña, 2003, p. 7).

Information and communication technologies that are used in the retail industry include data mining (Bagga and Singh, 2012), the Internet, e-commerce (Notomi *et al.*, 2015), electronic payment (Sumanjeet, 2009), smartphones, mobile apps (Kang *et al.*, 2015), electronic point of sale (EPOS) (Lynch, 1990), radio-frequency identification (RFID) tags (Jones *et al.*, 2005), self-service checkouts (Lee and Yang, 2013), social media (Drury, 2008), the Internet of Things (IoT) (Gubbi *et al.*, 2013) and augmented reality (Martínez *et al.*, 2014). In the following subchapter, the most important technologies that are used in the retail industry are discussed in more detail. Besides, it is examined how these technologies are used in the retail industry to create value for the companies.

3.2. Technologies used in the Retail Industry

3.2.1. Electronic Point of Sale (EPOS)

In physical stores, such as supermarkets, transactions between customers and the retailer take place at the point of sale (e.g. checkout at the supermarket). Electronic point of sale (EPOS) systems are used to record information about sales. These computerized systems are based on the bar coding of goods. A specific identifying code number is allocated to every item that a store has in its product range. There is a unique number for every variation (e.g. colour and size) of a product. This number, respectively bar code, is placed on the packaging of an item or directly on the product. At the store's checkout, the bar codes are read by a laser scanner. Then the bar code is transmitted to the store controller (the central computer of the store) that instantly sends the relevant information about the product back to the checkout. This information usually

contains a description of the product and its price, which is displayed at the checkout. At the same time, the information is printed on a till receipt for the customer. Moreover, EPOS systems record and store all the information about every product that is sold. Hence, these systems enable retail companies to establish databases and business information systems that help to manage and monitor promotions, stock control, advertising and ordering (Jones, 1985, pp. 273–274).

EPOS systems involve several benefits for retail companies, such as faster stocktaking, throughput and shelf-filling, decreased shrinkage, high accuracy and consistency in pricing, automatic re-ordering, higher efficiency and accurate, simple, fast, up to date and reliable information about products sold and the inventory (Lynch, 1990, p. 159). Furthermore, EPOS systems can be used to collect customer data through loyalty cards. Loyalty cards also have a bar code that can be read by a laser scanner. This bar code can contain information about the customer that is using the loyalty card. Thus, loyalty cards enable retailers to collect valuable information about their customers (Ziliani and Bellini, 2004, p. 286). EPOS databases offer a high strategic and tactical potential for retailers, as the collected data can be analysed in order to facilitate strategic decision making (Lynch, 1990, p. 159). These systems produce huge amounts of data that are managed by a technology called “data mining”, which is explained in the next subchapter (Bagga and Singh, 2012, p. 21).

Another development in the field of EPOS systems is the emergence of self-service technologies. These technologies enable customers to use specific services without any involvement of service employees (Meuter *et al.*, 2000, p. 50). Self-service technologies include self-service checkouts, which are used in the retail industry. Unlike traditional checkouts that require an employee to operate them, self-service checkouts are automated systems that enable customers to unload, scan, pay and bag their groceries or other purchases by themselves (Lee and Yang, 2013, p. 54). Retail companies, especially supermarkets, are adopting this technology in order to improve service quality (speed, convenience, customer experience and satisfaction) and productivity and to cut costs (Demirci Orel and Kara, 2014, p. 118; Weijters *et al.*, 2007, p. 3).

3.2.2. Data Mining

Data mining can be defined as the analysis of large amounts of data through the use of statistical methods. The main purpose of data mining is to reveal patterns in the data sets. This technology can facilitate decision making and it can be used for the forecasting of future market trends by providing the relevant data and statistics. Data mining is important in the retail industry, as this industry produces large amounts of data, which involve sales, consumption of services and goods and transportation. Moreover, timely information about market trends,

consumption trends and customer requirements is crucial for the success of a retail company. Hence, data mining is utilized to identify shopping patterns, customer behaviour and fraud activities in the retail industry. This can help retail companies to enhance their service quality, use of resources and distribution strategies. The effect of advertisement (e.g. price discounts for a limited period of time) on the turnover of a retailer, for instance, can be analysed by data mining tools (Bagga and Singh, 2012, pp. 19-22).

3.2.3. RFID Tags

Radio-frequency identification (RFID) is a technology that is used for the automatic tracking and identification of objects, such as pallets, containers, cases or individual items. RFID systems consist of a microchip with a coiled antenna (the RFID tag) and a reader with an antenna. Electromagnetic waves are sent out from the reader and connect with the RFID tag antenna. This creates a magnetic field that powers the microchip in the RFID tag. Then the RFID tag sends the waves, which were modulated by the microchip, back to the reader. Afterwards, the reader converts the waves into digital data. This data is used to identify and locate the object with the RFID tag on it. Besides, the data can contain additional information, such as price, purchase date and color. Hence, this technology enables the exchange of information between a computer system and tools, manufactured goods, containers, transport vehicles and many more objects, which can carry an RFID tag, without visual contact between the tag and the reader and any human intervention. RFID tags can store a large amount of unique item information and can be read through most obstacles and from a distance. Moreover, these tags are only less than a third of a millimeter wide. This technology also enables the user to update the information (e.g. usage counts, item number, status, serial number or destination) on the RFID tag. On the other side, there are several limitations to RFID. The waves can be distorted, masked or reflected by metal and moisture in the environment or in the item can also absorb them (Jones *et al.*, 2005, p. 396).

In the retail industry, RFID tags are used to enhance stock management, distribution, warehousing, store operations, marketing, consumer purchasing and transport. This is done by placing the tags on individual items, cases, pallets and reusable transit packaging in order to track them. Up to date information on logistics and inventory is generated by the RFID tags and suppliers, distributors, manufacturers and retailers can use this data to monitor their operations. This leads to a decrease in labor costs and shrinkage, improved control, efficiency, accuracy, security and management and enhanced customer service. In the food retail industry, for example, the RFID technology enables companies to identify the destination and origin of food products and to provide current information to national governments (requirement of the European Health and Consumer Protection Directorate from January 2005). RFID tags also ensure that retailers can determine where their products are located. Hence, retail companies

can reduce the number of stolen and missing items, respond immediately to changes and problems in the supply chain, determine the arrival of goods in store and monitor expiry dates of products by using the RFID technology (Jones *et al.*, 2005, pp. 395-398). Moreover, RFID tags are used for Electronic Article Surveillance (EAS). This system protects goods (mainly clothing and high value items) from being stolen by alarming the employees when a customer leaves the store without paying. This anti-theft system is able to detect the absence or presence of the RFID tag when a customer (with goods) passes the scanner that is located at the exit of the store. Hence, the alarm is not activated if the RFID tag has been removed from the article by an employee after the customer has paid for it. This is the most widespread and first commercial use of the RFID technology (Roberts, 2006, pp. 18–19).

3.2.4. Electronic Payment

Electronic payment or e-payment can be defined as payment between individuals or businesses and banks, public services or businesses that is conducted through an electronic medium, such as the Internet and other telecommunication networks. This payment method does not involve the use of traditional checks or cash. Instead, e-payment uses electronic systems, such as the electronic funds transfer, to transfer money from one bank account to another. Electronic funds transfer systems use secured networks to send credit card numbers and electronic checks between companies and banks. There are four different categories of e-payment systems: Online Electronic Cash Payment Systems, Smart Card based Electronic Payment Systems, Online Credit Card Payment Systems and Online Electronic Check Payment Systems. All of these systems have their own benefits and disadvantages and there are crucial requirements that need to be fulfilled in order to make the payment systems work properly. These requirements include cost efficiency, control, traceability, security, acceptability, convenience and anonymity (Sumanjeet, 2009, pp. 18–23).

Online electronic cash payment systems use electronic cash, which is a digital form of value exchange and value storage, to complete transactions. Electronic cash requires intermediaries to convert and has limited convertibility. Advantages of this payment system are convenience, security and privacy. Smart card based electronic payment systems involve the use of smart cards. These smart cards are small plastic cards with a memory chip, which can store encrypted information that is used for payment. This system is used, for instance, for prepaid telephone cards, stored value debit cards and highway toll payments. Anonymity, low transaction costs and good protection from misuse are benefits of this payment system. Online electronic check payment systems and online credit card payment systems are essentially electronic versions of traditional credit card and check payment systems. However, the electronic version of the check payment system has several advantages over the traditional check system, such as higher speed and lower costs. The most common electronic payment system is the online credit card

payment system, as it is widely accepted and involves other advantages, such as compatibility, simplicity, privacy, transaction efficiency, anonymity, mobility and convenience. Customers only need to send the details of their credit cards to the provider of the service if they want to pay for a service or product. Then the credit card organization completes the payment (Sumanjeet, 2009, pp. 24-30; Yu *et al.*, 2002, pp. 333–335).

3.2.5. E-Commerce

The most substantial technological development with regard to the retail industry is electronic commerce (e-commerce). This technology enables the purchase and comparison of products via the Internet and has changed the way people shop entirely. Due to the emergence of e-commerce, customers do not need to visit a physical store anymore when they want to buy products or services (Jahanshahi *et al.*, 2013, p. 849). Instead, they can simply access the online store of the retail company that offers the desired products or services by using a (mobile) device of their choice, such as a laptop, tablet, smartphone or personal computer. Hence, customers can shop anytime and from any location that offers an Internet connection. Furthermore, online shops provide information about their products so consumers can inform themselves and compare different offers. Customers are also able to look up additional product information, such as details about the manufacturing process of certain goods or the exact origin of an article. Hence, e-commerce has the potential to enhance the shopping experience of consumers significantly and to improve convenience for shoppers. Moreover, the payment process is relatively simple. Once the desired products are selected the payment information of the customer has to be submitted to the online shop. After successful payment, the products are delivered directly to the customer or are ready for collection at specific collection stations (Burt and Sparks, 2003, pp. 281–282; Jahanshahi *et al.*, 2013, p. 849; Notomi *et al.*, 2015, p. 38).

Besides, e-commerce is closely tied to social media, which is discussed in chapter 3.2.7. By using social networks, such as Facebook and Twitter, customers can share their opinion about products, send links to specific articles on e-commerce websites to their friends, find new online shops and share their favorite brands with the online community. Therefore, social media is an integral part of e-commerce that further increases its success and awareness (Culnan *et al.*, 2010, pp. 244-245; Notomi *et al.*, 2015, p. 38).

3.2.6. Smartphones and Mobile Apps

Classic mobile phones mainly enable the users to text and call someone and to use some other features, such as the organizer, calendar or camera. Smartphones (e.g. BlackBerry and iPhone), on the other hand, offer considerably more functions and features than classic phones, as they are packed with the newest technologies. These functions and features include, for instance, GPS, a video camera, mobile web browsing, higher resolution and larger screens, mobile apps

for myriads of purposes, e-mail, picture messaging, instant messaging, mobile games, audio and video playback and video and picture editing (Persaud and Azhar, 2012, p. 419). Mobile applications (mobile apps) are computer programs that can be installed on smartphones and also on tablet computers (portable PCs). These apps can offer a range of features and functions, such as completing purchases, sharing and receiving information and comparing offers (Taylor and Levin, 2014, pp. 759-760).

Smartphones and mobile apps can be used for numerous commercial purposes. In the retail industry, the emergence of mobile apps and smartphones is leading to various marketing innovations. Customers can use mobile apps, such as Google Shopper and Amazon's Price Check, to compare prices by scanning the bar code of an item or by taking a photo of an article. Furthermore, smartphones and mobile apps can be used to quickly look up customer reviews and other information about the desired product and to receive discounts and coupons. All this can be done by using a smartphone or a tablet computer while standing in a physical retail store (Persaud and Azhar, 2012, p. 419). Furthermore, more and more consumers are using their smartphones to purchase products online (e-commerce). However, most customers only buy habitual products with their smartphones (Wang *et al.*, 2015a, p. 217). Besides, mobile phones and smartphones can be used for mobile payments. This payment system uses wireless communication technologies to enable customers to pay for their services, goods and bills by using their mobile devices. This can be useful in several scenarios, such as payment for tickets, transport fares, parking fees and digital content (e.g. music, ring tones). Smartphones can also access electronic payment services and can be used for the payment of physical goods at the point of sale in a supermarket and at ticketing and vending machines (Dahlberg *et al.*, 2008, pp. 165–166).

As smartphones and mobile applications are continuing to gain importance in the retail industry, retailers are adopting the Quick Response Code (QR code) system to further improve customer service. QR codes are two-dimensional digital images, which can be placed on the packaging of products or directly on articles. The QR code can contain information, such as text, geo coordinates, product information and web-links. Mobile QR code scanner applications, which can be installed on smartphones, can quickly detect these QR codes by using the camera of the smartphone. Once detected, the mobile application rapidly displays the information that is embedded in the QR code (Cata *et al.*, 2013, p. 1). Customers of retail companies can use QR codes, for example, to receive information about the origin of vegetables or fruits and additional information, such as cooking recipes. All they have to do is to scan the QR code on the packaging of the product with their smartphone's camera (Soon, 2008, p. 59). This can increase the trust of the consumer in the quality of the products that a retailer offers (Tarjan *et al.*, 2014,

p. 1). All of the above mentioned features are also available on tablet computers (Notomi *et al.*, 2015, p. 38).

Hence, the shopping experience of customers is heavily influenced by the possibilities that smartphones and mobile applications offer and consumers can now use multiple channels (mobile, web-based and traditional physical stores) to shop. This increases the flexibility, efficiency, personalization and convenience for customers (Persaud and Azhar, 2012, p. 419). On the other side, the maintenance of the different distribution channels involves significant effort and expenditures for retail companies. This includes, for instance, increased shipping costs and the maintenance and costs of IT systems (Hübner *et al.*, 2016, p. 283).

3.2.7. Social Media

Social media is not a technology by itself; however, it is closely related to ICT and can have a significant influence on the retail industry. Hence, this topic is discussed in more detail in this chapter. Social media sites are websites where people can communicate and interact with each other by sending and receiving messages, sharing opinions, ideas and news, uploading photographs, joining groups, writing blogs and posting personal information (Pookulangara and Koesler, 2011, p. 348). Blogs, social networks, vlogs, podcasts, message boards, social bookmarking sites, wikis and even online games all belong to the category of social media (Drury, 2008, p. 274). Here, the focus is on social networks, such as Facebook, Twitter, Myspace, YouTube, Google+, Pinterest and Instagram, as these websites or applications are widely used by the population and can generate a lot of attention. The uncontested market leader with regard to social networks is Facebook. This network is used by 2.06 billion (as of September 2017) monthly active users and is the most famous social media service worldwide. The second place is taken by YouTube, a video-sharing platform, with 1.5 billion (as of September 2017) monthly active accounts (Statista, 2017).

Social media has the potential to create considerable business value, as companies can use it as a new innovative way to interact, communicate and collaborate with business partners, customers, suppliers and other stakeholders. The creation of virtual customer environments is enabled through social networks, such as Facebook and Twitter. These virtual environments involve online communities of interest that form, for instance, around particular brands, celebrities, products or firms. Virtual customer environments can create value in the areas of customer support and service, branding, product development and sales. Companies gain value when they manage to form a successful relationship with their customers. These relationships involve regular interaction between customers and the company and co-creation of content. Customers that are part of such relationships feel like company insiders and defend the company and its products. Hence, these customers tend to ignore negative information about

the company, are more likely to try out new products of the company and are generally more loyal to the company (Culnan *et al.*, 2010, pp. 244-245). Furthermore, social media is a powerful marketing channel that can be used for online advertising. Social media has essential benefits over traditional marketing channels, such as newspapers or television, as it helps companies to easily reach their desired customer groups. Facebook, for instance, enables companies to reach the desired target groups with their online advertisements with just a few clicks (Drury, 2008, p. 274). Besides, all social media applications can be accessed by a smartphone (for more information, see the previous subchapter). Therefore, companies are able to engage with customers at any time and at any place (Kaplan, 2012, p. 129). All of the above mentioned commercial uses of social media also apply to the retail industry. Retail companies can gain a lot of value by using social media, as it can improve their marketing strategy substantially. Social networks, such as Facebook and Twitter, enable retailers to learn about the needs of their customers, so that they can adapt accordingly. The interaction between retail companies and customers can create insights that were not available before. Hence, most retail companies have adopted a social media marketing strategy (Pookulangara and Koesler, 2011, p. 348).

3.2.8. Internet of Things

The Internet of Things and augmented reality, which is discussed in the next subchapter, are existing innovative technologies that have a lot of commercial potential. However, this potential is currently hardly used in the retail industry, as these technologies are relatively new and not fully developed (Li *et al.*, 2015, p. 243; Martínez *et al.*, 2014, p. 34). The Internet of Things involves the connection of physical things (e.g. bicycles, banknotes) to the network of the Internet. Typically, this is done by attaching RFID tags or embedded sensors to the objects. All parts of the network (also the physical things) are identifiable and able to exchange information about their surroundings and themselves through the use of wireless sensor network technologies. Hence, all objects in the Internet of Things can communicate and interact with each other and with the network and the end-user. This enables instantaneous access to data and information about the objects in the physical world and their environment (Bandyopadhyay and Sen, 2011, p. 49; Gubbi *et al.*, 2013, p. 1645). The vision of the Internet of Things is to invisibly embed information and communication technology systems in our environment, to link everyday objects and to connect all parts of the system through the use of a virtual infrastructure. This infrastructure includes visualization platforms, monitoring devices, analytics tools, storage devices and connection possibilities with existing networks/technologies, such as wireless LAN and LTE (Gubbi *et al.*, 2013, pp. 1645–1646).

Areas where the Internet of Things can be used commercially include business process management, logistics, automation, industrial manufacturing, intelligent transportation of goods and people and also retailing. The Internet of Things enables innovative services and

productivity and efficiency enhancements (Bandyopadhyay and Sen, 2011, pp. 49–50). In the retail industry, the Internet of Things can optimize supply chain logistics by making the relevant information and data immediately available. Manufacturers, for instance, can request information about sales and stock from the retailers, so they can ship and produce the right amount of goods. This can avoid underproduction or overproduction. In this regard, the Internet of Things is closely connected to the RFID technology, which is discussed in chapter 3.2.3., as RFID tags are used to track the stock and sales of retail companies. These tags can be placed on pallets, trucks, ships, individual items and on any other relevant objects. The data obtained from the RFID tags and the objects that are carrying them can be implemented in the Internet of Things network. This creates a virtual infrastructure that facilitates the management of the data and information and enables communication and interaction between the objects and between the objects and the users of the system. In retail stores, the Internet of Things can also be used for personalized marketing, theft protection, detection of allergen in a product, fast payment solutions, verification of the cool chain and shop guidance (Bandyopadhyay and Sen, 2011, p. 66). Furthermore, final product quality, production processes and the control of shelf life deterioration of products in the food retail sector can be enhanced through the use of the RFID technology in combination with (bio)-sensor technologies. The Internet of Things can connect the objects with the RFID tags and (bio)-sensors in order to monitor important parameters (e.g. bacterial composition and temperature) and to track and identify the products. This guarantees a good product quality (Miorandi *et al.*, 2012, pp. 1510–1511).

3.2.9. Augmented Reality

According to Martínez *et al.* (2014, p. 27), augmented reality is far from becoming a mainstream technology due to several bottlenecks. However, it offers a lot of opportunities and benefits that should be discussed. Augmented reality (AR) can be defined as a technology that uses mobile devices, such as AR glasses and smartphones, to augment elements from real life with additional visual information. AR devices are able to recognize the environment and can provide important information about close objects. Augmented reality is also capable of augmenting images or videos from the real environment with virtual elements, such as images, text, videos and 3D models, in real time. In order to operate, augmented reality applications require three main components: a camera, a computing unit and a device that can display the augmented information. The camera captures the real environment. Almost every camera that can be connected to a network (e.g. smartphone, USB camera) can be used for augmented reality applications. Some augmented reality devices, such as AR glasses, do not require cameras, as they use 3D positioning systems or GPS. The computing unit (e.g. smartphone, laptop) processes the captured video, spatial acquired information and the virtual information. At the end of the process, the augmented information can be displayed on a suitable device, such as a smartphone, laptop, flat screen and AR glasses (Martínez *et al.*, 2014, pp. 27-29). Moreover, the

fast growing popularity of smartphones and mobile platforms, such as iOS and Android, together with technological developments have enabled the masses to experience augmented reality applications. Generally, the vision of augmented reality is to improve the understanding and knowledge of people about their environment by providing an experience for the users where the real world and virtual data and information is mixed up in a single seamless environment (Yuen *et al.*, 2011, pp. 119-120).

Despite of all the possibilities and potential that augmented reality applications offer, only a minority of companies in the retail industry is using this technology. One reason may be the lack of implementation know-how, as augmented reality is relatively new. However, there are a few companies, such as Adidas or Lego, that have started their own augmented reality projects. Lego, for instance, uses 3D previews of products in order to enable customers to inspect articles before they buy them (Martínez *et al.*, 2014, p. 34; Spreer and Kallweit, 2014, pp. 20–21). In the retail industry, augmented reality can be used as a new innovative way to enhance the presentation of information about products. In bricks and mortar retail stores, augmented reality applications can be used to solve the problem of presenting multimedia content. Customers can simply point their tablet-PC or smartphone camera at a specific item in the shop and will receive digital information about the item on the screen of their mobile device (Spreer and Kallweit, 2014, pp. 20–21). Another application of augmented reality in the retail setting is the concept of Virtual Fitting Rooms. This technology enables a new innovative shopping experience, where customers can try on clothes and accessories without being present in a physical retail store. This can facilitate decision making for online shoppers and has the potential to reduce returns. Virtual Fitting Rooms use depth scanning techniques (available on smartphones) to create 3D models of customers. Shoppers can then dress their virtual 3D models with apparel from a digital retail catalogue by using a computer or mobile device. This enables customers to find the perfect items and style in real time. Besides, social media features enable the uploading of videos or photos from the Virtual Fitting Room to receive quick feedback (Pachoulakis and Kapetanakis, 2012, p. 35). Furthermore, augmented reality is used by the furniture company IKEA in order to improve their presentation of products. In 2014, IKEA has started to use the technology for an application that can preview furniture in a virtual room and visualize the product catalogue. To sum up, augmented reality provides multiple possible applications in the retail setting and the above mentioned projects represent only a few of them (Martínez *et al.*, 2014, p. 34).

3.3. Technological Developments and Changes in the Retail Industry

Chapter 3.2 has discussed some of the most important technological developments in the retail industry. These technological innovations have a substantial impact on fundamental aspects of the industry. Developments such as the electronic point of sale (EPOS), data mining and radio-

frequency identification (RFID) tags have important implications for the supply chain of retailers. EPOS systems and RFID tags together with integrated information systems, for instance, improve the supply chain and the operations of retail companies by providing fast and accurate information about the inventory and products (Jones *et al.*, 2005, pp. 395-398; Lynch, 1990, p. 159). Data mining is another technology that can significantly improve the strategic decision making of retailers through the analysis of large amounts of data (Bagga and Singh, 2012, pp. 19-22). Moreover, technologies such as e-commerce, smartphones, mobile apps and social media are changing how products and services are sold, advertised and distributed. The importance of the traditional physical retail store is declining due to the benefits that online distribution channels offer. These advantages include, among others, extended reach, increased customer convenience and facilitated access to information. Besides, retailers are integrating their online and offline activities in order to improve the shopping experience of customers. ICTs are also transforming the retail industry into a consumer-centric industry. E-commerce and other technologies have empowered customers and have enabled them to decide how, where and when they want to buy services or products. Hence, it is crucial for retailers to optimize customer convenience (Notomi *et al.*, 2015, pp. 38-39).

As the retail market becomes more and more competitive, retail companies have to exploit the opportunities and benefits that ICTs offer in order to survive and to stay competitive (Ganesan *et al.*, 2009, p. 84). According to Chan and Al-Hawamdeh (2002, p. 278) the new competitive instruments in knowledge-based economies are primarily information and innovation. Thus, retail corporations have to adapt their business models accordingly and have to increase the use of ICT in their operations (Chan and Al-Hawamdeh, 2002, p. 278). The chapters seven and eight will discuss the influence of ICT on the retail industry and the opportunities and challenges of ICT in more detail.

4. Globalization

4.1. Overview

This Master's Thesis also deals with the topic of Globalization, as this phenomenon has substantial consequences for the business environment and the operations of retail companies. Besides, there exists a mutually reinforcing relationship between globalization and ICT, which is also important for this Master's Thesis. Chapter four presents several definitions of globalization (chapter 4.2) and also covers the different dimensions and aspects of globalization (chapter 4.3) in order to provide the reader with basic knowledge about the issue. Chapter five examines the interaction of globalization and ICT in more detail. In chapter six, the importance of globalization for this Master's Thesis becomes clear, as this chapter discusses the impact of globalization on the retail industry. Globalization significantly changes the business environment of retailers and

influences the global economy. Consequences of the globalization process include, for instance, decreasing communication and transportation costs, decreasing barriers to trade, a more competitive business environment and the fragmentation of production processes (Aydın and Savrul, 2014, p. 1267).

4.2. Definitions of Globalization

This subchapter presents the fundamentals of globalization in order to introduce the reader to the topic. The basics of globalization are crucial for the understanding of its importance for the retail industry. Thus, multiple definitions of globalization are examined and different perspectives are discussed in the following.

Globalization is one of the most debated topics with regard to the economy, as the phenomenon has been changing the world economy considerably. Global cultural, political and social changes are also consequences of the globalization process (Aydın and Savrul, 2014, p. 1267). Numerous authors from different disciplines, such as Stiglitz (2004), Ricks (2003), Gaburro and O'Boyle (2003), Daly (1999), Das (2010) and Keohane and Nye (2000) cover the issue of globalization. However, there is no single definition of globalization, as its significance and meaning continues to be intensely discussed in the academic community (Clark and Knowles, 2003, pp. 361–362). In the following, several definitions of the word “Globalization” are presented.

The International Monetary Fund (IMF) defines globalization as “*the growing economic interdependence of countries worldwide through the increasing volume and variety of cross-border transactions in goods and services and of international capital flows, and also through the more rapid and widespread diffusion of technology*”. This definition already shows that there is a connection between globalization and ICT (see chapter five). Moreover, globalization leads to structural change and economic growth of economies worldwide. However, the benefits of globalization are spread unequally among developed and developing countries (International Monetary Fund, 1997, p. 45).

According to the Organisation for Economic Co-operation and Development (OECD, 2005, p. 11) globalization “*has been widely used to describe the increasing internationalisation of financial markets and of markets for goods and services*”. Furthermore, “*globalisation refers above all to a dynamic and multidimensional process of economic integration whereby national resources become more and more internationally mobile while national economies become increasingly interdependent*” (OECD, 2005, p.11). Due to the globalization of the economy most market access barriers have been eliminated and as a result national boundaries and distances have significantly decreased. Multinational companies are the driving force behind globalization,

as these companies create transnational networks in order to succeed in the international competition. The economic integration is not the only important aspect of globalization, as cultural, institutional, political and social dimensions also play a significant role in the globalization process (OECD, 2005, p. 11).

Ricks (2003, p. 355) states that “*globalization is the trend or act of making something worldwide in scope or application*”. He also points out that there is no commonly accepted definition and that everyone interprets globalization differently. Besides, the author also claims that global corporations are the major players in the globalization process and that religion, governments and other forces are also contributing to globalization (Ricks, 2003, pp. 355-356).

Gaburro and O’Boyle (2003, p. 97) discuss the economic globalization, which they define as “*the practice of economic agents (business enterprises, banks, and finance companies) working in different countries and serving the world market without a prevailing national base*”. The mentioned economic agents are selecting their location according to opportunities for profit and growth. They are growing exclusively due to their own efforts and the nation-state does not protect or support them. These agents are operating as if there are no boundaries between nation states (Gaburro and O’Boyle, 2003, p. 97).

Moreover, Gaburro and O’Boyle (2003, p. 97) examine the term “internationalization”, which is sometimes used interchangeably with “globalization”. The authors distinguish internationalization and globalization, as internationalization “*is characterized by business enterprises and markets which have a prevailing national basis and which have relationships with each other in the context of international trade*” (Gaburro and O’Boyle, 2003, p. 97). The difference to globalization is that the economic agents (with regard to internationalization) consider the national boundaries and have a home country where their operations originated (Gaburro and O’Boyle, 2003, p. 97).

Daly (1999, p. 31) also deals with the difference of globalization and internationalization. The author takes a different approach and states that “*globalization refers to global economic integration of many formerly national economies into one global economy, mainly by free trade and free capital mobility, but also by easy or uncontrolled migration*” (Daly, 1999. p. 31). In addition, Daly (1999, p. 31) also claims that globalization leads to the elimination of national boundaries. On the other hand, “*internationalization refers to the increasing importance of international trade, international relations, treaties, alliances, etc. Inter-national, of course, means between or among nations*” (Daly, 1999. p. 31).

Furthermore, globalization is frequently confused with the term “globalism”. Two papers from (Das, 2010) and (Keohane and Nye, 2000) are discussing this issue in more detail. Keohane

and Nye (2000, p. 105) start with the definition of globalism, as it is the basic concept behind globalization. They define globalism as “*a state of the world involving networks of interdependence at multicontinental distances*” (Keohane and Nye, 2000, p. 105). Hence, globalism can be understood as a condition, which can decrease or increase. Interdependence can be linked to situations among actors in various countries or among countries that involve reciprocal effects. The mentioned networks of interdependence are a result of the linkages that emerge due to the influences and flows of ideas and information, goods and capital, biologically and environmentally relevant substances (e.g. pathogens and acid rain) and forces and people. Besides, the authors describe global networks as networks of relationships that are characterized by multicontinental distances (Keohane and Nye, 2000, p. 105). Keohane and Nye (2000, p. 108) also distinguish between “thin” and “thick” globalism. “Thin” globalism refers to cultural and economic links between countries that only have an influence on a small group of people (e.g. the Silk Road – primarily influenced wealthy consumers). Whereas, “thick” globalism includes multiple extensive and intensive relationships and continuous and large long-distance flows (e.g. global financial markets affect people around the world). Thus, “thick” globalism impacts a much larger group of people than “thin” globalism (Keohane and Nye, 2000, p. 108).

On the other hand, globalization is “*the process of increasing globalism, now or in the past*” (Keohane and Nye, 2000, p. 108). Globalization can also be defined as “*the process by which globalism becomes increasingly thick*” (Keohane and Nye, 2000, p. 108). The thickening of globalism leads to three significant developments: increased transnational participation, enhanced institutional velocity and rising density of networks. Furthermore, globalization is connected to the significant shrinkage of distance (Keohane and Nye, 2000, pp. 105-108)

Das (2010, p. 66) also discusses the difference of globalism and globalization. The author states that “*globalism implies networks of connections spanning multi-continental distances, drawing them close together economically, socially, culturally and informationally*” (Das, 2010, p. 66). Thus, this definition also links globalism with multicontinental distances and networks of relationships. Moreover, Das (2010, p. 66) defines globalization as “*a process of increasing the international division of labour on the one hand and growing integration of national economies through trade in goods and services, cross-border corporate investment, and capital flows on the other*”. Das (2010, p. 66) takes an economic approach towards globalization and further claims that the blurring of national boundaries and the integration of world financial markets, economies and societies are a consequence of the globalization process.

To sum up, there are various different opinions and explanations of the term “globalization”. Most of the definitions presented above focus on the economic aspect of globalization. While the economic globalization is highly relevant for this Master’s Thesis, there are other dimensions,

trends and aspects of globalization that also play a crucial role for the retail industry (see chapter 4.3 and chapter six). Thus, it is important to always consider the context when discussing the globalization phenomenon.

At this point, it is also important to mention the recent trend towards de-globalization. According to Bhattacharya et al. (2016) from the Boston Consulting Group, there are signs that the trend of global integration has stopped. The vote of the United Kingdom to leave the European Union (the so-called Brexit) represents the most prominent sign of de-globalization. Other developments that are signaling the end of globalization include the rise of protectionism, nationalism and right-wing politics all around the world (Bhattacharya et al., 2016). However, Bhattacharya et al. (2016) argue that globalization is not over yet. Instead, the recent developments have introduced a new phase of globalization. This issue is also important for (retail) companies, as de-globalization could have important implications for the business world. Corporate managers should be aware of this trend in order to react accordingly (Bhattacharya et al., 2016).

4.3. Dimensions and Aspects of Globalization

4.3.1. Overview

Chapter 4.3 discusses the different aspects and dimensions of globalization in order to enhance the reader's knowledge about the phenomenon. It is essential to consider all areas of globalization, not only the economic aspect of it, as globalization is a multidimensional process. Other dimensions or aspects of globalization include, for instance, knowledge, labor and environmental, military, cultural and social globalism (Keohane and Nye, 2000, p. 106; Stiglitz, 2004, p. 470). Thus, the five aspects of globalization from Stiglitz (2004) and the four dimensions of globalism from Keohane and Nye (2000) are presented in the following.

4.3.2. Five Aspects of Globalization (Stiglitz, 2004)

Stiglitz (2004, p. 470) states that globalization has five different dimensions or aspects: movements of labor, capital market liberalization (and short term capital flows), trade, foreign direct investment and knowledge. These distinct elements are crucial for a deeper understanding of globalization. Thus, the five dimensions of globalization are discussed in the following paragraphs.

Knowledge

The free flow of ideas, decreasing communication costs and the increasing integration of societies are central to the globalization of knowledge. Globalization has substantially facilitated the transfer of knowledge between different parts of the world. This is especially important for

the growth of emerging markets, as they can benefit greatly from the increased diffusion of knowledge. The globalization of knowledge does not only include technical knowledge, but also ideas and concepts that have the potential to significantly transform whole societies (e.g. democracy). Besides, knowledge is the foundation for the adoption of institutions and policies that aim to increase growth (Stiglitz, 2004, p. 470).

Trade

Trade liberalization and the removal of trade barriers can benefit countries and can lead to economic growth through increased trade. Globalization has increased the extent of trade liberalizations and the total volume of trade. International financial institutions and large countries, such as the United States of America, are promoting trade liberalization. However, most countries refuse to remove their own barriers to trade unless their trading partners also remove them (Stiglitz, 2004, pp. 470–471).

Labor

Another dimension or aspect of globalization is the movement of labor. Global labor flows are as important as global financial movements with regard to global economic efficiency. The flows of different kinds of labor are essential for the productivity of markets and can have significant consequences for the economy of a country or region. Large movements of labor can increase the GDP (gross domestic product) of more developed countries. On the other side, labor flows can decrease the incomes of particular groups or sectors within these countries. Furthermore, migrant labor and their remittances are substantial sources of income for the population of various developing countries. Migrants from developing countries, who have been successful abroad and have returned to their home country in order to build up a new company, bring new technology and entrepreneurship into the country. In some cases, this can have considerable (positive) consequences for the economic growth of a (developing) country. However, the migration of young, skilled and highly educated labor from developing countries to more developed countries can prevent the economic growth of developing nations (Stiglitz, 2004, pp. 471–472).

Foreign Direct Investment

Capital flows also play a role in the globalization process, as they are linking countries economically. There are various different forms of capital movement, including portfolio investments and direct investments undertaken by foreigners (e.g. investments in constructing factories). Portfolio investments can involve short- or long-term capital flows (e.g. short-term lending or long-term bonds). These different types of capital flows can have different consequences for the economy of a country. Foreign direct investment, for instance, is linked to

foreign market access and access to foreign human capital, financial capital and technology (Stiglitz, 2004, p. 472).

Capital Market Liberalization

According to Stiglitz (2004, p. 472), the capital market liberalization is the most controversial element of globalization. One of the most important implications of the capital market liberalization is the freer movement of short-term financial capital across the globe. The liberalization of the capital market can lead to economic instability and can have especially negative consequences for the emerging markets. Developing nations do not have the institutions that are required to manage the risk and to deal with the implications of the capital market liberalization (Stiglitz, 2004, p. 472).

4.3.3. Four Dimensions of Globalism (Keohane and Nye, 2000)

Keohane and Nye (2000, p. 106) also state that globalism is a multidimensional phenomenon. As already discussed in the previous subchapter, globalization refers to an increase in globalism. Globalism is not only linked to economic issues. There exist several other forms or dimensions of globalism that are of equal importance. The four dimensions of globalism are presented and described in the following paragraphs (Keohane and Nye, 2000, p. 106).

Economic Globalism

Economic globalism is characterized by long-distance flows of capital, services, goods and knowledge and information which accompany market exchange. This dimension of globalism also includes the processes behind these long-distance flows and their organization. An example would be the organization of low-wage manufacturing in Asian countries for the European and U.S. markets (Keohane and Nye, 2000, p. 106).

Military Globalism

Military globalism is linked to long-distance relationships and networks of interdependence that are characterized by the use of force and the promise or threat of force. The strategic interdependence between the Soviet Union and the United States during the cold war represents an example of military globalism. This interdependence was so important because of the vast speed and scale of the potential war (Keohane and Nye, 2000, p. 106).

Environmental Globalism

Environmental globalism involves long-distance transportation of biological substances (e.g. genetic materials or pathogens) and materials in the oceans or atmosphere. This can have an impact on human well-being and health. Examples of environmental globalism are the diffusion

of the AIDS virus across the globe and the destruction of the ozone layer due to ozone-depleting chemicals. While there exist some types of entirely natural environmental globalism, most of the (negative) environmental developments are a result of human activity (Keohane and Nye, 2000, pp. 106–107).

Cultural and Social Globalism

Cultural and social globalism refers to the transnational flows of information, images, ideas and people that also carry information and ideas with them. The spread of scientific knowledge and the movement and diffusion of religions are examples of social and cultural globalism. Social globalism often follows economic and military globalism. Markets and societies are transformed by the information, people and ideas that follow economic flows and armies. Social globalism influences the attitudes of individuals toward politics, culture and personal identity and also their consciousness. There are interactions between cultural and social globalism and other kinds of globalism, as economic, military and environmental activities create ideas and transport information that may move across political and geographical boundaries. However, the emergence of the internet has reduced communication costs and has globalized communications. Hence, the movement of information and ideas is becoming more and more independent from the other types of globalism (Keohane and Nye, 2000, p. 107).

4.3.4. Implications for this Master's Thesis

It is essential to understand that globalization is not a one-dimensional process. As described above, Stiglitz (2004, p. 470) defines five different aspects of globalization and Keohane and Nye (2000, p. 106) split globalism into four dimensions. Every dimension or aspect involves different developments that have important implications for the economy and also for the retail industry. Such developments include, for example, the liberalization of trade policies and global sourcing (Mir *et al.*, 2014, p. 613). These developments can be linked to economic globalism or the dimension of trade. Another trend of globalization is the global climate change (Bu *et al.*, 2016, p. 577-578) that can be linked to environmental globalism. In chapter six, globalization trends and their impact on the retail industry are discussed in more detail. In general, the division of globalization into multiple dimensions can improve the understanding of the different developments that result from the globalization phenomenon and the linkages among them.

5. The Interaction of Globalization and ICT

5.1. Overview

In chapter five, the interaction of ICT and globalization is discussed. This interaction is important, as the retail industry is influenced by a combination of ICT and globalization. These two forces are tightly connected to each other. ICT is one of the main drivers of the globalization process

(see chapter 5.3). Besides, globalization is a key driver of developments in ICT (see chapter 5.4). Thus, there exists a mutually reinforcing relationship between ICT and globalization (Aggarwal, 1999, p. 84). ICT accelerates the globalization process through, for instance, increased and improved international communication, instantaneous access to information and global networks. At the same time, globalization promotes developments in ICT by, for example, intensifying international competition, increasing the need for information and by increasing international cooperation and interactions (Leidner, 2010, pp. 69–71).

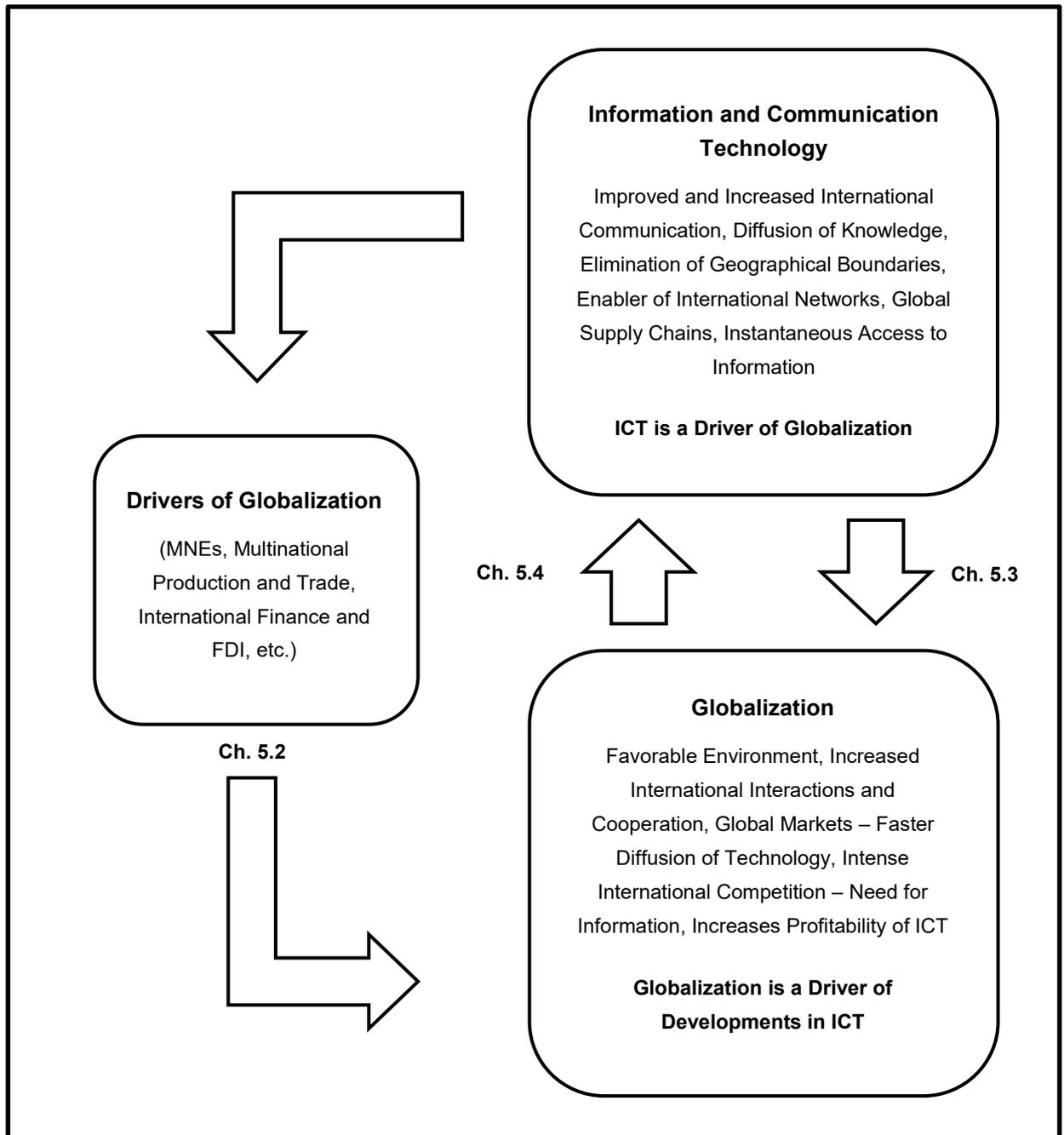


Figure 4: The Interaction of ICT, Globalization and other Drivers of Globalization

Source: Own graphical presentation on the basis of Aggarwal (1999, pp. 83-86), Argandoña (2003, pp. 9-10), Das (2010, p. 67), Garrett (2000, p. 941), Leidner (2010, pp. 69-71), Pohjola (2002, p. 138), Rugman and Verbeke (2004, p. 3) and Wolf (2005, pp. 2–3)

Figure four provides an overview of the interaction of ICT and globalization. In addition, it shows the relationship between ICT and the other drivers of globalization that are discussed in the following subchapter (5.2).

5.2. The Drivers of Globalization

In order to understand the interaction between globalization and ICT, one has to gain knowledge about the multiple drivers of globalization first. According to the literature, the drivers of globalization include multinational enterprises (OECD, 2005, p. 11; Rugman and Verbeke, 2004, p. 3), demographics, sustainability (Aggarwal, 2011, p. 51), government forces, market forces, cost forces, competition forces (Ananthram and Pearson, 2008, p. 10), highly mobile investment funds (Boatright, 2000, p. 3), trade and investment (Cho, 2003, p. 99), trade liberalization (Venables, 1998, p. 1), transportation cost reduction (Wolf, 2005, p. 2), enhanced global mobility of people and capital (Harvey and Griffith, 2007, p. 489), international finance and multinational production (Garrett, 2000, p. 941). ICT is so essential for globalization, as technology also influences the majority of the other drivers of the globalization process (Boatright, 2000, p. 3). The substantial reduction of communication and transportation costs and the emergence of multinational enterprises, for instance, are results of continuous technological developments (Wolf, 2005, pp. 2–3). In the following, some of the drivers of globalization are briefly discussed and described.

Multinational Enterprises and ICT

The OECD (2005, p. 11) and Rugman and Verbeke (2004, p. 3) state that multinational enterprises (MNEs) are one of the most important drivers of globalization. MNEs and their global operations lead to increased economic interdependence between national markets, as they operate in multiple markets all around the globe (Rugman and Verbeke, 2004, p. 3). Due to the need for strategic interactions and the intense international competition, MNEs are establishing transnational networks and relationships in order to stay competitive. Furthermore, information and communication technologies play a crucial role in supporting the operations of MNEs and their global networks (OECD, 2005, p. 11). Modern technology has decreased the importance of distance for companies through new forms of communication technologies and also enables the access to vital business information anywhere on the globe and at any time (Boatright, 2000, p. 3). Technological developments, such as the satellite, transcontinental telephony, radio, television, the Internet and computers have created new opportunities for companies and have enabled them to become multinational enterprises (Wolf, 2005, pp. 2–3).

Multinational Production, Trade and ICT

MNEs are also linked to multinational or transnational production and trade, which further contribute to the globalization process. Multinational trade and production continue to increase due to the reduction of trade barriers, free trade agreements, the increasing adoption of free-market economic systems and other policies, which have opened economies internationally. Companies are building factories in foreign countries and are establishing marketing and production arrangements with partners from foreign countries in order to take advantage of the new opportunities that foreign markets provide. This international financial and industrial business structure is an integral part of globalization (Kefela, 2011, p. 83). Technological innovations and developments are contributing to multinational trade and production and the international market integration by facilitating the access to information and by lowering transportation costs of goods (Garrett, 2000, p. 942). Moreover, ICT (e.g. the Internet and e-commerce) has enabled the digitization of heretofore physical products, such as movies, music and books. These goods can be bought online and are also shipped via the Internet within minutes. This further contributes to the globalization of trade and production (Garrett, 2000, p. 959).

International Finance, Foreign Direct Investments and ICT

Cho (2003, p. 99) argues that international financial markets and investment, especially foreign direct investment (FDI), are major driving forces of globalization. Companies from various industries and from numerous countries are expanding their operations through foreign direct investment. Besides, countries all across the globe try to attract FDI and multinational enterprises (MNEs) (Cho, 2003, p. 99). Cho (2003, p. 99) also states that this trend is driven by the interaction of major policy reforms, international corporate strategies and technological change. Furthermore, the need to attract FDI has resulted into developments and changes, such as the simplification and reduction of tariffs, the modernization and opening of economies, demonopolization, encompassing deregulation and privatization. Hence, foreign direct investment and international financial markets contribute to the globalization process by establishing global financial networks that lead to an increased interconnectedness of countries (Cho, 2003, p. 99). ICT also plays an important role with regard to financial markets and foreign direct investment, as inexpensive and instantaneous communications and the possibility to access information anytime and anywhere have substantially facilitated financial operations and have almost eliminated barriers of space (Boatright, 2000, p. 3). On the other hand, foreign direct investment is a powerful driver of economic growth and also leads to an increased diffusion of technological developments and innovations across the globe (Garrett, 2000, p. 943).

5.3. ICT – A Driver of Globalization

As already mentioned, globalization is a global process, which involves the increasing interdependence between nations and the massive rise in international flows of capital, knowledge, technology, services, people and goods (Argandoña, 2003, pp. 9-10). The consequences of the emergence of ICT also include an increased diffusion of knowledge, information, ideas and technologies. Important interdependencies exist between globalization and ICT, which will be discussed in this subchapter and chapter 5.4 (Pohjola, 2002, p. 138). Figure four (chapter 5.1) illustrates these interdependencies and points out the most relevant and important aspects of the interaction of ICT and globalization. Besides, most of the main other drivers of globalization, such as multinational enterprises, multinational production and trade, foreign direct investment and international financial markets, are substantially influenced by technological innovations (see chapter 5.2). Hence, there is a complex system of interactions behind globalization.

On the one hand, ICT can be viewed as an intensifier and driver of globalization. Various authors, such as Chary (2007), Leidner (2010), Noble *et al.* (2011), Acs and Preston (1997), Aggarwal (1999) and Kefela (2011), argue that ICT is leading the globalization process. The Internet and other information and communication technologies eliminate geographical boundaries and increase (international) communication, knowledge and information dissemination, global trade and the quantity of international networks. Moreover, ICT helps to enhance the efficiency and extent of co-operations between companies or nations. ICT also plays an important role in the assimilation of organizations and cultures across the globe. Companies are sharing business processes and knowledge, as they are becoming more interconnected through the use of ICT. Besides, the creation and distribution of products for the global market requires a lot of knowledge, information and data, which are managed by information and communication technologies. For the reasons mentioned above, it is evident that ICT contributes substantially to the globalization phenomenon and increases its pace (Argandoña, 2003, pp. 9-10; Leidner, 2010, p. 71; Pohjola, 2002, p. 138).

According to Leidner (2010, pp. 69–70), ICT plays a crucial role in the globalization of the economy, which is an essential part of the globalization process. Developments in ICT have enabled the effective and efficient management of global supply chains. ICT has also become a platform for trade that is joining buyers and suppliers from across the globe. In addition, technology facilitates the management of social networks and information and decreases geographical boundaries. The facilitated and instantaneous access to information, that modern ICT provides, is substantial for the economic globalization, as the need for information about operations, distribution, consumers, suppliers, logistics and markets is continuously increasing

due to intense international competition (Leidner, 2010, pp. 69–70). Furthermore, developments in telecommunications and data processing have enabled the trade of financial instruments at any time and at any place in the world (Acs and Preston, 1997, p. 1).

Aggarwal (1999, p. 83) states that technology has transformed the external and internal business environment and that ICT has raised the importance of intangible and intellectual resources and has shortened product life cycles. Besides, technology has led to industrial restructuring, less hierarchical business structures and virtual corporations (temporary network of organizations that is managed by electronic communications). ICT has created new sources of competition for companies worldwide and organizations need to take advantage of all the opportunities that modern technology provides. Hence, ICT accelerates global economic developments and increases international competition and cooperation. All these aspects further contribute to the process of economic globalization (Aggarwal, 1999, p. 83). Moreover, it is unlikely that the speed of technological change will decrease, as Moore's Law states that every 18 months, the computing power of microchips doubles (Aggarwal, 2011, p. 56).

5.4. Globalization – A Driver of Developments in ICT

On the other hand, globalization acts as a driver of developments in ICT. First of all, information and communication technologies, such as e-commerce, emerged as a response to the globalization process, which has led to the internationalization of the economy. Furthermore, globalization has created a favourable environment for developments in the field of ICT. This globalized environment involves the decrease of communication costs, the increase of international interactions and cooperation, the expansion of telecommunication and technology infrastructure and the increased exchange of knowledge, ideas and information (Argandoña, 2003, pp. 9-10; Aydın and Savrul, 2014, pp. 1268-1275).

ICT itself is also a service and product that is disseminated through global markets, which are a consequence of globalization. Hence, the globalization process contributes substantially to the diffusion of technological innovations and developments across the globe. As already mentioned in the last subchapter, the globalization of the economy has led to increased international competition that has vastly increased the need for timely and accurate information about markets, suppliers, consumers, operations, distribution and logistics. Therefore, efficient technological solutions are required to cover the need for information. Consequently, it can be argued that the intense global competition and the accompanying need for better and faster access to information, which have resulted from the globalization process, are accelerating and driving technological innovations and developments. In the modern economy, organizations are forced to continuously search for the newest technologies that can potentially provide them with

a competitive advantage over competitors that are not adopting the latest technologies (Leidner, 2010, pp. 69–70).

Aggarwal (1999, p. 85) also states that globalization is driving developments in ICT. The author claims that technology is an essential part of the globalization process, and that, at the same time, economic globalization is supplementing and reinforcing technology. Globalization significantly increases the profitability of ICT by extending the use of technology to more and larger markets around the world. It helps technology to cross traditional national boundaries and increases its use. Thus, it can be argued that globalization leads to increased economies of scale and scope for ICT products. This is crucial, as some businesses, especially in the field of ICT, are only profitable on a global scale (Aggarwal, 1999, pp. 85-90). Besides, Aggarwal (1999, p. 85) argues that globalization accelerates technological developments and innovations by increasing the amount of people from different parts of the globe that are developing technology and that are using it. Moreover, Aydın and Savrul (2014, p. 1275) show that the higher a country's degree of globalization is, the more developed is the country's technological and telecommunications infrastructure and the higher is the percentage of the population that uses ICT.

To sum up, there are a lot of important interactions between ICT and globalization. Chapter five showed that there is a mutually reinforcing relationship between globalization and ICT. Thus, it is crucial to consider this complex system of interactions when discussing the impact of globalization on the retail industry (next chapter).

6. The Impact of Globalization on the Retail Industry

6.1. Overview

As already mentioned, globalization substantially influences the global economy. Thus, the retail industry is also affected by the economic globalization. This chapter (six) aims at exploring the aspects of the globalization process that impact the retail industry. Therefore, globalization trends that have consequences for the retail industry are discussed in the following subchapters. Such trends include the liberalization of trade policies (Bishop *et al.*, 2011, pp. 120–121), global sourcing (Howlett, 2005, p. 25), urbanization and megacities (Kraas, 2007, pp. 80–81), natural resource scarcity (Curtis, 2009, p. 427) and global climate change (Bu *et al.*, 2016, pp. 577–578). In order to understand the developments in the retail industry better it is crucial to study these globalization trends, as they can result into major threats and opportunities for retail companies. Globalization trends also heavily impact the political, economic, social, technological, environmental and legal environment.

Globalization has an essential influence on the business world, as it decreases transportation and communication costs and barriers to trade. The globalization process also leads to an increasing fragmentation of production processes and enables companies to enter global production networks and to reach new markets. A more competitive business environment, in which the most successful companies can benefit the most through global transport, telecommunication and production networks, is another consequence of the globalization process (Aydin and Savrul, 2014, p. 1267). Globalization also significantly affects the retail industry. Global developments and trends, such as the reduction of regulatory barriers, the liberalization of retail foreign direct investment (FDI), the facilitation of market access and the decrease of cultural, organizational and institutional barriers, influence how retail companies operate. As a result, large retail companies are expanding their operations to different countries worldwide and the supply structures of the retail industry are getting more global. The globalization process also leads to structural changes in the retail industry, such as the shift from small-scale to large-scale store formats and the dominance of a few large retail groups (Wortmann, 2003, pp. 26-27; Wrigley and Lowe, 2010, pp. 30–31).

According to the International Monetary Fund (IMF) (1997, p. 45), globalization improves average living standards and productivity through the increased international division of labor. Customers benefit from globalization and the enhanced access to foreign markets and products, as they can choose from a broader range of services and goods at lower cost (IMF, 1997, p. 45). However, Keohane and Nye (2000, p. 106) state that globalization widens the gap between the rich and the poor and that it does not imply equality. Besides, globalization raises the level of competition that companies face. Structural change and economic growth of economies all across the globe are stimulated by the global competition and commerce that are consequences of the globalization process (IMF, 1997, p. 45).

All of these aspects of globalization have resulted in what Reinartz *et al.* (2011, p. 53) call “the globalization of retailing”. This term involves several interconnected developments, such as global operations and supply chains of retailers, the spread of retailing innovations all across the world and the expansion of large retailers from mature markets to nations that have developing markets and economies. The different forces of globalization have significantly changed the market environment of retail companies worldwide. The influence of the globalization forces can be seen in different aspects of the retail industry, such as store format, branding, product assortment and the supply chain (Reinartz *et al.*, 2011, p. 53).

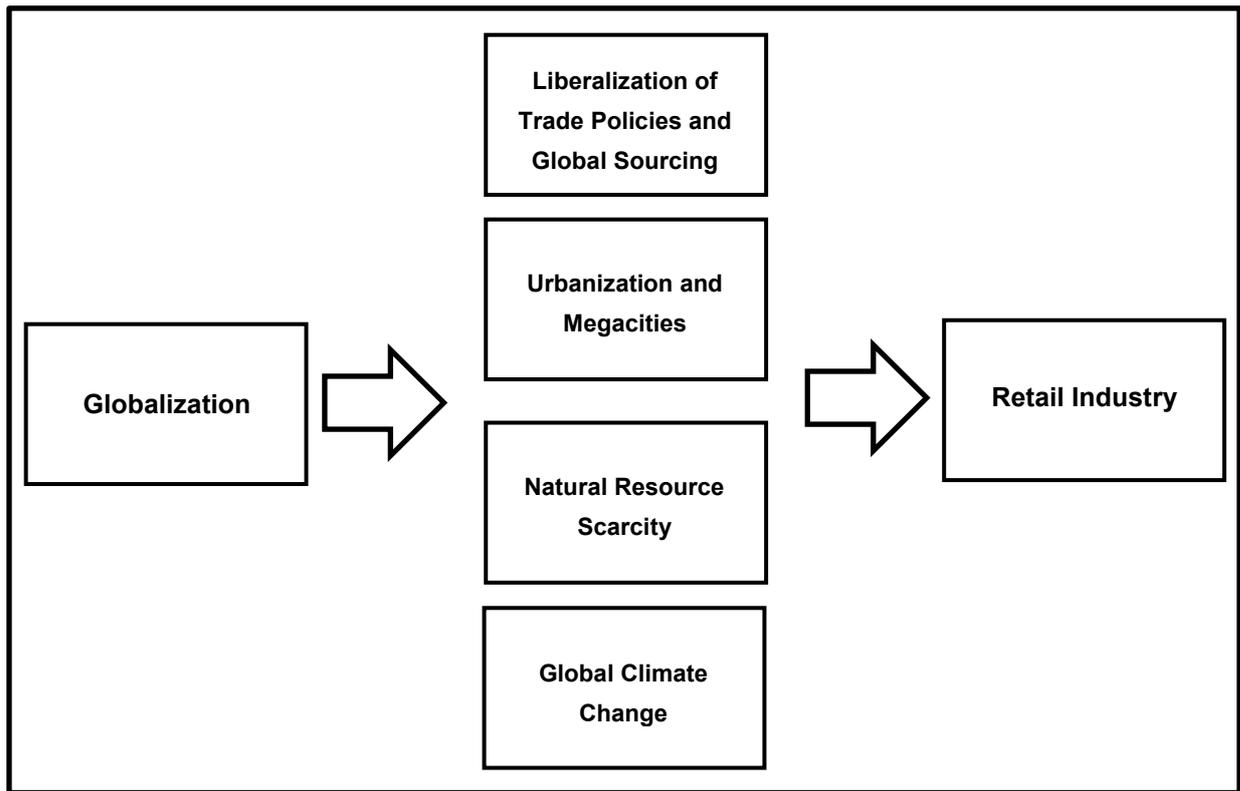


Figure 5: Globalization Trends and their Impact on the Retail Industry

Source: Own graphical presentation on the basis of Bishop *et al.* (2011, pp. 120–121), Bu *et al.* (2016, pp. 577–578), Curtis (2009, p. 427), Howlett (2005, p. 25), Kraas (2007, pp. 80–81)

Figure five illustrates the links between globalization, its trends and the impact on the retail industry. In the following (chapter 6.2), four of the most important globalization trends and their impact on the retail industry are discussed in more detail.

6.2. Globalization Trends and their Impact on the Retail Industry

6.2.1. The Liberalization of Trade Policies and Global Sourcing

The first trends that are examined are the liberalization of trade policies and global sourcing, as these issues are essential for the supply chain of retail companies. The liberalization of trade policies worldwide represents an important trend of economic globalization. Due to globalization, nations and companies are becoming more and more dependent on transnational and international trade. Thus, markets all across the globe are becoming more open towards foreign trade and influences (Mir *et al.*, 2014, p. 613). National governments play a crucial role in the process of liberalizing trade policies, as they regulate international standards, trade and structures. Besides, national governments also decide which sectors are getting privatized. Hence, governments are able to encourage and to facilitate the globalization process in a country. The government of a country can influence the efficiency of its market through

corporate governance and corporate laws. Furthermore, efficient international trade requires the cooperation of different nations with regard to trade regulations. In general, laws and governmental trade regulations are getting more liberal. Thus, more and more countries worldwide are starting to participate in international trade. The participation in international trade and international trade agreements are especially important for developing countries, as these aspects are essential for economic growth. Furthermore, international trade is supported by more efficient global financial markets and the faster flow of capital all across the globe (Bishop *et al.*, 2011, pp. 120–121).

The liberalization of governmental trade policies has also resulted into global sourcing decisions of companies and international supply chains. These developments and globalization trends also significantly influence the structure and the operations of the retail industry. Global sourcing and international supply chains have the potential to decrease the costs of retail companies and to increase their profits substantially. Sourcing decisions are crucial for the success of retailers, as market prices and wages vary considerably in different countries. The costs of labeling and coding of products, for instance, are probably lower in developing countries than in the United Kingdom. The emerging markets of China, Eastern Europe, Latin America, North Africa and India are continuously gaining importance for international retailers, as these economies are important supply hubs for the retail industry. Moreover, large retailers, such as Wal-Mart, are increasing their competitive advantage through extensive mergers and acquisitions activities that enable them to extend their international supply chains and to increase their efficiency (Howlett, 2005, p. 25).

Due to increased competitive pressure from consumers and markets, retail companies need to lower their procurement costs and are forced to enhance their product quality. Thus, retailers are required to search for suppliers that offer low cost but high quality products. Especially Eastern European and Asian countries provide such attractive sourcing opportunities, as these countries offer reasonably skilled and relatively cheap labor (Cho and Kang, 2001, p. 542). According to a study¹ from Cho and Kang (2001, p. 542), global sourcing has three major benefits: increasing the competitive advantage, service enhancement and quality assurance. Besides, availability is another motive for global sourcing. Retail companies from the USA, for instance, often have to use foreign sources, as specific goods (e.g. gems, minerals and chemicals) are simply not available in the domestic market (Cho and Kang, 2001, p. 545).

¹ This study uses data gathered by a survey. The samples consist of randomly selected companies from the apparel retail sector that engage in global sourcing. Data from 148 different apparel retail companies was used (Cho and Kang, 2001, p. 549).

However, global sourcing can also result into specific disadvantages and challenges. The sourcing of products from the Far East can be very cost-efficient for Western retail companies. On the other hand, the extension of the supply chain that is needed for global sourcing can lead to various risks and challenges (e.g. supply shortages and shrinkage), as the supply chain becomes more complex and longer. Longer chains involve more stock and that can result into increased risk and costs (Howlett, 2005, p. 25).

To sum up, the liberalization of trade policies and global sourcing come with important implications for the retail industry and its supply chain. Thus, managers of (international) retail companies have to be aware of developments with regard to this globalization trend (Cho and Kang, 2001, p. 542).

6.2.2. Megacities and Urbanization

Another interesting global development is the increasing urbanization. This trend and its impact on the retail industry are discussed in this subchapter. In general, the growth rate of the total population (e.g. of India) is lower than the growth rate of the population within urban areas (Narayana, 2010, p. 99). This trend towards urbanization is another consequence of the ongoing globalization process. Besides, the emergence of so-called “megacities” is also a result of this development. The environment can be substantially influenced by such types of cities. “Megacities” have the potential to alter political, socio-economic and ecological processes worldwide. Local and regional spheres are also heavily influenced by them. “Megacities” are characterized by high demographic and spatial expansion, high concentrations of population, strong economic power and capital, well developed infrastructures and critical decision making processes. They are also associated with rapid development. These processes are all happening simultaneously. Furthermore the cities’ demand for food, energy, infrastructure, construction and industrial production requires a significant amount of natural resources. This can result into serious environmental problems. In addition, urban areas are very exposed to environmental hazards and extreme weather conditions, such as tsunamis, floods, earthquakes and hurricanes. “Megacities” are also the centers of global developments, as upcoming worldwide trends, such as pollution, poverty, land consumption, growing social segregation and global warming, can be first spotted in these areas. Moreover, large cities and “megacities” involve a high concentration of global links and human resources. Thus, they also offer a vast potential for innovations in areas, such as technology, health care and sustainability (Kraas, 2007, pp. 80–81).

All of the above mentioned aspects of urbanization also influence the retail industry. First of all, the increasing urbanization leads to changes in the socio-economic environment and the demographic profile. This also has an impact on the retail industry, as companies need to adjust

their product range and services according to the needs of the population. In urban areas, for instance, the population is younger than in rural areas and this has implications for the assortment and business strategy of retail companies that operate mainly in urban or rural areas. The shop density is also much higher in urban areas than in rural areas. In India, for example, there are eleven retailers per 1000 persons (average of the total population). Whereas, Delhi (a major city in northern India) has almost 45 retail shops per 1000 persons (Srivastava, 2008, pp. 714–717).

Furthermore, the spending habits of retail customers vary depending on their environment. In the United States of America, rural households spent 18 % less than urban households (in 2011). Rural households also spent seven % less on food than urban households (USA, 2011). Besides, in 2011, rural households received 32 % less in yearly income than urban households (in the USA). In 2011, approximately eight % of US households were rural and 92 % were urban households (Hawk, 2013, pp. 1-2). These figures clearly illustrate the increasing urbanization due to globalization and the consequences for consumer expenditures.

In general, the urbanization trend leads to changing demands of retail customers. Thus, the assortments and business strategies of retail companies have to be in line with this trend (Srivastava, 2008, pp. 714–717).

6.2.3. Natural Resource Scarcity

A further trend that is directly linked to globalization is the increasing use of natural resources and the resulting natural resource scarcity. Global trade and the economic globalization substantially influence the need for natural resources worldwide. The demand for fossil fuels is continuously growing, as long-distance supply networks and chains are becoming more and more beneficial for international companies due to decreasing transportation costs and the concept of comparative advantage. Besides, the rising consumption of services and goods, the earth's fast growing population, the need for mobility and the increasing demand of electric energy heavily influence the use of natural resources (Christensen *et al.*, 1996, pp. 670–677; Curtis, 2009, p. 427). In a not very far future, shortages of, for example, conventional oil are going to occur, because more natural resources are consumed than the earth is able to naturally reproduce (Bentley, 2002, p. 189). The exact date of the exhaustion of the earth's oil reserves is almost impossible to determine. According to Sorrell *et al.* (2010, p. 5290), it is likely that the worldwide peak of conventional oil production will be before 2030.

The global economy and also the retail industry are relying on natural resources, such as oil and gas, for their operations. The costs of global supply chains and long-distance transportation of goods will dramatically increase if oil supply shortages occur. Hence, natural resource scarcity

can result into serious problems and challenges for the world's economy. This increases the importance of the development of alternative reliable energy sources (Bentley, 2002, p. 189; Curtis, 2009, p. 427). Furthermore, Curtis (2009, p. 427) states that the profitability and quantity of international trade and global supply chains will decrease due to the peak of conventional oil production and the ongoing global climate change (see chapter 6.2.4). The author calls this development "peak globalization" (a state of maximum international trade and production, after which international trade and production will decline) (Curtis, 2009, p. 427). Curtis (2009, p. 427) also argues that policies, which aim at limiting oil depletion and greenhouse gas emissions, can delay the situation of "peak globalization", nevertheless, these policies are not able to completely avoid it.

In summary, it can be argued that the natural resource scarcity may lead to substantial challenges and problems for the retail industry in the near future. Thus, appropriate measures have to be taken in order to prevent losses (Bentley, 2002, p. 189; Curtis, 2009, p. 427).

6.2.4. Global Climate Change

According to Bu *et al.* (2016, pp. 577–578), globalization also plays a crucial role in the ongoing global climate change. Bu *et al.* (2016, pp. 577–578) show in their study² that, on average, higher quantities of carbon emissions are produced by nations with higher levels of political, social and especially economic globalization. Hence, globalization is directly connected to the increasing environmental pollution and the accompanying global climate change. Furthermore, the study of Bu *et al.* (2016, p. 586) proves that nations which derive a high percentage of their GDP from the manufacturing sector produce more pollution with regard to greenhouse gas and carbon dioxide emissions. Consequently, the environmental quality in these countries is worse and manufacturing can be directly linked to environmental degradation. Due to the previously discussed globalization trends of global sourcing and global supply chains and networks (chapter 6.2.1) developed nations are more and more relocating their heavily polluting industries to countries that are less developed. This issue is called "the pollution haven hypothesis". The reasons for this development are that the environmental regulations of less developed countries are less strict and that the overall costs are lower. Besides, companies that want to survive and succeed in the competitive international market need to exploit every opportunity they can get (Bu *et al.*, 2016, pp. 577–591). Therefore, Bu *et al.* (2016, p. 592) conclude that less developed nations with a high degree of globalization produce, on average, more environmental pollution (carbon dioxide and greenhouse gas emissions) compared to developed countries. On the other hand, globalization and the accompanying rise of multinational enterprises can also lead to

² In the years 1990 to 2009, a panel data sample, consisting of 166 countries, was collected and then analyzed for this study (Bu *et al.*, 2016, pp. 583–586).

technology spillovers and increased foreign direct investment that have the potential to enable environmentally friendly techniques and practices (Bu *et al.*, 2016, p. 591).

The previously discussed global oil depletion (chapter 6.2.3) also has a severe impact on the earth's climate, as the production of fossil fuels represents one of the major CO² emission sources (Höök and Tang, 2013, p. 797). Low transportation costs and global trade have resulted into a vast amount of long-distance and global supply chains. This development also substantially contributes to the global climate change, as these complex supply chains all across the globe significantly increase the carbon dioxide emissions of most parts of the world (Curtis, 2009, p. 427). Besides, Höök and Tang (2013, p. 797) state that the earth's total quantity of fossil fuels is limiting the influence of humankind on global climate. Thus, the issues of global climate change and natural resource scarcity are interconnected. Moreover, Curtis (2009, p. 427) states that global warming and climate change have already started and that the intensity of symptoms, such as rising temperatures and the melting of arctic ice, will continue to increase as a result of the high levels of greenhouse gases in the atmosphere.

Global climate change also has some important implications for the retail industry. Food consumption and production, for instance, can be linked to severe environmental problems, such as soil degradation, increase of greenhouse gas emissions, climate change, loss of biodiversity and habitats, water scarcity and water pollution (Reisch *et al.*, 2013, p. 1). Hence, retailers are pressured by various stakeholders, such as the media, consumers and the government, to become more environmentally responsible. This can involve the increase of the amount of environmental friendly products in the product line of a retailer. Besides, retail companies are affected by governmental regulations that deal with different environmental issues (e.g. guidelines and regulations regarding carbon dioxide emissions and the disposal of electronic waste). This can result into increased costs for retailers, as government regulations can force them to adjust their business processes and supply chains. Due to global climate change and the increasing awareness of the population concerning its consequences, retail companies have started to adopt "green" practices and environmental sustainability programs (Ramanathan *et al.*, 2014, p. 231). Retailers are trying to decrease their environmental footprint through sustainability programs in areas, such as supply, production, transportation, distribution, technology and materials (Ramanathan *et al.*, 2014, p. 240).

These programs can serve as a marketing tool to enhance the image of retail companies with regard to environmental protection and can also be used to gain a competitive advantage. Ko *et*

al. (2013, p. 1709) show in their study³ that “green” marketing positively influences the image of a corporation, which consists of corporate reputation, product image and social responsibility. Furthermore, these factors (product image, corporate reputation and social responsibility) also affect the purchasing behavior of customers (Ko *et al.*, 2013, p. 1709).

As a result of the increasing diffusion of information about environmental pollution and sustainability issues, it has already become compulsory for large retailers and international retail chains, such as McDonald’s, Starbucks and Walmart, to implement some kind of environmentally friendly practices in order to keep their positive public image. Programs such as organic coffee and fair trade initially emerged due to environmental and ethical concerns. However, multinational retail companies are primarily using these programs (e.g. sustainable coffee) as a strategic tool to build consumer trust and brand reputation and to increase profitability, sales and quality. Nevertheless, these sustainability trends, together with the support of MNEs, can have a significant positive impact on the solution of environmental and sustainability problems (Elder *et al.*, 2013, p. 78). Besides, the number of environmentally conscious customers, who boycott retailers that are known to violate environmental guidelines and laws, is steadily increasing. Thus, retail companies need to be aware of this trend if they do not want to lose customers and market share (Elder *et al.*, 2013, pp. 86–87; Young *et al.*, 2010, p. 20).

To conclude, the retail industry is significantly affected by the global climate change. Stakeholders apply pressure on retail companies to comply with environmental guidelines and to adopt environmental sustainability programs and “green” practices (Ramanathan *et al.*, 2014, p. 231). Moreover, the attitude of retailers towards environmental issues substantially influences the corporate reputation and this can also have consequences for the purchasing behavior of customers. Hence, retail companies cannot afford to ignore this trend (Ko *et al.*, 2013, p. 1709).

7. The Influence of ICT on the Retail Industry

7.1. Overview

This Master’s Thesis has already dealt with the retail industry, ICT and globalization in general. Besides, the interaction of ICT and globalization and the impact of globalization on the retail industry were examined. Now that the basics have been covered, the main topic of this Master’s Thesis, the influence of ICT on the retail industry, is discussed. The focus is on e-commerce, as this technological development has fundamentally changed the retail industry. The traditional business model of the retail industry is threatened by developments in ICT and especially by the

³ The study uses data from 389 questionnaires that were completed by female customers of selected retailers in Seoul, Korea (Ko *et al.*, 2013, p. 1709).

Internet. New business models, such as multichannel retailing and e-commerce, have emerged and challenge the necessity of traditional retailing (brick and mortar stores) (Notomi *et al.*, 2015, p. 38). In addition, the competition in the retail industry has significantly increased due to modern technologies and social media has added additional pressure for retail companies (Culnan *et al.*, 2010, p. 244). In the following subchapters, these arguments are discussed in more detail.

Furthermore, it is important to mention that this Master's Thesis mainly covers the impact of interactive technologies on the retail industry. Varadarajan *et al.* (2010, p. 98) divide the different technologies that influence retailing into three categories: infrastructure technologies, communication technologies and interactive technologies. Infrastructure technologies include, for instance, automobiles, railroads, elevators and electricity. Communication technologies include, for example, the telephone, television and radio. Smartphones, e-mail, instant messaging, GPS, social networking, e-commerce, web browsers, access technologies (e.g. WiFi and broadband) and search technologies (e.g. Google) are examples of interactive technologies that heavily impact the retail industry. Retail customers can interact with retailers by using these technologies (Varadarajan *et al.*, 2010, pp. 97-98). Besides, Varadarajan *et al.* (2010, p. 97) define interactive technologies as *“methods, tools or devices that allow various entities (individuals, machines, or organizations) to engage in mediated communication to facilitate the planning and consummation of exchanges between them”*.

Chapter seven includes the role of ICT in the retail industry (chapter 7.2), the implications of e-commerce for the retail companies and the customers (chapter 7.3), the impact of ICT on the business environment of retailers (chapter 7.4) and the influence of ICT on the requirements for competitiveness in the retail industry (chapter 7.5). After reading chapter seven, the reader should be able to understand the importance of ICT in the retail industry.

7.2. The Role of ICT in the Retail Industry

7.2.1. Overview

This chapter (7.2) deals with the role of ICT in the retail industry and consists of seven parts. The first part (chapter 7.2.1) provides an introduction to the issue and describes the general impact of ICT on the retail industry. In the following subchapters (7.2.2 – 7.2.6), the influence of important technological developments (e.g. RFID, data mining and social media) on selected aspects of the retail industry (e.g. supply chain and business models) is examined. At the end of this chapter (7.2.7), the most important articles and findings are summarized in a table in order to provide an overview about the role of ICT in the retail industry. The influence of e-commerce on retail companies and on customers is discussed in a separate chapter (7.3), as this

technological development is of great importance for this Master's Thesis. In general, chapter 7.2 aims to point out the substantial influence that ICT has on the retail industry.

ICT has an essential impact on business worldwide, as technologies, such as the Internet, e-mail and e-commerce, change how communication and interactions take place (Bang and Markeset, 2012, p. 236). Advances in ICT also lead to changes in consumption and work decisions, new management systems, new labor skills, new support infrastructures and new competitive models (Argandoña, 2003, p. 5). The areas of networking, resource planning, communication and marketing are especially influenced by ICT (Taruté and Gatautis, 2014, p. 1224). Moreover, information and communication technology has dramatically increased the importance of services in the process of value creation. ICT is the key driver of innovations and developments in the service sector and offers numerous opportunities to enhance productivity. Traditional tangible services are replaced by new intangible services (e.g. online services). Furthermore, information and communication technologies enable companies to individualize their products through adjustable production processes and they facilitate communication and interaction with customers through technologies, such as cooperation platforms and e-commerce (Jetter *et al.*, 2009, pp. 37-39; Yapar *et al.*, 2015, p. 642).

Due to developments in ICT (e.g. networks, mobile devices and the Internet), important elements of the retail industry, such as the value chain of production, sales and distribution, are changing substantially (Notomi *et al.*, 2015, p. 38). Hence, retail companies are revising their business strategies and are increasing the use of ICT in their operations. Innovations in the retail industry mostly deal with the improvement of customer service, cost reduction and the enhancement of productivity (Chan and Al-Hawamdeh, 2002, p. 278). In order to improve customer service, retail companies are enhancing communication throughout the supply chain by using the connectivity of the Internet and related technologies (Barnes *et al.*, 2004, p. 607). ICT systems and strategies, such as sales-based ordering (SBO) and efficient consumer response (ECR) (see chapter 7.2.3), can reduce costs and increase productivity by supporting and enhancing the operations of companies (Reynolds, 2000, p. 419).

Moreover, even smaller companies are able to benefit from the opportunities and advantages that ICT offers, as the costs of computing equipment have decreased and the utilization of the Internet has increased substantially (Jones *et al.*, 2003, p. 1). According to the Miniwatts Marketing Group (2017), there are 3.89 billion Internet users (30.06.2017). This means that 51.7 % of the world population (2017 estimation: 7.52 billion) use the Internet. Whereas, the Internet penetration rate in Europe is 80.2 % (30.06.2017) and the most Internet users are from Asia (1.94 billion). From 2000 to 2017 the total number of world Internet users has grown by 976.4 % (Miniwatts Marketing Group, 2017). These figures indicate that the Internet is of great

importance for the business strategies of retailers. In the following, the influence of ICT on selected aspects of the retail industry is discussed.

7.2.2. The Impact of ICT on the Business Models of the Retail Industry

The first issue that is examined in more detail is the impact of ICT on the business models of retailers. As already mentioned in chapter 7.1, technological developments (especially the Internet) lead to the emergence of new business models in the retail industry. Besides, the traditional business model (brick and mortar store) is under pressure, as multichannel retailing and internet stores are very attractive options for retail companies and customers (Zhang *et al.*, 2010, p. 168).

Retail business models describe how retail companies create value for their customers and how retailers gain value from the market. Innovations with regard to business models are crucial for the success of retailers and for achieving a sustainable advantage, as the retail marketplace is characterized by increasing customer expectations, continuous change and intense competition. A business model also defines the kind of business activities that are performed, the organization of the activities and the degree of participation of the different actors that are involved in those activities (Sorescu *et al.*, 2011, p. 3). Furthermore, the retailing business model has two fundamental and unique characteristics. First of all, retailers mainly sell products that were manufactured by others. Thus, exclusivity with regard to the product assortment rarely involves any sustainable benefits for retail companies. Retailers that are primarily focusing on their product assortment are unlikely to gain a lasting competitive advantage, as similar products are almost always available elsewhere. Hence, successful retail business models concentrate on how retailers sell products, rather than on what retailers sell. Secondly, retail companies directly interact with an often large amount of end customers (unlike most manufacturers). Therefore, the customer interface is of great importance and successful retail business models have to include mechanisms to strengthen and improve the relationship and interaction of retailers with end customers (Sorescu *et al.*, 2011, p. 5).

The retail industry is heavily influenced by the enormous success of the Internet. According to Sorescu *et al.* (2011, p. 3), some companies have even used the Internet to create new markets (e.g. Apple with iTunes – online music). As a result of technological developments, the majority of large retail companies have adopted a multichannel distribution system (see chapter 2.3 for a discussion of the different distribution channels of the retail industry) (Sorescu *et al.*, 2011, p. 3). Zhang *et al.* (2010, p. 168) define multichannel retailing as “*the set of activities involved in selling merchandise or services to consumers through more than one channel*” and also claim that the retail industry is dominated by multichannel retailers. Thus, multichannel retailing enables customers to interact with retailers via different channels. Besides, customers visit different retail

channels for different reasons and purposes. Retail customers can, for example, gather information about products online, purchase products offline in a traditional physical retail store and contact the customer support by using a telephone (Sorescu *et al.*, 2011, p. 3).

Moreover, Piotrowicz and Cuthbertson (2014, p. 5) argue that technologies, such as the Internet, social networks, in-store technological solutions and smart mobile devices (e.g. smartphones and tablets), have blurred the line between physical and online channels. This leads to the emergence of the omnichannel retailing approach (see chapter 2.3). Omnichannel retailing is an evolution of multichannel retailing and combines all available channels in order to provide a smooth, unified and seamless customer experience. All channels of distribution are managed together and there is no division between the online and physical store, as it is the case with the multichannel approach. This enables customers to shop at any time and at any place and improves the convenience, speed and flexibility of the shopping experience. Omnichannel retailing includes services such as “order online, return to store”, “click and collect”, “showrooms”, “order in-store, deliver home” and many more combinations of traditional and online retail activities. Location-based services, tablets, smartphones, apps, digital flyers, mobile payments, e-coupons, e-valets, cloud computing, digital signage, virtual screens, intelligent self-service kiosks, virtual fitting rooms, vending machines, social media and the QR code are examples of technologies that enabled omnichannel retailing and significantly impact retail business models (Piotrowicz and Cuthbertson, 2014, pp. 5–6).

Sorescu *et al.* (2011, p. 3) also state that the focus of most retailers has expanded from only selling products to creating an enjoyable customer experience by empowering and engaging customers. Retail companies are developing new ways to interact with channel partners and customers and are expanding the scope of their target markets. Thus, retailing is increasingly including a wider range of activities. Some retailers, for example, are using mass customization technologies in order to be able to offer individualized products to their customers. Other retail companies are streamlining their supply chain to quickly align their product range with seasonal trends with the help of technology (e.g. the “fast fashion” approach from Zara – release five times more collections annually than the average of the industry). Moreover, Internet retailers, such as Amazon.com, are able to cover multiple niche markets due to their business model (see chapter 7.3 for a detailed discussion of e-commerce) (Sorescu *et al.*, 2011, p. 3).

As a result of the growth of Internet shopping many retail companies have started to focus on niche markets and segments. Retailers capitalize on the enhanced efficiency that comes with centralized warehousing and the decreased search costs that the Internet provides. Other retail companies have completely reworked their business models. They have changed their governance mechanisms and passed on the task of defining the ideal depth of supporting

services and product assortment to their stakeholders (suppliers and customers). The streaming service Netflix, for instance, implemented a customer-based system for recommendations that enhanced consumer access to a wider movie assortment. This supports the business model of Netflix and improves customer effectiveness, as the role of movie reviewing is passed on to consumers and the movie ratings are communicated to other customers. Besides, the recommendation system enhances cost efficiencies (better inventory management) and improves customer loyalty (Sorescu *et al.*, 2011, p. 10).

Another phenomenon that has resulted from technological developments in the retail industry is called customer co-creation. The scope of assortments has been redefined by customer co-creation and a variety of retail companies from different segments have adopted technologies that enable customers to individualize their products. Customers can, for example, create their own personalized M&Ms (pictures and text) at <http://www.mymms.com> and can design their own Nike shoes online by using NikeID. These mass customization technologies have the potential to massively increase customer loyalty by enabling the co-creation of products. Moreover, customer co-creation can be used by new retailers to establish a customer base in markets that are underserved by mass customization manufacturers. Thus, customer co-creation can create substantial value for retailers and customers (Sorescu *et al.*, 2011, p. 11).

As a consequence of the above mentioned technological developments and the overall shifts in the retail industry, MacKenzie *et al.* (2013) from McKinsey & Company argue that the traditional retail business model (brick and mortar store) is becoming less and less important and sustainable. In the past (US retail market), small-scale local stores were replaced by large supermarkets and department stores, which in turn were replaced by discount chains, suburban shopping malls and big-box retailers (e.g. Walmart). These traditional retail formats are now challenged by e-commerce and multichannel retailing. Besides, more and more manufacturers are starting to sell products directly to consumers due to the opportunities that the Internet and e-commerce provide (e.g. Apple and Nike). Retail companies have to be aware of these shifts in order to keep their competitive position and to stay sustainable (MacKenzie *et al.*, 2013). Reynolds *et al.* (2006, p. 46) also state that e-commerce, the Internet and the increasing concentration and (international) competition in the retail industry are forcing retailers to change their business models and strategies and to become more flexible.

Piotrowicz and Cuthbertson (2014, p. 10) also deal with the changing role of traditional physical retail stores. The authors claim that physical stores are still important, as retail customers want to feel the atmosphere in the shop and want to touch, see, try and feel the product. Nevertheless, it is unclear what the role of traditional physical retail stores will be in the future. This may depend on the corresponding customer segment and product category. The physical

store could become the focal point (hub) that integrates all available sales channels. It could be used to attract customers by providing a personal experience. In this regard, the degree of customer experience and the product characteristics are important. Thus, a store redesign is often required in order to implement in-store technologies, such as augmented reality, self-service technologies and interactive screens, and to optimize the layout of the physical store (Piotrowicz and Cuthbertson, 2014, p. 10). Besides, Piotrowicz and Cuthbertson (2014, p. 10) argue that the success of internet retailing has led to increased customer demands with regard to the breadth of the product range of physical stores. Hence, for instance, grocery stores are offering more and more non-food products in addition to their traditional assortment (Piotrowicz and Cuthbertson, 2014, p. 10).

To sum up, developments in ICT are leading to complex changes in the business models of retailers and the significance of the customer experience is increasing dramatically. The role of the traditional physical retail store is changing, as multichannel and omnichannel retailing strategies gain importance in the industry due to the success of the Internet (Sorescu *et al.*, 2011, p. 3; Zhang *et al.*, 2010, p. 168). In addition, customer involvement (e.g. customer co-creation, customer recommendation systems and product individualization) is becoming more and more important for the business models of retailers (Sorescu *et al.*, 2011, pp. 3-11).

7.2.3. The Impact of ICT on the Supply Chain of the Retail Industry

The next aspect of the retail industry that is substantially influenced by technological developments is the supply chain. It is crucial for the success of retailers to implement supporting technologies throughout the supply chain. Sales data that is collected at the electronic point of sale (EPOS), for instance, can be used to plan and organize the inventory replenishment and production with suppliers (Krafft and Mantrala, 2006, pp. 22–23). In general, retail companies use technologies, such as the Internet and related technologies (e.g. e-mail and videoconferencing), to improve the efficiency and communication in their entire supply chain (Barnes *et al.*, 2004, p. 607).

Finnegan and Longaigh (2002, p. 159) state that ICT is especially important for the coordination, control and communication in large (international) companies. Databases and communication networks can improve decision making by enabling rapid and reliable information and data sharing within the company. Technology also substantially decreases spatial and time dependence (e.g. communication between headquarter and subsidiary that is located in another part of the world) and managers do not need to travel in order to participate in joint decision making. Besides, ICT helps to streamline decision making and can automate specific coordination activities. Thus, technology enables the operations of corporations to become more

global and increases the degree of integration between business entities (Finnegan and Longaigh, 2002, p. 159).

However, not only the communication within a company is important but also the communication with actors outside of the company, such as logistics service providers, suppliers and customers. Partnerships and the ability to work together with other companies and individuals are crucial for the success of retail companies. In the past, retailers used to work with local suppliers and local warehouses. Due to globalization and technological developments, the reach of the supply chain and logistics networks of retailers has expanded substantially. The operations of retail companies have become more and more global. Products are sourced internationally, and consequently, the movements and interactions involved in supply chain management and logistics are also international. This leads to logistical challenges for retailers, as the complexity of the supply chain is increasing and the pressure on retailers to reduce costs and to enhance service is rising too. ICT can significantly facilitate and enhance the communication of retailers with suppliers and other stakeholders by enabling integrated supply chain systems (Chitra, 2015, p. 1471).

Supply chain strategies and systems, such as efficient consumer response (ECR) and sales-based ordering (SBO), are supported by ICT and enable retailers to substantially enhance productivity and the overall efficiency of their operations and can reduce costs (Reynolds, 2000, p. 419). Sales-based ordering helps to react quickly to demand. This system sends the data that is acquired when items are scanned and sold in a store to reordering and replenishment systems (Chitra, 2015, p. 1473). Efficient consumer response (ECR) is a strategic concept that aims to eliminate unnecessary costs and inefficiencies, such as excessive inventory. This strategy is supported by ICT systems, such as EPOS (Electronic Point of Sale) and SBO (Harris *et al.*, 1999, p. 35).

Furthermore, ICT plays a crucial role in the transportation of goods. Technology has the potential to significantly improve the energy efficiency, scheduling and routing with regard to the transport operations of retail companies (Wang *et al.*, 2015b, p. 23). Vehicle fleets, for example, can be equipped with technologies, such as communication equipment and GPS systems, that enable real-time vehicle and driver performance monitoring (Chitra, 2015, p. 1474).

In general, modern retail supply chain systems and logistics are dependent on the use of ICT. In retail logistics, Information movement has become as important as the movement of products. The efficient control and management of information and data is essential for the success of retail supply chains. Retail logistics is no longer only about boxes and vehicles (Chitra, 2015, p. 1474). It has become crucial for retailers to have the ability to immediately react to pricing and

inventory issues. This is ensured by the use of ICT (Fiorito *et al.*, 2010, p. 891). In the following, the influence of the RFID technology on the retail industry is examined. This technology also heavily influences the supply chain of retailers. RFID is discussed in a separate chapter due to its importance for multiple aspects of the retail industry.

7.2.4. The Impact of RFID on the Retail Industry

The next important issue that is examined in more detail is the impact of the RFID (radio-frequency identification) technology on the retail industry. The basics of RFID were already explained in chapter 3.2.3. In short, RFID enables the automatic identification and tracking of objects, such as cases, containers, pallets or individual items. RFID tags can contain information, such as color, location, identity, purchase date and price. This technology enables computer systems to exchange information with objects that carry a RFID tag. Besides, no human intervention and visual contact between the RFID tag and the reader is needed (Jones *et al.*, 2005, p. 396).

The RFID technology can be used by retailers to improve store operations, marketing, distribution, stock management, warehousing, transport and consumer purchasing. The monitoring of the operations of retailers, distributors, suppliers and manufacturers is also enhanced by the use of RFID tags, as they provide up to date and reliable information on logistics and inventory (Jones *et al.*, 2005, pp. 395-398). For example, RFID tags enable the immediate tracking of products (which carry a RFID tag) that are delivered to retail stores. This information can be used to minimize backroom inventory, enhance analysis of sales figures and to keep shelves full (Zhu *et al.*, 2012, p. 158).

Tsai *et al.* (2010, p. 255) also argue that RFID has become an essential element of the retail industry. The technology leads to improved efficiency, management and control of activities in the retail supply chain and inventory management. Consequently, RFID enables enhancements in customer service, cost savings, shrinkage reductions, improved tracking of customer purchasing behavior and better targeting of customers (Tsai *et al.*, 2010, p. 255).

Sellitto *et al.* (2007, p. 74) further state that organizational decision making of retailers is improved by the use of RFID. The technology enables the automatic transmission of data to company-wide systems. These systems significantly support the monitoring and management of activities across the entire retail supply chain. The data and information derived from RFID systems is valuable for retail companies, as it is characterized by completeness, accuracy, timeliness and up-to-dateness. This high information quality is achieved by real time capturing of data (Sellitto *et al.*, 2007, pp. 69-74). Sellitto *et al.* (2007, p. 74) conclude that the RFID technology provides superior quality information that can substantially enhance operational,

tactical and strategic decision making. For example, RFID can be used with electronic point of sale (EPOS) systems (see chapter 3.2.1) in order to create probabilistic demand patterns and forecast demand trends. This kind of application is especially advantageous in the apparel retail industry, as this sector has high levels of demand uncertainty. In this context, the RFID technology is used to count inventory in the retail floor and back room, record items received and deduct sold products when their RFID tags are removed at the EPOS (Zhu *et al.*, 2012, pp. 158–159).

Furthermore, the RFID technology can substantially increase product security and decrease shrinkage. Product security is important, as theft (e.g. shoplifting, employee theft, staff members collaborating with customers in order to steal products and the in-store consumption of products without paying) is a serious issue for retailers that can reduce profits (Rekik *et al.*, 2009, p. 189). The use of RFID tags can prevent theft losses by enabling Electronic Article Surveillance (EAS). EAS is mainly used for clothing items and other expensive products. It can detect RFID tags on items that were not paid when retail customers are passing the scanner, which is usually situated at the store exit. The system then issues an alarm that alerts employees. Thus, RFID and EAS can significantly improve product security and reduce shrinkage due to theft (Roberts, 2006, pp. 18–19).

In summary, it can be stated that RFID is an integral part of the supply chain and operations of retailers. The technology is especially important in the business areas of logistics and inventory management (Jones *et al.*, 2005, pp. 395-398). Besides, decision making on all management levels can be enhanced by the high quality information that can be derived from RFID systems (Sellitto *et al.*, 2007, p. 74). RFID can also significantly improve product security by enabling Electronic Article Surveillance (EAS). However, mostly large retail companies are adopting the RFID technology. Smaller retailers can often not afford to invest in RFID, as they are restricted by their size (Shin and Eksioglu, 2014, p. 642).

7.2.5. The Impact of Social Media on the Retail Industry

Another technological phenomenon that has important implications for the retail industry is social media. An explanation of the basics of social media can be found in chapter 3.2.7. In short, social media (e.g. message boards, blogs, social networks, vlogs, wikis, podcasts, etc.) (Drury, 2008, p. 274) enables people and also companies to interact with each other by providing a platform where users can post (personal) information, write blogs, upload photographs, share ideas, opinions and news, join groups and receive and send messages (Pookulangara and Koesler, 2011, p. 348). In this Master's Thesis, the focus is on social networks (e.g. Facebook, Google+, Twitter, Myspace, YouTube, Instagram and Pinterest). These networks are very

popular and have the potential to influence a vast number of people all across the globe (2.06 billion Facebook users in September 2017) (Statista, 2017).

Social media has a significant impact on the retail industry. According to Hennig-Thurau *et al.* (2010, p. 311), social media influences corporate strategies, business models and the role of the customer in the retail industry. Besides, new adaptive strategies with regard to social media can lead to opportunities for growth. Social media provides retail companies with the ability to communicate and interact with customers in multiple new ways. It also enables retailers to measure this communication and the purchase-related and browsing behavior of consumers. The social media activities of consumers (e.g. status update, blog post, photo upload, forum entry, etc.) are visible to others and companies can track and record them for their purposes. Customer relationship management and marketing can benefit substantially from the opportunities that social media offers, as it enables individualized marketing activities. Location-sensitive messages and offers, for example, can be generated by mobile services (e.g. smartphone apps of social networks) that use GPS and the IP addresses of customers to locate their spatial position (Hennig-Thurau *et al.*, 2010, pp. 311-312).

Furthermore, Hennig-Thurau *et al.* (2010, p. 312) argue that social media has empowered retail customers. Social media platforms, such as YouTube, Instagram and Facebook, have revolutionized the way consumers make purchasing decisions and interact with (retail) companies. Most notably, social media has changed how people talk about their experiences with specific products, services and retailers (Lorenzo-Romero *et al.*, 2014, p. 45). Consumers can reach everyone at any time and place with the help of mobile devices and are becoming more active players in the market. Customers, for instance, are able to write and post a movie review directly in the cinema right after the movie has ended or they can search for product reviews online when they are in a retail shop by using their smartphones. Thus, the opinions and comments of consumers are becoming more important due to social media (Hennig-Thurau *et al.*, 2010, p. 312). This leads to new challenges for retailers, because they cannot directly influence any social media channel of individual consumers, which is outside the brand control of retailers (Piotrowicz and Cuthbertson, 2014, pp. 9–10).

In the apparel retail industry social media has also empowered customers. Instead of dictating the fashion to customers, retailers are more and more concentrating on the opinions of customers. Due to the emergence of social networks (e.g. Facebook and Twitter) and also blogs, retail companies are now able to instantly observe the reactions and thoughts of consumers. Social media enables retailers to get insight into the customer's mind without the help of market research companies. Thus, social media can help retailers to improve the product quality and assortment (Fiorito *et al.*, 2010, p. 890).

MacKenzie *et al.* (2013) from McKinsey & Company state that social media is getting increasingly important for advertising and marketing in the retail industry. On the other hand, traditional mass advertising media, such as newspaper advertising and direct mail, are slowly losing importance for retailers. However, they are far from disappearing completely. Advertising is changing toward digitization and personalization, which is enabled by complex predictive models and algorithms that analyze digital-media trends (e.g. Facebook and Twitter data and trends) and transaction data (MacKenzie *et al.*, 2013). According to MacKenzie *et al.* (2013) and McKinsey & Company, 75 % of the content that is watched by users on Netflix and 35 % of the products that are purchased by consumers on Amazon were recommended to the customers by product recommendation systems that are based on the mentioned algorithms.

Another very important aspect of social media in the retail industry is the importance of service and product reviews from customers. Ramanathan *et al.* (2017, p. 105) claim in their study⁴ that product and service reviews on social media websites significantly affect the behavior of retail customers. Moreover, according to the research of MacKenzie *et al.* (2013) and McKinsey & Company, the weight of peer recommendations is ten times higher than that of the recommendations from salespeople (for the average consumer). The brand, product and destination choice of consumers is substantially influenced by their social media friends that share their opinions on specific brands and stores and other shopping experiences online. A negative service, product or retail store review that was written by a dissatisfied customer and posted on a social media platform (e.g. Twitter and Facebook), for example, is immediately recognized and read by several other customers. Such negative comments are probably distributed by the people who read the original post. This can lead to problems for the retailer, as some consumers may boycott the company as a result of the negative feedback on social networks. On the other side, an appropriate, timely and friendly reaction/response of a retailer to a negative comment on a social media website can also have a positive effect for the image of the retail company and can display attentive customer service. Hence, it is crucial for retail companies to maintain positive social media reviews for their stores, services and products (Ramanathan *et al.*, 2017, pp. 106-108).

Furthermore, opinion leaders play a crucial role with regard to social media reviews. Opinion leaders are individual persons that managed to get a lot of attention on social media platforms, such as YouTube, Facebook or Twitter. Some of them are able to reach millions of people with their reviews and opinions (van Eck *et al.*, 2011, p. 187). The most influential person on YouTube, named “PewDiePie”, for example, currently has 62 million subscribers that regularly

⁴ In order to collect the data for this study, 102 paper based questionnaires were analyzed. The customer survey was conducted in the South East of England (Ramanathan *et al.*, 2017, p. 113).

watch his videos (YouTube, 2018a). The official YouTube channel of Walmart, one of the world's largest retail companies, for comparison, only has 242 thousand subscribers (YouTube, 2018b). These numbers clearly illustrate the potential impact of negative or positive product, service or retailer reviews from opinion leaders in social networks on the public image of a retail company. According to van Eck *et al.* (2011, p. 187), opinion leaders can significantly influence the success of the introduction of new products. Van Eck *et al.* (2011, pp. 199) find in their study⁵ that if there are active opinion leaders in a social network, new products and information diffuse faster in the network. Besides, the percentage of product adoption is substantially higher. Such effects do not occur in a social network that has no opinion leaders. These findings can be used to develop successful strategies for the introduction of new products and may explain the reason of the failure of specific products. A new product, for instance, can be sent to opinion leaders before the official product release. Some opinion leaders will test the new product and will communicate their opinion about the product to their audience. This will quickly increase awareness of the product and may get customers to try it. Some retailers and manufacturers also have contracts with opinion leaders that allow them to effectively inform customers about their products. As influential opinion leaders are able to reach thousands, if not millions, of people through social networks in a short amount of time, some companies focus on opinion leaders and social networks as their main marketing strategy and do not invest in traditional mass media campaigns (e.g. television and newspaper advertising) (van Eck *et al.*, 2011, pp. 199–200). Bluehole, a small video game developer, for example, managed to publish one of the most successful video games “PlayerUnknown’s Battlegrounds” without a big mass media marketing campaign. The marketing strategy of the company exclusively relied on opinion leaders on social media platforms, such as Twitch (live streaming video platform owned by Amazon) and YouTube. The game was given to many popular individuals in the gaming community to try it and they quickly increased the game’s popularity by playing it on their streams on Twitch and in their videos on YouTube. This word of mouth marketing method enables even small companies to compete with large companies that invest millions in their marketing campaigns (Feldman, 2017). Thus, the use of opinion leaders as a marketing strategy can be valuable and beneficial for retail companies (van Eck *et al.*, 2011, p. 187).

Social media reviews also inform retail store managers and help them to identify ideal solutions to retain existing customers and to attract new ones. They also help to identify possible future problems for retailers. Thus, social media reviews support the marketing and operations department of a company in working together in order to enhance the shopping satisfaction and customer experience (Ramanathan *et al.*, 2017, p. 106). Ramanathan *et al.* (2017, p. 106) argue

⁵ The data for this study was obtained by using an online questionnaire. The participants consisted of 136 individuals from the Netherlands. Besides, participants were separated into opinion leaders (29.4 %) and followers (70.6 %) (van Eck *et al.*, 2011, p. 191).

that a key requirement for high service quality is to understand the interaction of marketing efforts and service operations of corporations. This is also highlighted by the feedback of customers. Besides, customer reviews on social media websites are also valuable for future service and product developments (Ramanathan *et al.*, 2017, p. 106).

To conclude, social media plays a crucial role in the retail industry. Social networks have empowered customers by enabling them to influence other customers with their opinions and product reviews that they share on social media platforms (e.g. Facebook and YouTube). It is essential for retailers to keep track of the public opinion about their products, services and company in order to react and respond accordingly. Negative feedback from retail customers on social networks can have serious consequences for retailers, as information spreads quickly over the Internet (Ramanathan *et al.*, 2017, pp. 106-108). However, social media can also be beneficial for retail companies, as, for example, opinion leaders on social networks can be used to improve the awareness and image of the company (van Eck *et al.*, 2011, p. 187). Besides, valuable data (see next subchapter) can be obtained from social networks. This data can be used to develop individualized marketing strategies (Hennig-Thurau *et al.*, 2010, pp. 311-312). Hence, retail companies have to be aware of the influence of social media and the resulting challenges and opportunities (Ramanathan *et al.*, 2017, p. 108).

7.2.6. The Importance of Data and Data Mining Technologies in the Retail Industry

The last important issue that is discussed in this chapter is the importance of data and data mining technologies for retailers. The retail industry produces huge amounts of data. This data includes, for instance, information about the transportation of goods, consumption of products and services and sales. Data mining tools (see chapter 3.2.2) enable retailers to analyze such data and to convert it into information that is useful for the management of the company. This analysis can be used, for instance, to forecast future market trends and customer behavior and to facilitate managerial decision making (Bagga and Singh, 2012, pp. 19-22). Before the emergence of data mining technologies, corporate managers were not able to make such informed decisions, as the analysis of large amounts of collected data was too time-consuming and expensive (Hormozi and Giles, 2004, p. 63).

Data mining tools are able to consolidate data from different retail channels and other data sources (e.g. EPOS and RFID systems). The entire information is stored in a data repository named "data warehouse". In this way, a holistic overview of the retailer's customers can be created. The analysis of this data is used to gain company and customer insight and can help to find trends and relationships previously unknown. The databases of retailers include information, such as promotional information, pricing data, sales history, inventory information and consumer behavior and shopping patterns. Thus, the data mining technology can enhance the Customer

Relationship Management of companies, supports complex decision making and is crucial for competitiveness (Anderson *et al.*, 2007, p. 395). Besides, data warehousing and data mining tools can help to resolve understocking and overstocking issues of retailers, which have become a crucial problem for retail companies, as the life cycles of products have decreased and the variety of products has increased (Fiorito *et al.*, 2010, p. 888).

With regard to e-commerce (extensively discussed in chapter 7.3), data mining systems can be used to track and analyze the customer's online shopping behavior. It is not only possible to record the products that are purchased by customers, but also to record the products that are viewed by customers but not purchased (Pantano, 2014, pp. 348–349). Compared to traditional offline shopping in physical stores, e-commerce enables the collection of valuable customer data, such as billing and delivery address, payment information, contact information and other information that is linked to the customer's online store account (Chen *et al.*, 2012, p. 198). Besides, data mining technologies can track which goods are often purchased together by which customer groups and individual customers and enable a detailed examination of customer buying patterns (Chen *et al.*, 2012, p. 207). The collected customer data can then be analyzed in order to develop customized advertising and selling strategies and to examine the factors that can influence the decision making process of customers. Hence, historical data and data mining enable retail companies to understand emerging market trends and support them in building an appropriate strategy (Pantano, 2014, pp. 348–349).

ICTs, such as data mining can also be used to analyse the data that is collected through loyalty programmes of retail companies. Loyalty schemes and cards grant customers discounts for repeated purchases. In the background ICT systems gather information about customers and their shopping behaviour. Loyalty cards also enable the identification of customers (Ziliani and Bellini, 2004, p. 286). This information is stored in a database and can then be analysed by data mining tools. These analyses include, for example, promotion analysis, product-buyer profile, cross-purchasing analysis, analysis of purchasing patterns, new product launch performance analysis and basket analysis (Bagga and Singh, 2012, p. 19-22; Ziliani and Bellini, 2004, p. 286). Besides, data mining systems are able to identify demographic groups and also smaller customer segments with similar characteristics, behavior patterns and desires. Finally, the collected insights can be utilized to create individualized marketing strategies and to improve the strategic and operational decision making of managers in the retail industry (Smith, 2008, pp. 119–120).

MacKenzie *et al.* (2013) from McKinsey & Company suggest that retail companies should use data mining and advanced analytics of customer data to make decisions and offers that are localized and targeted. This should happen in real time. Product preferences of customers and

other influences can help retailers to develop such decisions and offers. Data from social networks can be analyzed in order to identify the customer's product preferences. For example, a discount for a specific product that a consumer has "liked" on Facebook can be given to that consumer. Offers can also be customized according to the customer's location. Coupons for a coffee shop, for instance, can be delivered to customers that are living nearby the shop. Besides, offers and advertisements can be customized in accordance with special shopping occasions. An advertisement for a new suitcase or bathing suit, for example, can be sent to customers that have planned a vacation in the next month or week (MacKenzie *et al.*, 2013).

Furthermore, MacKenzie *et al.* (2013) point out that the insights that can be obtained from advanced analytics and data mining tools can be used to create value in all business areas, and not only in the marketing department. Amongst other things, data mining systems support retailers by enabling them to anticipate variations in consumer traffic patterns, to fine-tune their product assortments and to identify optimal inventory levels, distribution routes and allocations. At the same time, this improves unit economics and customer experience. A footwear retailer, for instance, could implement a data-based system that is able to link the inventory of all available channels. When a consumer purchases shoes in the retailer's online shop at full price, this system scans the inventory of all stores in order to identify the shoes that the customer ordered and that are least likely to be sold at full price before the season ends. The system then calculates if it is more profitable to sell the shoes from the store than to sell the shoes from the centralized warehouse. Thus, such systems can help retail companies to maximize their profits and to enhance fulfillment decisions in real-time (MacKenzie *et al.*, 2013).

In addition, data mining technologies can be valuable for customer retention and acquisition, fraud detection and the risk management of a corporation. With regard to fraud detection, data mining can be used to detect fraudulent actions, such as asset theft, unauthorized use of assets (e.g. private use of corporate computers and cars) and embezzlement of company funds. This can prevent retailers from losing significant amounts of financial resources. Besides, data mining can support the risk management of retail companies by, for instance, predicting the amount of customers that are probably lost to competitors in the (near) future. This way, retailers are better prepared for possible problems and risks and can develop appropriate solutions and strategies. Data mining technologies can also help retail companies to retain existing customers and to gain new customers by analyzing customer data from multiple sources and by predicting market trends (Hormozi and Giles, 2004, pp.70-71).

Data and its analysis are, for example, especially important in the fashion and clothing retail industry. Large clothing and fashion retailers often have multiple stores across different countries. Demand in this retail sector is very flexible, as the life cycles of products are very

short (frequent model changes) and most products are seasonal. Besides, at any moment hundreds of different product models are sold, transactions are completed in real time and there are hundreds of different product delivery locations. Large companies in the fashion and clothing retail industry often store historical data for several years and every year millions of sales are recorded. In order to survive and to stay competitive in this market, the large amounts of data have to be analysed, interpreted, summarized and reported in a short space of time. For that reason, data analysis technologies are crucial for the operations of fashion and clothing retailers. In this context, technologies, such as data mining, are used to determine inventory and sales status of every product, to analyse the monthly sales performance and growth rates of each store and each region and to calculate the required inventory and total sales revenue. In addition, data analysis tools can help to determine product discounts by calculating product shelf life. They can also be used to compare the target amounts against the actual sales for each store and sales region (profitability analysis) (Kocakoç and Erdem, 2010, pp. 171–172).

To sum up, data mining tools are very valuable for retailer companies, as they can analyse huge amounts of collected data in order to identify useful information for the management and to reduce information overload. This can help retailers to gain a competitive advantage over their competitors (Hormozi and Giles, 2004, pp. 62-63). Data warehouse and data mining systems have become crucial for the strategic and operational activities and decision making processes of (large) retail companies. In the e-commerce sector and for large retailers, such as Walmart, Marks and Spencer, Tesco and Amazon, data mining technologies have become common practice and are a substantial part of core business processes. Besides, the creation of customer-centric marketing and business intelligence is significantly supported by data-driven technologies (Chen *et al.*, 2012, p. 198).

7.2.7. Summary

This subchapter tries to summarize the most important findings of chapter 7.2, which discussed the role of ICT in the retail industry. Table one provides an overview and summary of the most important articles that were used in this chapter. It includes information about the authors of the articles, year of publication, journal, VHB (Verband der Hochschullehrer für Betriebswirtschaft) rating of the journal, title of the article and research method and presents the main findings of the individual articles. Besides, the table (one) is organized according to the subchapters 7.2.2 to 7.2.6, which deal with the impact of important technologies, such as social media, data mining and RFID systems, on specific areas of the retail industry (e.g. business models, data management, supply chain, marketing, etc.). All articles in the table (one) are from journals that have a VHB rating not worse than C. Unfortunately, one journal does not have a VHB rating.

Author / Year	Journal / VHB Rating	Title	Research Method	Findings
7.2.2. The Impact of ICT on the Business Models of the Retail Industry				
Piotrowicz and Cuthbertson / 2014	International Journal of Electronic Commerce / B	Information Technology in Retail: Toward Omnichannel Retailing	Focus Group	<ul style="list-style-type: none"> • Developments in ICT lead to the emergence of omnichannel retailing strategies (combine all available distribution channels to create a seamless customer experience). • The role of the traditional physical retail store is changing (focal point for all channels).
Sorescu et al. / 2011	Journal of Retailing / A	Innovations in Retail Business Models	Literature Research	<ul style="list-style-type: none"> • Technology substantially influences retail business models and can lead to a sustainable competitive advantage. • The involvement of customers is of great importance. • The multichannel retail business model is dominating.
7.2.3. The Impact of ICT on the Supply Chain of the Retail Industry				
Chitra / 2015	International Journal of Logistics & Supply Chain Management Perspectives / No Rating	A Study on Challenges in Retail Logistics	Literature Research	<ul style="list-style-type: none"> • ICT has significantly expanded the reach of supply chain networks. • Integrated supply chain systems enhance and facilitate the communication of retailers with stakeholders, such as suppliers. • Modern retail supply chains are dependent on technology.
Finnegan and Longaigh / 2002	Journal of Information Technology / A	Examining the Effects of Information Technology on Control and Coordination Relationships	Field Study	<ul style="list-style-type: none"> • ICT is essential for the communication, control and coordination in large companies, as it enables rapid information sharing and decreases spatial and time dependence. • Technology enables the activities of companies to become more global.

7.2.4. The Impact of RFID on the Retail Industry				
Sellitto et al. / 2007	International Journal of Retail & Distribution Management / C	Information Quality Attributes Associated with RFID-derived Benefits in the Retail Supply Chain	Literature Review / Exploratory Research	<ul style="list-style-type: none"> The RFID technology supports organizational decision making and the entire supply chain of retailers, as it enables the automatic transmission of data to company-wide systems. RFID systems provide superior quality information for retailers.
Tsai et al. / 2010	Information & Management / B	Determinants of RFID Adoption Intention. Evidence from Taiwanese Retail Chains	Focus Group	<ul style="list-style-type: none"> RFID technology is a crucial element of the retail industry. RFID systems improve the inventory management, management of the supply chain and efficiency of retail companies.
7.2.5. The Impact of Social Media on the Retail Industry				
Hennig-Thurau et al. / 2010	Journal of Service Research / A	The Impact of New Media on Customer Relationships	Literature Review / Conceptual Framework	<ul style="list-style-type: none"> Social media provides multiple new ways for retailers to interact with customers. Social media enables the collection of valuable customer data and individualized marketing activities. Retail customers are empowered by social media (product reviews).
Ramanathan et al. / 2017	International Journal of Operations & Production Management / B	Role of Social Media in Retail Network Operations and Marketing to Enhance Customer Satisfaction	Survey Questionnaire	<ul style="list-style-type: none"> Customer reviews on social media platforms substantially influence the shopping behavior of retail customers. It is important for retailers to maintain positive social media reviews. Social media can be used to attract new customers, to retain existing ones and to identify possible future problems.

van Eck et al. / 2011	Journal of Product Innovation Management / A	Opinion Leader's Role in Innovation Diffusion: A Simulation Study	Online Questionnaire	<ul style="list-style-type: none"> Opinion leaders substantially influence the success of new products through their reviews on social media platforms. Focusing on opinion leaders is a valuable marketing strategy for retail companies.
7.2.6. The Importance of Data and Data Mining Technologies in the Retail Industry				
Anderson et al. / 2007	Journal of Retailing and Consumer Services / C	Customer Relationship Management in Retailing. A Content Analysis of Retail Trade Journals	Content Analysis	<ul style="list-style-type: none"> Data mining technologies enable retail companies to gain company and customer insight (trends and relationships). The analysis of retail data is crucial for competitiveness and supports the Customer Relationship Management and decision making of retail companies.
Hormozi and Giles / 2004	Information Systems Management / C	Data Mining. A Competitive Weapon for Banking and Retail Industries	Literature Review	<ul style="list-style-type: none"> Data mining enables the effective analysis of large amounts of data, reduces information overload and identifies useful information for managers. Data mining tools support the customer retention and acquisition, fraud detection and risk management of retailers.
Pantano / 2014	International Journal of Information Management / C	Innovation Drivers in Retail Industry	Literature Research	<ul style="list-style-type: none"> The online shopping behavior of customers can be tracked and analyzed by data mining systems. Historical data and data mining enable the identification of emerging market trends and help retailers to develop customized advertising and selling strategies.

Table 1: The Impact of ICT on the Retail Industry - Summary

7.3. The Impact and Success of E-Commerce in the Retail Industry

7.3.1. Overview

Chapter 7.3 discusses the influence of e-commerce on the retail industry in more detail and is divided into three parts. The first part (7.3.1) provides a general picture of the importance of e-commerce in the industry and explains why the technology is so successful. Part two (7.3.2) deals with the implications of e-commerce for retail companies. Finally, the third part (7.3.3) examines the impact of e-commerce on retail customers.

Laudon and Traver (2014, p. 10) define e-commerce as “*digitally enabled commercial transactions between and among organizations and individuals*”. E-commerce can also be explained as “*the use of the Internet, the World Wide Web (Web), and mobile apps to transact business*” (Laudon and Traver, 2014, p. 10). The mentioned “commercial transactions” imply the exchange of value between two parties (e.g. individuals and retail companies). In general, services and products are exchanged for money via e-commerce platforms (e.g. Amazon) (Laudon and Traver, 2014, p. 10). These platforms may also be called Internet shop, online store, web-store, e-store, e-shop, virtual store and web-shop (Niranjanamurthy *et al.*, 2013, p. 2360). It is also important to mention that this Master’s Thesis only deals with retail e-commerce, also called business to consumer (B2C) e-commerce, online retailing or online shopping (retail companies selling to individual customers). Other forms of e-commerce include B2B (business to business) e-commerce and C2C (consumer to consumer) e-commerce (e.g. eBay) (Niranjanamurthy *et al.*, 2013, p. 2360). See chapter 3.2.5 for more information about the basics of e-commerce.

E-commerce is very popular and successful and has been growing dramatically since its emergence in the late 1990s (Laudon and Traver, 2014, p. 6). According to a report from eMarketer (2017), global retail e-commerce sales are estimated to increase from 1.859 trillion USD in 2016 to 2.774 trillion USD in 2018 (49.2 % increase). In 2021, global retail e-commerce sales are estimated to reach 4.479 trillion USD. Besides, in 2016, 8.7 % of total global retail sales were e-commerce sales (estimation 2018: 11.6 %; estimation 2021: 15.5 %) (eMarketer, 2017). These figures illustrate the growing importance and success of e-commerce in the retail industry.

This success is founded on the unique characteristics of e-commerce that distinguish it from the traditional retail business model (brick and mortar stores). Laudon and Traver (2014, pp. 12–17) identify eight features or characteristics of e-commerce that contribute to its success. These features/characteristics are shown in table two below.

Feature / Characteristic	Explanation
<p style="text-align: center;">Global Reach</p>	<p>E-commerce enables companies to reach customers all around the world and across national, regional and cultural boundaries. Everyone that has access to the Internet can potentially be reached through e-commerce.</p>
<p style="text-align: center;">Richness</p>	<p>Compared to traditional media (e.g. radio and television), e-commerce offers substantially more information richness, as it has interactive elements and enables the individualization of messages to customers. A single customer experience can include text, video and audio marketing messages.</p>
<p style="text-align: center;">Ubiquity</p>	<p>Customers can access e-commerce platforms everywhere and at any time due to mobile devices. This significantly expands the marketplace beyond traditional boundaries (physical location and opening hours). Besides, the costs of shopping are reduced and the customer convenience is improved.</p>
<p style="text-align: center;">Interactivity</p>	<p>E-commerce is characterized by high customer involvement. By using e-commerce platforms, customers interact with retailers (two-way communication) and the dialog and customer experience is dynamically adjusted to the individual.</p>
<p style="text-align: center;">Customization/Personalization</p>	<p>E-commerce technology enables the customization and personalization of services, products and marketing messages according to the characteristics of individuals and groups.</p>
<p style="text-align: center;">Universal Standards</p>	<p>The Internet is the foundation of every e-commerce platform. Thus, companies all use the same technology standards (Internet standards) with regard to their e-commerce operations. All nations across the globe share these Internet standards. This leads to network externalities (advantages due to the amount of people/companies that use the same technology) and a comparative and coherent business environment.</p>

Social Technology	E-commerce technologies permit customers to share and create content.
Information Density	The Internet and e-commerce significantly decrease communication and information storage and processing costs. Besides, these technologies improve the accuracy, timeliness and currency of information. The quality and the total amount of available information are substantially increased.

Table 2: The Eight Unique Characteristics/Features of E-Commerce

Source: Own graphical presentation on the basis of Laudon and Traver (2014, pp. 12–17)

Flavián and Guinalú (2005, pp. 412–414) state that the virtual communities that are created by online retailers, such as Amazon, significantly affect the success or failure of e-commerce platforms. Virtual communities refer to a network of people that interact via the Internet. Through virtual communities e-commerce customers are able to obtain benefits from other customers of e-commerce platforms. These benefits occur when customers are searching for products in the product catalogue of an online retailer. After selecting a specific product, the e-commerce platform user can view traditional information about the product (information that is also provided in a physical retail store), such as product features and price, and also receives recommendations, reviews and opinions of other customers who have already bought the product. These product reviews are independent and thus increase consumer trust, loyalty and satisfaction. In this way, virtual communities replace the personal treatment and support the customers are given in traditional physical retail stores. Hence, the formation of virtual communities may compensate the impersonality and coldness of online retailing. Almost every e-commerce platform offers a product review function and enables the creation of virtual communities. However, the results are significantly different. The reason for that is that e-commerce platforms, product reviews and virtual communities are subject to network externalities (value increases with the number of users). E-commerce customers are more likely to trust online shops that have many customers and consequently more product reviews and active users in the virtual community than online stores that are only used by a few people. Hence, the user community of an e-commerce platform (virtual community) is creating value for new or existing customers of the online shop and also increases the brand awareness of online retailers. This leads to substantial benefits for online retailers with large virtual communities. The high brand recognition of the online retailer Amazon, for example, enables the company to compete under superior conditions, as the reputation of Amazon is better than the reputation of most other online retailers in the same industry segment. Besides, the need for expensive traditional mass media marketing campaigns can be decreased through active virtual communities. The marketing of products that have very specific characteristics (for example: a

book about a particular insect species) is also made easier through virtual communities, as individuals can find other like-minded people in the virtual community that have already bought and tried the product and have written recommendations and reviews about it (Flavián and Guinalú, 2005, pp. 412–414).

Furthermore, the rise of mobile devices, such as smartphones and tablets, is substantially contributing to the success of e-commerce. Such devices allow users to shop and look up information about products at any time and place. Hence, e-commerce customers are no longer tied to laptops or personal computers. This has transformed e-commerce into a more mobile experience (Notomi *et al.*, 2015, p. 38). The conducting of e-commerce transactions using mobile devices is called mobile commerce or m-commerce (Niranjanamurthy *et al.*, 2013, p. 2360). Moreover, the emergence of smartphones and tablets has increase the amount of people that can access e-commerce platforms, as not everybody owns a personal computer or laptop. Mobile devices also enable customers to access e-commerce platforms in situations where they would otherwise not have access to the Internet (Einav *et al.*, 2014, p. 492). Einav *et al.* (2014, p. 489) state that retailers that adopt mobile shopping applications are experiencing sustained and immediate increases in total e-commerce sales. Thus, retail companies should pay attention to the opportunities that mobile e-commerce offers and optimize their e-commerce platforms and websites for mobile devices (Einav *et al.*, 2014, p. 489).

To sum up, e-commerce represents one of the most (if not the most) significant and successful technological developments in the retail industry. The success and importance of e-commerce in the retail industry will continue to grow in the next years (2018-2021), as total global e-commerce sales are increasing significantly (eMarketer, 2017). The unique characteristics of the e-commerce technology, such as global reach, ubiquity and interactivity, are contributing substantially to its popularity and success. These characteristics also imply some major advantages of e-commerce over traditional brick and mortar stores (e.g. higher information quality, personalization possibilities and the expansion of the marketplace beyond traditional boundaries) (Laudon and Traver, 2014, pp. 12–17). Besides, the virtual community around an e-commerce platform is a powerful tool that is capable of increasing the success chances in the distribution and marketing of products and services over the Internet (Flavián and Guinalú, 2005, p. 421). The rising popularity of mobile devices, such as tablets and smartphones, further contributes to the growth of e-commerce, as these devices enable retail customers to shop whenever and wherever they want (Notomi *et al.*, 2015, p. 38).

7.3.2. The Implications of E-Commerce for Retail Companies

This subchapter examines the implications of e-commerce for retail companies in more detail. E-commerce has an essential impact on retailers, as it has changed the way retail companies interact with their customers. Alongside traditional sales channels, such as brick and mortar stores, direct selling, mail order or telephone, retail companies are increasingly adopting e-commerce as a new way of selling goods and services. The increasing number of Internet users and the decreasing costs of Internet access are contributing to the increasing use of e-commerce by both retail companies and customers. Furthermore, online sale channels offer numerous advantages over conventional sale channels, such as higher flexibility, lower costs, broader product lines, increased market outreach, greater convenience, customization and faster transactions (Barlow *et al.*, 2004, p. 157; Jones *et al.*, 2003, p. 1; Srinivasan *et al.*, 2002, p. 41).

Retailers can use the Internet and e-commerce to manage and establish lasting relationships with customers. A channel for two-way communication between retail companies and their customers can be created by developing flexible, interactive and innovative websites/e-commerce platforms. In addition, a lot of knowledge about customer behavior can be obtained through e-commerce and data mining (see chapter 7.2.6). This supports the promotional, advertising and research activities of retailers (Hart *et al.*, 2000, p. 970). The virtual communities that form around e-commerce platforms (already discussed in chapter 7.3.1) also represent valuable information sources for retail companies. The information that is obtained from virtual communities supports the strategic decision-making of online retailers by improving the understanding of customer behavior. Besides, retail companies can involve customers in the product development process and enhance customer relationships through virtual communities (Flavián and Guinalú, 2005, pp. 417–418).

E-commerce has also enabled retail companies to substantially extend their assortment. Compared to traditional physical stores, online retailers can offer a wider range of services and products due to the fact that products only have to be virtually displayed and do not occupy shelf space. A retail shop in a mall, for example, has to physically display its full assortment to customers. Therefore, the physical retailer is limited by the size of the store and other factors, such as rent costs. Online shops do not have to deal with these limitations, as they do not physically display their products to customers. E-commerce customers can still evaluate and view products online via demonstration videos, customer reviews, avatars and models. Besides, online retailers use remote places to store their products. These locations provide cheap and sufficient space and online retailers do not have to pay high rents for locations in, for example, the center of a city. In most cases, brick and mortar retailers face higher fixed costs than online

retailers. Thus, online shops also have the advantage of being able to offer lower prices than traditional retailers (Anderson and Swaminathan, 2011, p. 224).

In addition, online retailers can build alliances with other companies in order to have the ability to offer a relatively seamless service and an almost unlimited product assortment to their customers. An online retailer, for instance, can have only a small assortment of a specific product segment in its inventory and can still be able to offer and deliver countless product varieties that are requested by customers through its global or national network of partners. This substantially extends the product range of online retailers. Thus, the customer's search costs are reduced and customer loyalty and satisfaction are enhanced (Anderson and Swaminathan, 2011, p. 224).

Moreover, the success of e-commerce has led various retailers to concentrate on niche segments. As a consequence of the enhanced efficiency that results from centralized warehousing and the decreased search costs for retail customers due to the Internet and search engines (e.g. Google and Bing), many online retailers are adopting a "long tail" strategy (Sorescu *et al.*, 2011, p. 10). The "long tail" theory was introduced by Anderson (2008) in his book *"The Long Tail: Why the Future of Business Is Selling Less of More"*. Anderson's (2008, pp. 22-23) "long tail" theory states that due to digitization, retail companies can potentially make more money through selling niche products than through selling mass products. The reason for this is that e-commerce has allowed retailers to offer a vast amount of niche products. This would be unprofitable in the traditional retail setting (brick and mortar stores), as there is not enough shelf space and not enough demand for niche products in physical retail stores. Thus, online retailers can now serve a previously untapped market for niche products. The "long tail" can be especially long for digital products, such as music or movies, as distribution costs are virtually zero. These products can be directly and instantly downloaded from e-commerce platforms (e.g. Amazon and iTunes) and never run out of stock, as they can be duplicated infinitely many times. The basic idea behind the "long tail" strategy is that selling small quantities of many different products is as profitable or even more profitable as selling high quantities of a few different products. The performance and success of "long tail" strategies heavily depends on e-commerce technologies (Anderson, 2008, pp. 22-24).

It should also be mentioned that not all types of products can be easily sold via e-commerce platforms. Apparel products, for instance, are difficult to sell over the Internet, as customers want to feel, touch and try on such products before buying them. Certainly there are exceptions to this generalization, as some online retailers, for example, offer convenient refund options for apparel articles (Grewal *et al.*, 2004, p. 704). Other online apparel retailers use augmented reality applications, such as virtual fitting rooms (see chapter 3.2.9 for more details), in order to solve

this issue. Augmented reality enables e-commerce customers to virtually try products and helps in the buying decision process (Pachoulakis and Kapetanakis, 2012, p. 35). Besides, high-risk products, such as fine art, cars or diamonds, are also not frequently sold via online stores. Selling these products requires competent and experienced salespersons that interact with customers individually and in person (Grewal *et al.*, 2004, p. 704). However, this problem can be solved through the implementation of showrooms. A showroom is basically a physical store where products are showcased, but not sold (e.g. Tesla showrooms). The final purchase is then completed online by using an e-commerce platform (PwC, 2017, p. 7). According to PwC (2017, p. 7), many retail customers already use traditional physical shops in this way. They purchase products online and browse in person (PwC, 2017, p. 7). Another interesting fact is that the most commonly purchased products on the Internet are products with standardized formats (e.g. music, computers and books) (Grewal *et al.*, 2004, pp. 707–708).

Furthermore, e-commerce, the widespread use of the Internet and the decreasing costs of computer hardware are enabling even small and medium sized retail companies (SMEs) to trade, communicate and operate in global markets (Jones *et al.*, 2003, p. 1). Online retailers are able to reach more customers than traditional retailers, as their physical location (location of the distribution center) is not very important and customers can access e-commerce platforms from any location and at any time, if Internet access is available. This can potentially lead to greater sales for retailers that adopt e-commerce (Grewal *et al.*, 2004, pp. 706–707). Thus, rapid business growth can be achieved by (small) retail companies that use an e-commerce strategy (Grandón *et al.*, 2011, p. 292).

E-commerce has also led to more competition and transparency in the retail industry (online and offline). The Internet enables retail customers to easily compare prices of different (online) retailers. Search engines, such as Google and Yahoo, and shopping bots (software application) can be used to find the (online) shop that offers the best price for a specific product. It has become important, if not crucial, for retailers to partner with multiple search engines in order to get displayed on their websites and to appear price competitive (Grewal *et al.*, 2004, pp. 704–710). Besides, when shopping in traditional physical retail stores, customers can use their mobile devices (e.g. tablets and smartphones) to check if there is an online store that offers a better price for the desired product(s). This substantially increases price transparency in the retail industry. Consequently, retailers are competing for the best price and the prices in the retail industry are becoming more and more competitive (Doherty and Ellis-Chadwick, 2010, p. 943). This is especially true for standardized products, such as music, movies and books. As retailers are offering, for instance, the exact same book, the only difference is the price of the book. Thus, in most cases, the retailer that can offer the best price for the book will be chosen by the customer (Grewal *et al.*, 2004, p. 710).

To conclude, e-commerce has some crucial advantages over brick and mortar stores and seriously threatens the traditional business model of retail companies. E-commerce technologies are changing how retailers interact and communicate with customers and enable lasting and interactive relationships with customers (Hart *et al.*, 2000, p. 970). Besides, retail companies can significantly extend their product assortment and reduce fixed costs through the use of e-commerce and centralized warehouses (Anderson and Swaminathan, 2011, p. 224). E-commerce has also increased the profitability of selling niche products (long tail strategies) by reducing search costs for customers and by improving the efficiency of retail companies (e.g. centralized warehousing) (Sorescu *et al.*, 2011, p. 10). However, some products (e.g. apparel, cars and other high-risk products) are difficult to sell online, as customers cannot try them before buying (Grewal *et al.*, 2004, p. 704). Moreover, e-commerce has dramatically increased the amount of consumers that can be reached by retailers, but it also increased transparency and competition in the retail industry (Grewal *et al.*, 2004, pp. 704-710).

7.3.3. The Implications of E-Commerce for the Customers

E-commerce not only has important implications for retail companies, it also substantially affects customers and their shopping behavior. Thus, this subchapter discusses the impact of e-commerce technologies on retail customers in more detail. E-commerce has fundamentally changed the consumer's buying process and decision making and also provides new ways for customers to interact with retailers. Besides, online shopping offers several advantages over traditional shopping (brick and mortar stores) for retail customers, such as increased convenience, greater product choice (see chapter 7.3.2), no travel costs, time savings, lower prices and enhanced access and availability of product information (Chaparro-Peláez *et al.*, 2016, p. 1278; Notomi *et al.*, 2015, p. 38).

The e-commerce technology significantly increases convenience for customers and empowers them. Due to the emergence of e-commerce, customers do not need to travel to several retail stores when shopping. In fact, they do not have to leave their homes at all to go shopping. Online shops enable consumers to find and purchase desired products easily with almost no effort. Consequently, e-commerce consumes less time than traditional shopping and there are no extra costs for parking and gasoline. In addition, customers can quickly find the online retailer that offers the best price for the product they want to buy by using search engines, such as Google. Online shops offer a one-stop shopping experience that is convenient for customers and the product assortment of e-commerce platforms is often much larger than that of brick and mortar stores. Thus, the retail customer's search costs are also reduced by e-commerce (Anderson and Swaminathan, 2011, p. 224).

Through the use of online stores, customers can order products at any time and at any place. They can also inform themselves about different products and services and compare them easily by using the Internet. Retail customers have been empowered by the rise of e-commerce, the Internet and other technological developments, such as smartphones. Mobile devices, for instance, allow customers to easily acquire information about products and the companies that are selling them, search for cheaper alternatives and ask for advice while shopping in brick and mortar stores (Notomi *et al.*, 2015, pp. 38-39). This leads to a more equal balance with regard to the access to information that customers have compared to retail companies (Piotrowicz and Cuthbertson, 2014, p. 9). In general, consumers have more freedom than ever to decide what to purchase, where to purchase and how to purchase products. Thus, retail customers will choose retailers that are able to satisfy their needs (e.g. convenience and price) (Notomi *et al.*, 2015, pp. 38-39).

Besides, virtual communities (see chapter 7.3.1) and the possibility to write products reviews online are increasing the power of consumers and can affect the success of online retailers. The Internet has enabled retail customers to easily communicate with each other by using social media websites or feedback forums (e.g. Facebook, Twitter and YouTube). The opinions and product reviews of customers that can be found online can significantly influence the shopping behavior of other customers (Flavián and Guinalú, 2005, pp. 412–414).

E-commerce has changed the shopping behaviour of customers. People are purchasing products online because of several motivations, such as convenience (time and effort saving, flexibility, payment methods), price, product variety, product customization and online exclusive offers. On the other side, there are also barriers to online shopping, which include risk (payment, personal information, product), trust and delivery issues (Chaparro-Peláez *et al.*, 2016, p. 1278). According to the study⁶ of Chaparro-Peláez *et al.* (2016, p. 1282), convenience is the strongest motivation to shop online and risk is the most important barrier to online shopping.

Furthermore, retail customers prefer to buy certain sensitive products online, as e-commerce platforms provide a higher level of anonymity and privacy compared to brick and mortar stores (Grewal *et al.*, 2004, p. 706). Another reason for consumers to shop online is that some people do not like the traditional shopping experience. Customers do not need to get dressed, drive a car and fight traffic, talk to salespeople and deal with crowds when shopping online. In addition, busy customers that do not have time to visit retail stores are not restricted by opening hours

⁶ This study uses data from a questionnaire, which was completed by 817 participants that consist of students from the Universidad Politécnica de Madrid and Spanish online shoppers (Chaparro-Peláez *et al.*, 2016, p. 1278).

and distance when using online shops, which are always “open” or online (Grewal *et al.*, 2004, p. 707).

In summary, it can be stated that e-commerce substantially empowers retail customers and influences their shopping behavior. The Internet and e-commerce are enabling consumers to share their opinions and reviews about products and services, to communicate with other consumers and to compare prices of different retailers online (Flavián and Guinalú, 2005, pp. 412–414). In addition, online shopping has multiple advantages over traditional shopping for customers, such as a broader product assortment, higher convenience (e.g. time savings, reduced search costs and no travel costs) and improved access to product information (Anderson and Swaminathan, 2011, p. 224; Notomi *et al.*, 2015, pp. 38-39).

7.4. The Impact of ICT on the Business Environment of the Retail Industry

7.4.1. Overview

This chapter deals with the influence of ICT on the environment of the retail industry. As this Master's Thesis has already mentioned or discussed multiple important consequences of ICT for the business environment of retailers, such as the increasing transparency of the retail industry (see chapter 7.3.2), the empowered customers (see chapter 7.2.5 and chapter 7.3.3) and the increasingly global supply chains (see chapter 5.3 and chapter 7.2.3), this chapter tries to sum up the most important issues and also adds several new aspects. Subchapters 7.4.2 to 7.4.6 examine the global trends that are caused by developments in ICT and their impact on the retail industry. In the following, some basic implications of ICT for the business environment of retailers are presented.

ICTs and especially the commercial use of the Internet have an essential impact on the overall business environment. Information has become one of the most important resources for companies. Technologies, such as e-commerce, are indispensable for businesses and companies are facing more and more competitive pressure to adopt ICT (Chan and Al-Hawamdeh, 2002, p. 278). Advances in ICT eliminate geographical boundaries and enable companies, customers, suppliers and other stakeholders of companies to interact across corporate and national borders. Besides, modern ICT improves and enables global networks, global supply chains and a worldwide integration of processes. This results in massively increased economies of scale (Jetter *et al.*, 2009, p. 43; Torre and Moxon, 2001, p. 617). According to Terzi (2011, p. 752), e-commerce and the Internet boost international trade, as these technologies have a similar effect on the economy as the removal of trade barriers. Furthermore, developing economies can experience knowledge spillovers through imports from high-income countries (Terzi, 2011, p. 752).

Developments in ICT and the accompanying global trends have led to important changes in the business environment of retailers. These changes include, among others, the dematerialization of consumption (Bourreau and Doğan, 2018, pp. 106–107), the increasing importance of network externalities (Goldenberg *et al.*, 2010, pp. 4-5) and the increasing power of customers (Notomi *et al.*, 2015, pp. 38-39). In the following subchapters, some of the most significant global developments with regard to the environment of the retail industry and ICT are examined in more detail. Figure 6 below provides an overview of these trends.



Figure 6: Global Trends in the Retail Environment Caused by Developments in ICT

Source: Own graphical presentation on the basis of Bourreau and Doğan (2018, pp. 106-107), Goldenberg *et al.* (2010, pp. 4-5), Leidner (2010, pp. 69-70) and Notomi *et al.* (2015, pp. 38-39)

7.4.2. Global Supply Chains

Due to technological developments and the economic globalization, the supply chain of the retail industry is becoming more and more global. Technological innovations (e.g. Internet) have enabled efficient international supply chain management and reduced geographical boundaries (Leidner, 2010, pp. 69–70). The rapid and reliable sharing of information that ICT systems offer is essential for the processes and communication within a large international company (Finnegan and Longaigh, 2002, p. 159). As retailers source more and more products from international markets, the communication with other stakeholders, such as suppliers and logistic service providers around the globe is also crucial for the operations of retail companies. ICT helps to solve the logistical challenges that are associated with such international operations (Chitra, 2015, p. 1471). This issue is also discussed in chapter 5.3 and chapter 7.2.3.

Digital sensors and tags that are connected through wireless communication systems are able to identify and track (the location of) objects and can collect data about transactions. Such systems are crucial for global supply chains. The assembly of the iPod, for instance, would be impossible without tools for supply chain management and digital tracking, as it involves 451 components from multiple different countries. Besides, online platforms and digitization enhance the speed and efficiency of cross-border exchanges and production. The rapid growth of e-commerce platforms enables faster and greater flows of services and products to new distant markets. This allows even smaller companies to participate in global trade (Hirt and Willmott, 2014, pp. 6-7). To sum up, ICT systems have enabled global supply chains and are vital for their success. This has substantially influenced the sourcing decisions of retailers (Chitra, 2015, p. 1474).

7.4.3. Dematerialization of Consumption

The Internet and other developments in ICT (e.g. smartphones and MP3 audio files) have led to the dematerialization of consumption. Dematerialization refers to the transformation of physical products, such as movie, software and music DVDs, newspapers and books, into electronic information (e.g. software downloads and digital newspapers). This information (e.g. music) can then be downloaded by retail customers through using the Internet and e-commerce platforms (e.g. Amazon) (Magaudda, 2011, p. 16). More and more consumers are switching from physical to virtual or digital consumption. One advantage of digital products is that customers can purchase and access them at any time and place by using mobile devices, such as tablets and smartphones. This development especially affects the music industry (Bourreau and Doğan, 2018, pp. 106–107). According to Bourreau and Doğan (2018, p. 106), 800 million music CDs were purchased by US customers in 2003. Annual sales of music CDs substantially decreased due to the success of digital music catalogs (e.g. iTunes) and in 2015, only 125 million physical units were sold (US). These figures clearly illustrate that the way consumers enjoy recorded music has changed and they also show the consequences of the dematerialization of

consumption. Thus, retail companies should be aware of this development and should modify their business strategies accordingly (Bourreau and Doğan, 2018, pp. 106–107). Besides, the dematerialization of products, such as books (eBooks), leads to reduced transport and production costs (Vendrell-Herrero *et al.*, 2017, p. 69). In fact, the marginal production costs of digital products are virtually zero (e.g. extra copy of a movie). In addition, retailers can easily distribute digital products to customers all around the globe by using e-commerce platforms and the Internet (Hennig-Thurau *et al.*, 2010, p. 312). This influences the position of retailers in the supply chain (Vendrell-Herrero *et al.*, 2017, p. 69). Vendrell-Herrero *et al.* (2017, p. 69) state that these new conditions empower downstream companies (retailers).

7.4.4. Empowered Customers and Increased Transparency

As already discussed in chapter 7.2.5, chapter 7.3.2 and chapter 7.3.3, technological developments, especially e-commerce and social media, have substantially increased the power of retail customers and the transparency in the retail industry. The rapid growth of mobile networks, the Internet and smart mobile devices, such as smartphones and tablets, has led to a digital shift in the retail environment and essentially changed the shopping behaviour of consumers. They can access the Internet anytime and at any place, even in stores, by using mobile devices. Moreover, consumers are used to order and receive items anywhere and at any time. In general, the digital shift has empowered consumers, as they can decide where, when, what and how they purchase. The retail industry is transforming into a consumer-centric industry and companies need to adapt to this change. Hence, retail companies are integrating their online and offline activities and are increasingly focusing on omnichannel strategies (Notomi *et al.*, 2015, pp. 38-39).

Furthermore, the emergence of social media platforms (see chapter 7.2.5) has significantly increased the importance of individual opinions about products and services, as customers are able to reach virtually everyone in their social network (online) with their product and service reviews and recommendations by using the Internet and services, such as Facebook and YouTube. This substantially influences the shopping behavior and decision making of retail customers and empowers them (Hennig-Thurau *et al.*, 2010, p. 312). Retail companies should be aware of this development, as negative opinions and reviews on social media platforms can have severe consequences for retailers due to the ubiquity of the Internet (Ramanathan *et al.*, 2017, pp. 106-108).

The Internet and e-commerce have also increased the transparency (see chapter 7.3.2) in the retail industry. Retail customers can use their laptops, computers or mobile devices to easily compare different retail companies and their prices. Customers can always access information about product details and retailers by using the Internet. In addition, shopping bots and search

engines (e.g. Yahoo and Google) enable consumers to quickly find the best offer for a specific product or service. Consequently, price competition has increased in the retail industry due to the increased transparency and developments in ICT and this also benefits customers (Grewal *et al.*, 2004, pp. 704-710).

Moreover, the enhanced transparency in the retail industry has increased the awareness of retail customers about the consequences of their product choices (e.g. environmental pollution and ethical issues). Sourcing decisions and other business practices of retail companies are no longer invisible to customers, as such information is freely available in the Internet (e.g. social media, public interest groups and the press). This can have significant negative or positive consequences for the customer attitudes, demand for services and products and the brand image of retailers (Ganesan *et al.*, 2009, p. 85).

7.4.5. Increasing Importance of Services

ICT has also increased the importance of services in the retail industry. Digital technologies (e.g. web services and cooperation platforms) offer opportunities for enhanced cooperation and interaction between retail companies and customers and can intensify the customer relationship. Flexible ICT systems and processes also enable the individualization of services (Jetter *et al.*, 2009, pp. 38–39). As a consequence, retail companies increasingly differentiate themselves on the basis of service quality (Varadarajan *et al.*, 2010, p. 108).

Retail customers are increasingly demanding services that add value to their shopping experience, such as “order online, pick up in store”, self-service technologies and interactive screens (Piotrowicz and Cuthbertson, 2014, p. 10). The quality of the service with regard to e-commerce platforms is also important for the customer satisfaction. Thus, online retailers are implementing interactive elements, such as live chats, on their websites to add additional value for the customers (Laudon and Traver, 2014, pp. 14-15). Besides, the enhanced power of the consumers and the high transparency in the retail industry (due to developments in ICT) have led to more freedom of choice for customers (see chapter 7.4.4). This has further increased the importance of services, as retail customers are more and more choosing the retailer that offers the best added value services and that is able to satisfy their continuously changing demands (Notomi *et al.*, 2015, p. 39).

Hence, the product assortment of retailers is expanding due to the service shift and retail companies are no longer only offering traditional physical products. Retailers are increasingly combining physical goods with intangible services and processes in order to increase the value for the consumers (Notomi *et al.*, 2015, pp. 38–39). Kowalkowski *et al.* (2017, p. 8) state that,

“the transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic” are called *“servitization”*.

According to the international consulting company Accenture (2018, p. 3), retail offerings will change dramatically in the future as a result of the connectivity and ubiquity of the Internet. Connected digital devices and sensors will be used by retailers to easily track the emotions, behaviors and preferences of customers. This will enable retail companies to understand the desires of customers in real time and to respond immediately with individualized product and service offerings. Retailers will also be able to predict the products that the customer wants and that need to be replenished. Smart sensors on a washing machine, for example, will alert automatic replenishment systems that inform retailers to deliver supplies. In general, retailing will become more and more service-oriented due to the opportunities that modern ICT provides (Accenture, 2018, p. 3).

7.4.6. The Increasing Importance of Network Externalities

Another important development in the retail business environment is the growing importance of network externalities or network effects for electronic products (e.g. fax machines, DVD players and electric cars) and digital services (e.g. social networking websites, e-mail, e-commerce platforms and electronic payment methods) and products (e.g. online video games and other software products). Network effects or network externalities describe the phenomenon that the perceived value of a network, service or product increases with the amount of users (Goldenberg *et al.*, 2010, pp. 4-5). The value of a social network (e.g. Facebook), for instance, rises when more users join the network (Lin and Lu, 2011, p. 1152). The success of the Internet itself might be the best example of network externalities, as its value mainly depends on the number of individuals and companies that use it (Laudon and Traver, 2014, p. 14).

Yang and Mai (2010, p. 1050)⁷ examine if the value of an online video game increases with the amount of people that are playing it. They conclude that online video games are subject to network externalities and that the perceived quality of the video game greatly depends on the user base size (Yang and Mai, 2010, p. 1050). In addition, Yang and Mai (2010, p. 1050) state that potential customers use the user base size as a search attribute and that the negative influence from unfavourable reviews is reduced if the user base is large. Their findings are not restricted to online video games, as they hold true for other hedonic products (e.g. movies) as well. This insight might help retailers to optimize their product assortment, inventory and marketing strategies (Yang and Mai, 2010, p. 1056). Retail companies can, for example, communicate the large amount of customers that use a product or service to potential customers

⁷ The dataset for this study includes seven games and 1695 user reviews and covers a period of 49 months (May 2003 to March 2007).

in order to drive sales and to enhance consumer trust (Flavián and Guinalú, 2005, pp. 412–414).

Network externalities are also important for retailers, as the perceived value of an e-commerce platform (e.g. Amazon) also depends on the amount of customers that use it. As already explained in chapter 7.3.1, the number of product reviews and users in the virtual community of an online store is crucial to its success and significantly influences the customer's trust and loyalty and the company's brand awareness (Flavián and Guinalú, 2005, pp. 412–414). Goldenberg *et al.* (2010, p. 4) further show that network externalities can slow down sales for a new product, as potential customers may wait for other people to adopt it first in order to derive more value from it and to avoid mispurchases (e.g. Blu-ray player vs. HD-DVD player). They also find that the growth patterns of the sales of CD players, cellular services, fax machines and DVD players have the form of a “hockey stick” (low sales at the beginning and once a certain point is hit growth increases substantially) (Goldenberg *et al.*, 2010, p. 4). Thus, the success and failure of certain products and services that retail companies offer might be explained by network externalities (Goldenberg *et al.*, 2010, p. 4; Tucker, 2008, p. 2024).

7.5. The Influence of ICT on the Requirements for Competitiveness in the Retail Industry

7.5.1. Overview and the Importance of Flexibility in the Volatile Retail Industry

Having discussed the most important consequences of developments in ICT for retailers and their business environment, this chapter now focuses on the impact of ICT on the requirements for competitiveness in the retail industry. Thus, this and the following subchapters (7.5.1 to 7.5.4) try to sum up the most important implications of ICT for the competitiveness of retailers. Figure seven below provides an overview of the issues that are examined in this chapter.

The pace of technological innovations has increased significantly and this also leads to continuous changes in industries that are affected by ICT, such as the retail industry. Innovation cycles, for instance, are getting shorter and the overall complexity is increasing (Jetter *et al.*, 2009, p. 43). Andersen (2001, pp. 108-109) states that corporations in industries with higher dynamism and complexity are more likely to use the Internet and intranet in comparison to companies in industries that are less complex and dynamic. In general, innovations in ICT are increasing the volatility and complexity of the retail industry (Notomi *et al.*, 2015, p. 39).



Figure 7: Competitiveness in the Digitized Retail Industry

Source: Own graphical presentation on the basis of Hirt and Willmott (2014, p. 4), Jetter et al. (2009, p. 43), Notomi et al. (2015, pp. 38-41) and Renko and Ficko (2010, pp. 216-218)

The Internet and e-commerce are good examples of technological developments that substantially changed the retail industry and that forced retailers to react. Besides, emerging technologies, such as social commerce (shopping via social media), augmented reality (see chapter 3.2.9), the Internet of Things (see chapter 3.2.8) and artificial intelligence can potentially revolutionize the retail experience for customers and the operations of retailers in the near future. The (early) adoption of such technologies may enable retail companies to differentiate themselves from competitors and to gain a competitive advantage over them (Deloitte, 2017a, p. 8).

Thus, companies need to be flexible and have to quickly detect developments in the field of ICT in order to react and adapt accordingly (Notomi *et al.*, 2015, p. 39). In some cases, technological innovations force companies to fundamentally change their organization, corporate culture and business model in order to stay competitive and to survive in the more and more volatile business environment (e.g. Netflix – switch from DVD rental and sales to online streaming). One of the most important tasks for (retail) companies is to deal with the radical changes in information consumption and production that are caused by developments in ICT. Technology (e.g. data mining systems and sensors) allows companies to collect huge amounts of data and information about customers and market trends. It is crucial for the success of a company to effectively and efficiently manage this data and to extract the relevant information. The obtained insights can help organizations to predict market trends, adapt to changes in the environment and to develop innovative strategies and business models (Jetter *et al.*, 2009, p. 43).

7.5.2. New Competitors and E-Commerce

Developments in ICT have changed the way retailers compete with each other and have enabled new competitors to enter the retail market. The emergence of the Internet and e-commerce has fundamentally changed the competitive environment of retailers (Chan and Al-Hawamdeh, 2002, pp. 286–287). In addition, technology has significantly increased the reach of retailers and has made retailing more global (MacKenzie *et al.*, 2013, p. 6). As a result, the competition in the retail industry is rapidly and continuously growing (Ganesan *et al.*, 2009, p. 84).

New competitors are often smaller companies that primarily concentrate on specific subcategories of products (Hirt and Willmott, 2014, p. 4). These companies are able to enter the market due to e-commerce platforms and online marketplaces, such as the Amazon marketplace and eBay. These platforms allow small companies to offer and sell their products and services via popular and large online stores. In this way, they can reach a large amount of potential customers (Deloitte, 2017a, p. 4). This substantially decreases barriers to entry for new competitors, as they do not need to build their own physical stores or distribution networks. They only have to pay a commission to, for instance, Amazon in order to benefit from their distribution platform. Consequently, such companies can offer very low prices for specific products and this forces established retail companies to also lower their prices in order to remain price competitive (Hirt and Willmott, 2014, p. 4).

As the worldwide adoption of ICT (e.g. Internet access, mobile devices, wireless LAN) is constantly increasing, the influence of technology on the daily life of customers becomes more and more visible (Drori, 2010, p. 64). Thus, retail companies that want to remain competitive cannot afford to ignore technological innovations and have to invest into technologies that exploit

this trend of global ICT adoption, such as e-commerce (Varadarajan *et al.*, 2010, p. 108). Online shopping (see chapter 7.3 for a discussion on e-commerce and its consequences for the retail industry) is convenient for customers and also offers other advantages to customers (e.g. easy price comparison). As a result, customers are increasingly favoring retail companies that offer an e-commerce service/website (Notomi *et al.*, 2015, pp. 38-41).

According to Eid (2011, p. 89) the success of retailers with regard to their e-commerce operations mainly depends on four factors: service information quality, privacy perception, security risk perception and user interface quality (usability). These factors substantially affect the loyalty, trust and satisfaction of e-commerce customers. Hence, retailers should focus on improving these aspects of their e-commerce platforms (Eid, 2011, p. 89). Furthermore, e-commerce websites are subject to network externalities (see chapter 7.3.1 and chapter 7.4.6). Therefore, retail companies should be aware of the fact that the value of their online shops also depends on the amount of users it has and should modify their strategies accordingly (e.g. special offers for new customers) in order to attract more users (Flavián and Guinalú, 2005, pp. 412–414).

7.5.3. Using Technology to Gain a Competitive Advantage

Retail companies (especially local retailers) need to make use of the advantages that information and communication technologies offer (e.g. efficiency gains, effectiveness, organization expansion, improved internal and external communication and higher productivity) in order to survive in the increasingly competitive retail market that is mainly dominated by transnational and international companies. The costs of investing into digital technologies may be enormous, but ignoring the digital shift in the retail industry might lead to even more costs/losses for retailers (Ernst & Young, 2016, p. 20).

Renko and Ficko (2010, p. 216) argue that the success of a retail company greatly depends on the supply chain and logistics performance. As suppliers and other stakeholders of retail companies can be located in different parts of the world, ICTs, such as integrated information systems, are crucial for effective supply chains and the integration of inside and outside activities of organizations (Gunasekaran and Ngai, 2004, p. 270). Besides, the optimization of supply chains through the use of ICT (e.g. efficient consumer response, just-in time, etc.) can result into reduced costs and increased productivity for retailers. This can lead to a competitive advantage for the companies that are adopting new logistics technologies. Hence, retail companies have to be aware of innovations in logistics and supply chain technology and have to implement them into their processes (Renko and Ficko, 2010, pp. 216-218).

In general, organizations have to rework their strategies in order to benefit from the opportunities that ICT offers and information and innovation are the most important competitive instruments in knowledge-based economies (Chan and Al-Hawamdeh, 2002, p. 278). Besides, it is important to adjust ICT investments to organizational processes and internal competences to achieve the best performance (Taruté and Gatautis, 2014, p. 1218).

As already mentioned, the management of customer and market data and information is essential for retailers. Technologies, such as data mining, enable retailers to gain a competitive advantage by analyzing collected data and by identifying emerging trends. The amount of available data is steadily growing due to technological developments, such as social media, RFID, EPOS, e-commerce and mobile devices (e.g. apps, GPS tracking). Besides, companies have access to the customer's online browsing behavior and online search trends (e.g. Google trends). This information has to be exploited by retailers in order to stay competitive and to enhance customer experience and operational efficiency (Deloitte, 2018, pp. 27-29).

7.5.4. Customer Centricity

In the retail industry, price is not the most important competitive aspect. As mentioned in the previous chapters (such as chapter 7.4.4), ICT has empowered customers (e.g. social media, product reviews, price comparison websites, mobile devices, etc.) and the retail industry is becoming more consumer-oriented. Customers are choosing retail companies according to the retailer's ability to satisfy their continuously changing demands. These demands can involve convenience in receiving and purchasing methods, specific brands, product functions, prices and customer service. As the environment, time of life, situation, finances and other factors can change, customer needs are varying. Hence, retail companies can gain a competitive advantage by focusing on a strategy that is based on service improvement. In this regard, the Internet and e-commerce are essential instruments to enhance customer service. These technologies improve and enable the communication in the supply chain and with customers (Barnes *et al.*, 2004, p. 607; Notomi *et al.*, 2015, p. 39). Besides, strategies that respond to the increased consumer power can include initiatives, such as social media marketing campaigns, product differentiation and the optimization of e-commerce websites (Doherty and Ellis-Chadwick, 2010, p. 957).

In general, customer expectations and demands have increased significantly due to the opportunities that ICT offers. Retail customers have the freedom to decide where, how and when they buy products and services. Thus, retail companies can no longer survive and succeed by simply selling products. They need to provide some added value for their customers. This can be achieved by offering special services (e.g. order online and collect in-store) and by combining products with services that increase convenience for customers (e.g. maintenance). Moreover,

retail companies need to create seamless and convenient shopping experiences by integrating the different sales channels (online, brick and mortar stores, mobile, etc.). Omnichannel retailing is becoming more and more important, as it enables retailers to satisfy customer demands at any time and via any channel (Notomi *et al.*, 2015, pp. 38-40).

According to Abraham *et al.* (2017) from the Boston Consulting Group, the personalization of marketing, products and services (e.g. personalized offers, search results and sales experiences) is also crucial in the customer-centric retail market. Creating long-lasting and individualized customer relationships and locking in customers are the main goals of personalization strategies. Retailers that use advanced digital technologies to create personalized customer experiences, and consequently more buying opportunities for customers, are able to significantly increase their revenues. Personalization can also lead to enhanced customer loyalty and increases the barriers to entry for new competitors. Thus, retailers need to modify their business strategies accordingly and have to merge the digital and physical experiences in order to deepen the connections with customers (Abraham *et al.*, 2017, pp. 1- 3).

8. Fundamental Opportunities and Challenges of ICT in the Retail Industry

8.1. Overview

This Master's Thesis has already discussed several fundamental opportunities and also challenges of ICT in the retail industry. Opportunities and advantages include, for instance, the optimization of the supply chain (see chapter 7.2.3), increased product security (see chapter 7.2.4), enhanced communication with customers (see chapter 7.2.5) and improved managerial decision making (see chapter 7.2.6). On the other side, privacy concerns, rising industry volatility and complexity (see chapter 7.5.1), growing competition (see chapter 7.5.2) and increasing transparency (see chapter 7.4.4), are examples of challenges with regard to ICT in the retail industry. It is crucial to be aware of these fundamental opportunities and challenges in order to understand the importance of ICT in the retail industry. Besides, they can have a significant impact on the business strategies of retailers (Zhang *et al.*, 2010, p. 168).

To provide a holistic overview, chapter eight summarizes the different challenges and problems and opportunities and advantages of ICT for retailers that were already mentioned in this Master's Thesis and also adds some new insights. A table at the end of chapter 8.2 and chapter 8.3 lists the most relevant scientific articles that deal with this issue and are cited in this Master's Thesis.

8.2. Fundamental Opportunities and Advantages of ICT

8.2.1. Overview

This chapter sums up the fundamental advantages and opportunities of ICT for retail companies and examines them in more detail. Technological innovations in the retail industry can come with essential benefits for retailers. They can significantly improve the competitiveness of companies and can add value to their operations. As the retail industry gets more and more digitized and globalized, retailers that want to succeed need to be aware of these advantages and opportunities and have to exploit them (Ismail *et al.*, 2011, p. 1). In the following, the opportunities of ICT that were already examined in this Master's Thesis are briefly discussed and some other advantages of ICT are also presented. At the end of this chapter, a table (table three) provides an overview of relevant scientific articles that deal with the advantages and opportunities of ICT for retailers. Figure eight below shows the main benefits and opportunities of ICT in the retail company.



Figure 8: Advantages and Opportunities of ICT in the Retail Industry

Source: Own graphical presentation on the basis of Chan and Al-Hawamdeh (2002, p. 287), Finnegan and Longaigh (2002, p. 159), Grandon and Pearson (2004, p. 197), Hart *et al.* (2000, p. 970), Prater *et al.* (2005, pp. 138-139) and Zhu *et al.* (2012, p. 152)

8.2.2. Increased Market Reach

The Internet and the emergence of e-commerce have substantially increased the reach of retail companies (see chapter 7.3). These technologies have enabled online retailers to operate in the global market. One major advantage of retailers that use e-commerce is that national, regional and cultural boundaries are virtually non-existent for them. Thus, online retailers are able to reach customers all around the globe. The only requirement is that customers have access to the Internet (Laudon and Traver, 2014, pp. 12-17). Besides, the physical location of online retailers (their distribution centers) is not crucial for their success. In general, retail companies that use e-commerce can reach significantly more customers than traditional brick and mortar retailers. This, in turn, can increase the sales and profits of e-commerce retailers (Grewal *et al.*, 2004, pp. 706–707).

Furthermore, Chan and Al-Hawamdeh (2002, p. 287) argue that the e-commerce technology allows even small and medium sized enterprises (SMEs) to have a global presence. E-commerce websites can expand the networks of retail companies and can increase the awareness in the retail market in a cost-effective way. This offers small and medium sized retail companies the opportunity to compete with larger companies (Chan and Al-Hawamdeh, 2002, p. 287).

8.2.3. Improved External and Internal Communication

ICTs, such as the Internet, e-mail, video-conferencing, e-commerce, mobile devices and intranet, significantly enhance the internal and external communication of retail companies. In the globalized world, virtually every business company is dependent on technology that facilitates communication. Large international companies especially rely on digital communication systems and networks in order to coordinate business operations and activities across local and national borders. ICTs enable the rapid and reliable sharing of information and data within a company and decrease the spatial and time dependence. In addition, these technologies enable managers to participate in joint decision making without having to travel (Finnegan and Longaigh, 2002, p. 159). According to Andersen (2001, p. 101), the improved communication capabilities of companies due to ICT can also lead to enhanced coordination of strategic actions, better strategic decision making and improved learning from strategic initiatives.

Moreover, technologies improve the external communication of retail companies. The ability of a retailer to communicate efficiently with suppliers, customers, logistics service providers and other stakeholders is essential for the success of the company. Besides, as a result of globalization, the activities and operations of retail companies have become much more global and suppliers can be located in different countries. Thus, ICTs that can enhance the

communication capabilities of companies become more and more important (Chitra, 2015, p. 1471). The communication with customers (see improved customer relationships below) can also be enhanced by using technologies, such as social media, e-commerce and the Internet (Laudon and Traver, 2014, pp. 15-17).

Shachaf (2008, p. 131) further states that ICTs can facilitate intercultural communication. Technologies, such as e-mail, teleconferencing and videoconferencing, can help to resolve problems and challenges that can occur in cross-cultural teams by mitigating the negative effects of intercultural miscommunication (Shachaf, 2008, pp. 139–140). In particular, the study⁸ from Shachaf (2008, pp. 139–140) shows that ICTs can enhance the maintenance and creation of team identity by decreasing distorted communication. In addition, ICT increases team cohesiveness, common ground and inclusion. This is especially important for international retail companies that operate in different cultural environments (Shachaf, 2008, pp. 139–140).

8.2.4. Improved Customer Relationships

E-commerce and other interactive technologies, such as social media, can also enhance and intensify the relationships between retail companies and their customers (see chapter 7.3 and chapter 7.2.5). These technologies are characterized by high interactivity and provide new ways for retailers to communicate with customers. This enables individualized dialogs and customer experiences (Laudon and Traver, 2014, pp. 15-17).

Retail companies can create a two-way communication channel with customers by providing flexible and innovative e-commerce websites. This can support their promotional, advertising and research activities and adds value to the relationship between retailers and customers (Hart *et al.*, 2000, p. 970). Besides, the information that can be obtained from virtual communities of e-commerce platforms (see chapter 7.3.1) can be used by retail companies to enhance their knowledge about customer behavior. This information and knowledge can then be used to improve the customer relationships. Virtual communities around e-commerce platforms also enable the involvement of customers in product development processes, which further intensifies customer relationships (Flavián and Guinalú, 2005, pp. 417–418).

⁸ The data for this exploratory study were collected by using interviews with 41 employees of a Fortune 500 corporation that were part of an intercultural team (nine different countries) (Shachaf, 2008, pp. 139–140).

8.2.5. Facilitated Access to Information and Knowledge

Technologies, such as data mining, social media, e-commerce, search engines and the Internet, significantly facilitate the access to knowledge and information for retailers. Relevant information for retail companies involves, for example, market trends, sales, customer behavior, competitor prices and strategies and supply chain and logistics related issues (Pantano, 2014, pp. 348–349). ICT systems together with sensors, loyalty programs (Ziliani and Bellini, 2004, p. 286) and RFID tags allow retailers to gather huge amounts of data. RFID systems, for instance, are able to track, identify and trace information in the whole supply chain. These systems provide retailers accurate information about products in real time (Zhu *et al.*, 2012, p. 152).

As already discussed in chapter 7.2.6, data mining systems are used to analyze the collected data and to present it in a comprehensible way. This enables retail companies to rapidly and easily gain access to valuable knowledge and information, which can be used to build a competitive advantage (Bagga and Singh, 2012, pp. 19-22). Besides, ICT systems significantly enhance the quality and reliability of the information that is available to retailers (Sellitto *et al.*, 2007, p. 74). The facilitated access to high quality information due to ICT also substantially improves managerial decision making, business processes, supply chain efficiency, reduces labor costs and can help to avoid stock-outs (Zhu *et al.*, 2012, p. 152).

8.2.6. Improved Managerial Decision Making

Furthermore, ICT, the facilitated access to knowledge and information and the improved internal communication substantially enhance the managerial decision making process. The high quality information that can be derived from data mining systems, such as market trends, sales data and changes in consumer behavior, significantly supports and improves the strategic and operational decisions of retail companies (Grandon and Pearson, 2004, p. 197). ICT and the knowledge that can be generated with it enable retailers to forecast trends and to react timely and appropriately. The insights that can be obtained through the use of ICT, for instance, can be used by decision makers to develop effective advertising and selling strategies. This can result into an essential competitive advantage for retailers that use data management technologies (Pantano, 2014, pp. 348–349). Chapter 3.2.2 and chapter 7.2.6 discuss data mining and the importance of data in the retail industry in more detail.

Besides, the enhanced internal communication that ICT provides substantially facilitates the decision making process in retail companies. This is especially true for large international companies that operate in different countries all across the globe. Technologies, such as video-conferencing, e-mail and teleconferencing allow decision makers from different subsidiaries to communicate without having to travel (Finnegan and Longaigh, 2002, p. 159). This saves time, decreases the effective distance between managers and increases the efficiency of the

management of a company. Thus, the use of ICT for decision making can create an important competitive advantage in the retail market (Chary, 2007, pp. 182-186).

8.2.7. Enhanced Efficiency

ICT also considerably enhances the efficiency of virtually every operation, process and activity of a retail company. Technologies especially improve the different processes in the retail supply chain and increase its flexibility and responsiveness. The implementation of RFID systems (see chapter 3.2.3 and chapter 7.2.4), for instance, can lead to enhanced accuracy of point of sale data and inventory management (correct inventory levels), better visibility of inventory and orders, overall decreased costs for logistics operations (e.g. automatic computer reordering) and enhanced store operations (Prater *et al.*, 2005, pp. 138-139).

According to Barba-Sánchez *et al.* (2007, p. 111), ICTs can enhance productivity, strengthen growth possibilities and reduce business costs. Technology further increases a company's efficiency by improving business relationships, business cooperation and the diffusion and quality of knowledge (Barba-Sánchez *et al.*, 2007, p. 111).

Efficiency is also increased in the areas of product pricing, ordering and assortment. The demand for the different products can be predicted by using technologies that analyze previous sales and other available data. In addition, the Internet can be used to get information about the prices of competitors. ICT also improves the efficiency and quality of store management and layout. Surveillance cameras and image analysis technology, for instance, can be used to prevent theft by detecting suspicious activities and to analyze the in-store movements of customers in order to improve marketing strategies (Notomi *et al.*, 2015, pp. 40–41).

Moreover, Wang *et al.* (2015b, p. 23) argue that ICT significantly enhances the efficiency with regard to transportation. Technologies, such as supplier management systems and vehicle telematics (e.g. vehicle tracking, navigation, etc.), enable collaborative transport arrangements, better scheduling and routing. Besides, the use of ICT in transportation also reduces CO²-emissions by improving efficiency. This is important for retailers, as their operations often involve the transportation of goods over large distances (Wang *et al.*, 2015b, p. 23).

8.2.8. Advantages of E-Commerce

Apart from the already mentioned benefits, e-commerce offers several more advantages and opportunities for retail companies. Jahanshahi *et al.* (2013, p. 856) conducted a study⁹ about the most important benefits of e-commerce from the viewpoint of East Asian SMEs. The findings of their study show that improved company brand and corporate image and reduced marketing, transaction and advertising costs are the major advantages of e-commerce for SMEs. By using the Internet and e-commerce SMEs are able to introduce their brands and products to the market and to generate awareness about their company in a cost-effective way. Other benefits of e-commerce include increased profit, market share, productivity, ROI, accessibility for end users, efficiency in dealing with suppliers, responsiveness from end users, customer loyalty and improved customer service and business process flow. Besides, also customers benefit from e-commerce, as this technology minimizes the effort and time it takes to perform transactions and to search and select services and goods. This leads to enhanced customer satisfaction and loyalty (Jahanshahi *et al.*, 2013, p. 854-862).

In general, e-commerce can help retail companies to improve their competitiveness in the global market. The technology lowers the transaction costs and the costs of information and communication. Thus, the e-commerce technology supports retailers in enhancing the efficiency of their operations and activities (Chan and Al-Hawamdeh, 2002, p. 287).

8.2.9. Summary

In the following, the most important findings of chapter 8.2 are summarized. The table below (table three) provides an overview of the most relevant articles that were used in this chapter (chapter 8.2). It presents information about the authors of the articles, year of publication, journal, VHB (Verband der Hochschullehrer für Betriebswirtschaft) rating of the journal, title of the article and research method and shows the main findings of the articles. In addition, table three is organized according to the subchapters 8.2.2 to 8.2.7, which cover the main advantages and opportunities of ICT in the retail industry. All articles in the table are from journals that have a VHB rating not worse than C.

⁹ To obtain the required data for this study, a questionnaire was sent to 601 SMEs from India, Malaysia and Iran. Limitations of this study involve differences in the electronic infrastructure of the three countries (Jahanshahi *et al.*, 2013, p. 853).

Author / Year	Journal / VHB Rating	Title	Research Method	Findings / Advantages of ICT
8.2.2. Increased Market Reach				
Chan and Al-Hawamdeh / 2002	Business Process Management Journal / C	The Development of E-Commerce in Singapore	Literature Research	<ul style="list-style-type: none"> E-commerce enables SMEs to have a global presence by expanding their networks and by increasing awareness. ICT enhances the competitiveness of small retail companies.
Grewal et al. / 2004	Journal of Business Research / B	Internet Retailing. Enablers, Limiters and Market Consequences	Literature Research	<ul style="list-style-type: none"> E-commerce increases the market reach and sales of retail companies. The success of online retailers is not dependent on their physical location and they can reach more consumers than traditional retailers.
8.2.3. Improved External and Internal Communication				
Andersen / 2001	The Journal of Strategic Information Systems / A	Information Technology, Strategic Decision Making Approaches and Organizational Performance in Different Industrial Settings	Questionnaire	<ul style="list-style-type: none"> ICT enhances the communication capabilities of companies, which, in turn, can improve strategic decision making, coordination of strategic actions and learning from strategic initiatives.
Finnegan and Longaigh / 2002	Journal of Information Technology / A	Examining the Effects of Information Technology on Control and Coordination Relationships	Field Study	<ul style="list-style-type: none"> ICT enables and improves the communication in large international companies, as it provides rapid and reliable information sharing and decreases spatial and time dependence. ICT facilitates joint decision making.

Shachaf / 2008	Information & Management / B	Cultural Diversity and Information and Communication Technology Impacts on Global Virtual Teams	Interviews / Exploratory Study	<ul style="list-style-type: none"> • ICT enhances intercultural communication by mitigating negative effects of cross-cultural miscommunication. • ICT improves team cohesiveness, team identity, common ground and inclusion.
8.2.4. Improved Customer Relationships				
Flavián and Guinalú / 2005	International Journal of Retail & Distribution Management / C	The Influence of Virtual Communities on Distribution Strategies in the Internet	Case Studies	<ul style="list-style-type: none"> • ICT can be used to improve customer relationships, as it improves the knowledge of retailers about customers and their behavior. • E-commerce enables the involvement of retail customers in product development.
Hart et al. / 2000	European Journal of Marketing / C	Retailer Adoption of the Internet. Implications for Retail Marketing	Online Survey / Websites Review	<ul style="list-style-type: none"> • Flexible and innovative e-commerce platforms can create a two-way communication channel between retailers and their customers. • E-commerce and ICT improve customer relationships and promotional, advertising and research activities of retail companies.
8.2.5. Facilitated Access to Information and Knowledge				
Zhu et al. / 2012	Journal of Engineering and Technology Management / C	A Review of RFID Technology and its Managerial Applications in Different Industries	Literature Survey	<ul style="list-style-type: none"> • RFID systems can provide retail companies accurate, reliable and timely information about products by tracking, identifying and tracing information throughout the whole supply chain. • ICT facilitates and enables access to high quality information.

8.2.6. Improved Managerial Decision Making				
Grandon and Pearson / 2004	Information & Management / B	Electronic Commerce Adoption. An Empirical Study of Small and Medium US Businesses	Online Survey	<ul style="list-style-type: none"> ICT enhances the operational and strategic decision making process of retailers by providing high quality information about changes in consumer behavior, market trends, sales data and other valuable information.
Pantano / 2014	International Journal of Information Management / C	Innovation Drivers in Retail Industry	Literature Research	<ul style="list-style-type: none"> ICT allows retailers to forecast trends and to react appropriately and timely. Data management technologies can improve the competitive advantage of retail companies by supporting the development of effective advertising and selling strategies.
8.2.7. Enhanced Efficiency				
Barba-Sánchez et al. / 2007	Problems and Perspectives in Management / C	Drivers, Benefits and Challenges of ICT Adoption by Small and Medium Sized Enterprises (SMEs)	Literature Review	<ul style="list-style-type: none"> ICT improves productivity, increases business growth and decreases costs. ICT increases the efficiency of companies through enhanced business relationships and cooperation and improved diffusion and quality of knowledge.
Prater et al. / 2005	Supply Chain Management: An International Journal / B	Future Impacts of RFID on E-Supply Chains in Grocery Retailing	Literature Research	<ul style="list-style-type: none"> RFID systems can improve the efficiency of retail companies by enhancing inventory management and ordering, reducing overall costs for logistics operations and improving store operations.

Table 3: Opportunities and Advantages of ICT in the Retail Industry - Summary

8.3. Fundamental Challenges and Problems of ICT

8.3.1. Overview

Until now, this Master's Thesis mainly dealt with the advantages and strengths of ICT in the retail industry; however, there are also important challenges and problems with regard to ICT. These will be discussed in this chapter. Such challenges include, for example, privacy concerns, increased transparency in the retail industry and information overload. It is crucial for retail companies to understand the possible problems and challenges of ICT in order to react accordingly and to resolve them efficiently (Jahanshahi *et al.*, 2013, p. 858). In the following, the fundamental problems and challenges of ICT in the retail industry are discussed in more detail. Table four at the end of this chapter summarizes some relevant scientific articles that deal with the problems and challenges of ICT for retail companies. Figure nine below provides an overview of the most important disadvantages and challenges.



Figure 9: Problems and Challenges of ICT in the Retail Industry

Source: Own graphical presentation on the basis of Barlow *et al.* (2004, p. 157), Chaparro-Peláez *et al.* (2016, pp. 1278-1280), Falk and Hagsten (2015, p. 357), Flavián and Guinalú (2005, pp. 412–414), Jetter *et al.* (2009, p. 43), Ramanathan *et al.* (2017, pp. 106-108) and Reinders *et al.* (2008, pp. 118–119)

8.3.2. Privacy, Security and Trust Issues

Privacy, security and trust issues represent important challenges or problems of ICT in the retail industry. These problems are especially relevant for retail companies that operate an online store. A study¹⁰ from Chaparro-Peláez *et al.* (2016, p. 1280) shows that risk is the most significant barrier to online shopping for consumers. Retail customers are worried about the security with regard to the payment and personal information that they have to submit to e-commerce platforms. Thus, the customer's level of trust towards online retailers is of great importance for their success (Chaparro-Peláez *et al.*, 2016, pp. 1278-1280). Walczuch and Lundgren (2004, p. 159) also conclude in their study¹¹ that the success of an online store mainly depends on the customer's trust. They further state that the trust of consumers towards e-commerce platforms is dependent on multiple factors, such as word-of-mouth, reputation, perceived investment, perceived familiarity, perceived control and information from relatives and friends. In general, the image a customer has of an online retailer determines the level of trust. Consequently, gaining the trust of customers is one of the most important challenges that online retailers have to master in order to succeed (Walczuch and Lundgren, 2004, pp. 168–169).

According to the study¹² of Jahanshahi *et al.* (2013, p. 858), which was also mentioned in the previous chapter, the two most important barriers and problems for retail companies with regard to e-commerce adoption are security and privacy issues and high maintenance and running costs (for East Asian SMEs). The use of e-commerce requires a high level of trust, as companies are also worried about sensitive information that is provided online and the level of security (Jahanshahi *et al.*, 2013, p. 858).

Furthermore, privacy and its breach are important issues for customers with regard to ICT that is used in the retail setting. Retail companies are collecting information about customers and their behavior with the help of technologies, such as social media, RFID systems and e-commerce. This information is used by retailers to adjust and individualize offerings and marketing strategies. However, this can also be perceived as a breach of the customer's privacy and this might lead to negative sentiments towards a retailer (Piotrowicz and Cuthbertson, 2014, pp. 11–12).

¹⁰ See chapter 7.3.3 for more information about the study.

¹¹ The required data for this study was collected by using a paper questionnaire that was distributed to 149 US American students (Walczuch and Lundgren, 2004, p. 164).

¹² See chapter 8.2.8 for more information about the study.

8.3.3. Information Overload

Moreover, the end of traditional information production and consumption is one of the most essential challenges for corporations. The operations of companies can produce huge amounts of user- and sensor-generated data, which has to be managed effectively and efficiently in order to extract important information. The collection and analysis of such data is crucial for the competitiveness of companies in the modern economy (Jetter *et al.*, 2009, p. 43).

In the retail industry, technologies and systems, such as loyalty programs, RFID systems, social media, EPOS systems and e-commerce, produce valuable data and information about customers, sales and market trends (see chapter 7.2.6). However, this data needs to be analyzed correctly and efficiently in order to be useful for retailers. The challenge is to transform the available data into valuable information for the management of retail companies. Retail companies that do not have the required skills and data management technologies to analyze available customer, sales and market data are facing a significant competitive disadvantage (Smith, 2008, pp. 118-120).

8.3.4. Increasing Transparency and Competition in the Retail Industry

Two consequences, challenges or problems of ICT in the retail industry that were already discussed in this Master's Thesis are the increasing transparency (see chapter 7.4.4) and competition (see chapter 7.5.2). In short, technological innovations, such as social media and e-commerce, have enabled retail customers to easily acquire information about products and services by using the Internet (Ramanathan *et al.*, 2017, pp. 106-108). Everyone that has access to the Internet can use one of the many price comparison websites and search engines to find the best offer. This substantially increases the comparability and transparency in the retail industry. As a result, the competition between retail companies is growing significantly, as retailers compete for the best price and product (Srinivasan *et al.*, 2002, p. 41).

Moreover, every action, product and service of a retail company is extensively discussed and reviewed in the Internet. Hence, there is little space for mistakes, as retailing becomes more and more transparent for customers. Retail companies cannot afford to ignore this development, as negative reviews and comments in the Internet can have devastating consequences for the image and sales of a retailer (Ramanathan *et al.*, 2017, pp. 106-108).

Besides, for local retailers the competition with online retailers is increasing dramatically (Hirt and Willmott, 2014, p. 4). According to Hirt and Willmott (2014, p.4), ICT (e.g. online marketplaces and e-commerce) has lowered the financial market entry barriers for new competitors (see chapter 7.5.2). In addition, new competitors that sell their products via online marketplaces are able to offer lower prices than traditional retailers. Thus, the price competition

is increased and traditional retailers are forced to lower their prices (Hirt and Willmott, 2014, p. 4).

8.3.5. Lack of ICT Infrastructure

Sufficient ICT infrastructure (e.g. Internet access) is required for retail companies in order to fully exploit the advantages and opportunities of ICT (Falk and Hagsten, 2015, p. 357). This is not a critical problem in developed countries. In Europe, for instance, 80.2 % of the population has access to the Internet (2017). However, there are still 19.8 % that do not use the Internet in Europe. On a global scale this problem is far more visible. Only 51.7 % (3.89 billion people) of the entire population of the world (2017 estimation: 7.52 billion people) has access to the Internet (2017). This means, for example, that online retailers are not able to reach 48.3 % of the world population (Miniwatts Marketing Group, 2017).

Furthermore, there is an important difference between developed and developing countries with regard to the use of ICT in retailing. The poor physical infrastructure, the insufficient electricity supply and the inferior communication connectivity infrastructure in developing countries hinder the extensive use of information and communication technology and its diffusion (Avgerou, 2003, p. 374; Lal, 2007, p. 217).

According to Jahanshahi *et al.* (2013, pp. 851-858), only 7.8 % of India's population, 13.0 % of Iran's population and 55.3 % of the population of Malaysia had access to the Internet in 2010. Of course, these figures are not representative of the retail industry as a whole, but they illustrate the problem or challenge that retail companies in developing countries are facing when they try to adopt technologies, such as e-commerce. Besides, Internet service providers and Internet users in Iran must comply with strict guidelines issued by the government of Iran, otherwise they will be charged with high penalties. For instance, Internet users in Iran are not allowed to visit non-Islamic web sites and have to notify the government about their own web sites. These controls and the high costs that are linked to Internet access prevent the diffusion of the Internet and related technologies in developing countries, such as Iran. Thus, retailers in developing countries are not able to exploit all the advantages that ICT offers (Jahanshahi *et al.*, 2013, p. 851-858).

8.3.6. Costs of ICT Adoption and Network Externalities

Retail companies that want to adopt ICT (e.g. e-commerce, supply chain management systems and RFID systems) can face considerable costs. These costs can be too high for some companies, especially for small retailers, that do not have the required financial resources to digitize their business. Other companies simply do not see the value in investing into ICT. These

challenges act as a barrier for the adoption of ICT and, consequently, the affected retailers cannot benefit from the advantages that ICT offers (Tsai *et al.*, 2010, pp. 259–260).

Moreover, network externalities can be a problem for retailers that want to engage into e-commerce and want to set up a new online store. Although the financial market entry barriers have been reduced by e-commerce (e.g. online marketplaces) (Hirt and Willmott, 2014, p. 4), it is crucial for the success of new online retailers to be aware of network externalities. As already discussed in chapter 7.4.6, retail customers prefer online stores that already have a lot of users, as this substantially increases the trust and awareness towards a retailer (more product reviews, virtual community, etc.). Thus, the e-commerce operations of retail companies may fail, if they struggle to get sufficient online customers (Flavián and Guinalú, 2005, pp. 412–414).

8.3.7. Lack of Training and Knowledge

Another problem of ICT in the retail industry is the retailer's lack of knowledge and training with regard to new technologies. In order to exploit the full potential of ICTs appropriate training and knowledge is required. Inefficiencies can occur in retail companies if employees are insufficiently trained to use new technologies. Employees have to be convinced to use the opportunities that ICT provides. This can be a difficult task for retailers (Smith, 2008, p. 115). Besides, Barba-Sánchez *et al.* (2007, p. 106) argue that especially small enterprises are not taking full advantage of the benefits that ICT offers, because they are not sufficiently aware of them.

Furthermore, there are also barriers for retail customers with regard to the use of ICT. People with low computer literacy are unlikely to exploit the full potential of ICT and to use e-commerce platforms or other new technologies that are used in the retail setting (e.g. self-service technologies and QR codes). Thus, it is difficult for online retailers to reach such people and this reduces the potential sales. The challenge of getting customers used to new technologies will get more and more complex, as retailers are increasingly adopting innovative technologies, such as self-service checkouts and augmented reality (Iglesias-Pradas *et al.*, 2013, pp. 318-320). Reinders *et al.* (2008, p. 108) show in their study¹³ that forcing customers to use self-service technologies results into negative sentiments toward the provider of the service and the self-service technology itself. Customers feel frustrated if they have no choice with regard to the use of the self-service technology and might switch to other providers. Hence, companies need to be careful when adopting such technologies and have to find a way to familiarize customers with new technologies (Reinders *et al.*, 2008, pp. 118–119).

¹³ The data for this study was collected by using a questionnaire. 1150 usable responses from railway customers (Dutch Railways) from the Netherlands were analyzed in total.

8.3.8. Lack of Trial and Social Experience

One major problem of the use of ICT and especially e-commerce in the retail industry is the lack of trial (see chapter 7.3.2) and social experience. Retail customers still want to try, feel, see and touch products before they buy them and this is not possible when buying products via online stores (Barlow *et al.*, 2004, p. 157). This is especially important for high-risk and high-value products, such as cars and jewelry. Other products, such as eyeglasses and clothing, are also difficult to sell online, as retail customers are not able to physically try them. Interactive technologies, such as augmented and virtual reality, can solve this problem to some extent. However, customers will still continue to favor brick and mortar stores when they plan to purchase certain products (Varadarajan *et al.*, 2010, p. 103).

Furthermore, there are many people that enjoy the social experience of shopping and the social interactions with salespeople. People also enjoy the experience of shopping with family and friends (Grewal *et al.*, 2004, pp. 707–708). Online retailing cannot offer this form of social experience and interaction. Thus, these customers prefer the traditional (brick and mortar store) shopping experience and will not frequently shop online (Barlow *et al.*, 2004, pp. 157-158).

8.3.9. Summary

The following table (table four) summarizes the findings of chapter 8.3. It shows an overview of the articles that were mentioned in this chapter. Information about the authors of the articles, year of publication, journal, VHB (Verband der Hochschullehrer für Betriebswirtschaft) rating of the journal, title and research method of the article are presented and the main findings are also listed in table four. Besides, table four is organized according to the subchapters 8.3.2 to 8.3.8. All articles in the table (four) are from journals that have a VHB rating not worse than C.

Author / Year	Journal / VHB Rating	Title	Research Method	Findings / Challenges of ICT
8.3.2. Privacy, Security and Trust Issues				
Chaparro-Peláez et al. / 2016	Journal of Business Research / B	Conjoint Analysis of Drivers and Inhibitors of E-Commerce Adoption	Online Questionnaire	<ul style="list-style-type: none"> • Risk is the most important barrier to online shopping for retail customers. • The security with regard to payment and personal information worries customers.
Piotrowicz and Cuthbertson / 2014	International Journal of Electronic Commerce / B	Information Technology in Retail: Toward Omnichannel Retailing	Focus Group	<ul style="list-style-type: none"> • The extensive collection of customer information by retailers might be regarded as a breach of privacy.
Walczuch and Lundgren / 2004	Information & Management / B	Psychological Antecedents of Institution-Based Consumer Trust in E-Retailing	Questionnaire	<ul style="list-style-type: none"> • The customer's trust is crucial for the success of online retailers. • Reputation, word-of-mouth, perceived investment, familiarity and control and information from relatives and friends determine the level of trust towards an online retailer.
8.3.3. Information Overload				
Jetter et al. / 2009	Business & Information Systems Engineering / B	Technological Innovation and Its Impact on Business Model, Organization and Corporate Culture – IBM's Transformation into a Globally Integrated, Service-Oriented Enterprise	Case Study	<ul style="list-style-type: none"> • One of the most important challenges for companies is the effective and efficient management of the huge amounts of user- and sensor-generated data.

8.3.4. Increasing Transparency and Competition in the Retail Industry				
Ramanathan et al. / 2017	International Journal of Operations & Production Management / B	Role of Social Media in Retail Network Operations and Marketing to Enhance Customer Satisfaction	Survey Questionnaire	<ul style="list-style-type: none"> • Due to technologies, such as social media and e-commerce, the retail industry is becoming more and more transparent for customers. • Negative online reviews of customers can have significant consequences for retailers.
Srinivasan et al. / 2002	Journal of Retailing / A	Customer Loyalty in E-Commerce: an Exploration of its Antecedents and Consequences	Online Survey	<ul style="list-style-type: none"> • The Internet enables customers to easily compare prices of different retailers and this leads to increased (price) competition in the retail industry.
8.3.5. Lack of ICT Infrastructure				
Falk and Hagsten / 2015	International Journal of Production Economics / B	E-Commerce Trends and Impacts Across Europe	Secondary Data Analysis	<ul style="list-style-type: none"> • In order to be able to fully exploit the benefits and opportunities of ICT sufficient ICT infrastructure is required.
8.3.6. Costs of ICT Adoption and Network Externalities				
Tsai et al. / 2010	Information & Management / B	Determinants of RFID Adoption Intention. Evidence from Taiwanese Retail Chains	Focus Group	<ul style="list-style-type: none"> • The financial resources that are required to adopt ICT can be a substantial challenge for retailers that want to digitize their business.

Flavián and Guinalú / 2005	International Journal of Retail & Distribution Management / C	The Influence of Virtual Communities on Distribution Strategies in the Internet	Case Studies	<ul style="list-style-type: none"> • Online stores are subject to network externalities and consequently they may fail if they do not manage to attract enough customers. • The customer's trust increases with the number of users an online store has.
8.3.7. Lack of Training and Knowledge				
Reinders et al. / 2008	Journal of Service Research / A	Consequences of Forcing Consumers to Use Technology-Based Self-Service	Questionnaire	<ul style="list-style-type: none"> • Forcing retail customers to use self-service technologies leads to negative attitudes with regard to the service provider and the technology itself (due to lack of ICT knowledge).
Smith / 2008	Journal of Knowledge Management / C	Modernizing Retail Grocery Business via Knowledge Management-Based Systems	Interviews	<ul style="list-style-type: none"> • Sufficient training and knowledge is required for retail companies to fully exploit the potential of ICTs.
8.3.8. Lack of Trial and Social Experience				
Barlow et al. / 2004	International Journal of Retail & Distribution Management / C	Developments in Information and Communication Technologies for Retail Marketing Channels	Literature Research	<ul style="list-style-type: none"> • Customers still value the social experience of shopping and want to try, feel and touch products (especially high value products and clothing) before they purchase them. • E-commerce does not offer these possibilities.

Table 4: Challenges and Problems of ICT in the Retail Industry - Summary

9. Implications for Managers of Retail Companies

Chapter nine, the last chapter of this Master's Thesis, discusses the implications of developments in ICT for managers of retail companies. In order to successfully manage a retail company, managers have to be aware of the impact of ICT and especially e-commerce on the retail industry. It is crucial to analyse and to be familiar with the influence of ICT on the business environment and on the requirements for competitiveness. Furthermore, managers of retail companies need to know about the advantages and opportunities that ICT offers and also need to pay attention to possible challenges and problems of ICT. This chapter will try to provide valuable information and suggestions for managers of retail companies and examines possible solutions of problems that are associated with the use of ICT.

New technologies are influencing how retail customers choose services and products, select channels and make purchases (Grewal *et al.*, 2017, p. 5). Due to these continuous and rapid developments in the field of ICT, managers have to be flexible and prepared to modify business processes and strategies. It is essential for the competitiveness of retail companies to identify important trends and developments in ICT early and to react and adapt accordingly (Jetter *et al.*, 2009, pp. 43-44). Retailers that fail to keep track of technological innovations and their potential consequences for retailing risk losing customers to competitors that use ICT (especially interactive technologies) to enhance the customer's shopping experience and to satisfy their needs. Thus, it is advisable for the management of a retail company to assign one person or even department with the responsibility to monitor and evaluate new information technologies and their effect on the competitive strategies of retailers and other companies (e.g. service providers and suppliers) (Varadarajan *et al.*, 2010, p. 108).

The consulting company Deloitte (2016, p. 20) states that it is crucial for the long-term success of retail companies to have both a strong digital and physical presence. In order to succeed in the retail industry that is dominated by omnichannel retailers, retail companies also need to invest in new digital capabilities, such as analyzing collected customer data to individualize services and marketing. Managers should aim to increase the overall efficiency of the company's operations when investing into ICT. However, retailers are not able to invest in everything at the same time. Investments should be undertaken according to a chosen strategy. Retail companies should analyse their current capabilities and should detect weaknesses and problems in their organization that need to be resolved. In addition, the role of traditional physical retail stores has changed and retailers have to react to this development. The customer experience in physical stores needs to change. Technology-driven developments, such as self-service technologies and "order online, pick up in store", have the potential to significantly alter the physical shopping

experience. Thus, it is important for managers of retail companies to monitor such developments and to modify their physical stores accordingly (Bain & Company, 2018, p. 4).

Moreover, one major issue that retail managers have to address is the increasing customer centricity in the retail industry. Customers have more power than ever before. They are more connected, savvier, more demanding and more critical. Thus, retailers have to offer a personalized, convenient and seamless shopping experience that satisfies the needs of their customers. Retail managers can respond to this development by using digital innovations to differentiate, personalize the offer, communicate the brand story, lock in loyalty and to improve the customer experience. Furthermore, the operations of retailers have to be digitized and the supply chain has to be re-engineered in order to respond to the developments in the retail industry due to ICT. Retail companies need to use digital technologies to reduce complexity and costs so they can focus on creating value at the front line. Managers have to view digital holistically in order to exploit its full potential. Hence, the ultimate goal should be to increase business efficiency and to reduce costs, while also reimagining retail and offering end-to-end shopping experiences for customers (Ernst & Young, 2016, p. 3).

It is also important for the management of a retail company to dedicate resources to the maintenance and creation of a social media and Internet presence. The Internet and especially social media provide new ways for retailers to communicate with their customers (Deloitte, 2016, p. 17). According to the consulting company Accenture (2018, p. 7), it is crucial for retailers to enable customers to communicate with them via social media channels. Retail companies that do not offer this possibility may lose relevance, market traction and the customer's trust (Accenture, 2018, p. 7). Besides, social media plays a crucial role for the marketing of retail companies. Thus, managers of retail companies cannot afford to ignore the opportunities that social media and the Internet offer. Retailers have to rework their marketing strategies and have to rethink how information is communicated (Deloitte, 2016, p. 17).

Managers of retail companies that operate an e-commerce website also face the essential challenge of gaining customer trust. Online retail customers demand a high level of security with regard to payment and their personal information (Iglesias-Pradas *et al.*, 2013, p. 320). Hence, it is crucial for online retailers to ensure secure and safe transactions on their e-commerce websites (Ernst & Young, 2016, p. 20). Besides, the efforts to improve security have to be communicated to customers. Online stores can also increase the customer's trust by providing easy-to-understand information about their e-commerce service and the guarantees that are given to customers. Consumers often have to experience the process of purchasing something online by themselves in order to build trust (Walczuch and Lundgren, 2004, p. 169). In general,

shoppers have to be made aware of the advantages that e-commerce and other technologies offer (Weijters *et al.*, 2007, p. 17).

Furthermore, Zhang *et al.* (2011, p. 197) argue that online retailers should focus more on customer relationships and on the quality of their e-commerce websites. They found in their study¹⁴ that repurchase intention and relationship quality is positively influenced by website usability. Thus, the management of online retail companies should find ways to improve the user experience. This can be done by, for example, making online purchasing faster and easier, enhancing website navigation functions and providing valuable product information (Zhang *et al.*, 2011, p. 197). Zhang *et al.* (2011, p. 197) also show that expertise with regard to order fulfilment is a significant antecedent of customer relationship quality. Consequently, online retailers can increase customer retention and loyalty by demonstrating their expertise (e.g. publish delivery statistics and professional testimonies). In addition, managers of online retail companies can enhance relationship quality by sustaining and establishing a good company reputation (Zhang *et al.*, 2011, p. 197).

To sum up, it is crucial for managers of retail companies to be aware of technological developments in the retail industry. Managers have to exploit the accompanying opportunities and have to find solutions for the challenges of ICT (Varadarajan *et al.*, 2010, p. 108). Monitoring technological innovations and developments (Jetter *et al.*, 2009, pp. 43-44), using available customer data effectively, investing in new digital capabilities (Bain & Company, 2018, p. 4), responding to the increasing customer power and centrality (Ernst & Young, 2016, p. 3), creating an online (social media) presence (Deloitte, 2016, p. 17) and building customer trust (Iglesias-Pradas *et al.*, 2013, p. 320) are some of the most important issues that need to be addressed by managers. Retailers that ignore the significant changes in the retail industry due to ICT will most likely not survive or succeed in the long run (Varadarajan *et al.*, 2010, p. 108).

¹⁴ The required data for this study was obtained by using a printed questionnaire. 360 usable responses from students and staff members of a university in Northern Ireland were analyzed (Zhang *et al.*, 2011, p. 195).

10. Conclusion

In this chapter, the main findings of this Master's Thesis are presented and the research question is answered. Thus, the most important issues of the different chapters are summarized in the following. In order to examine the importance of ICT in the retail industry a detailed literature review was conducted. In general, the findings show that ICT has become essential for the economic success and survival of retailers in the globalized business environment. Authors of scientific articles from recent journals and consulting companies agree that technology is crucial for the present and future of the retail industry. The reviewed consultant literature mainly deals with the possible applications of ICT in the retail setting and its advantages and opportunities, whereas the scientific articles that were covered in this Master's Thesis also discuss the challenges and problems of ICT and its fundamentals.

New technological developments and innovations lead to substantial changes in the retail industry and its environment and change the structure of the retailers' operations. Consequently, retailers face new challenges and opportunities that need to be managed (Sorescu *et al.*, 2011, p. 3). In this regard, e-commerce is especially important, as this technology has a vast impact on the retail industry (Jahanshahi *et al.*, 2013, p. 849). Other technologies, such as data mining (Bagga and Singh, 2012, p. 19), electronic payment (Sumanjeet, 2009, p. 18), smartphones, mobile apps (Kang *et al.*, 2015, p. 210), electronic point of sale (EPOS) systems (Lynch, 1990, p. 159), radio-frequency identification (RFID) tags (Jones *et al.*, 2005, p. 396), social media (Drury, 2008, p. 274), the Internet of Things (IoT) (Gubbi *et al.*, 2013, p. 1645) and augmented reality (Martínez *et al.*, 2014, p. 27), are also significantly changing the operations, strategies and processes of retail companies.

This Master's Thesis has also dealt with the relationship between ICT and globalization and the impact of the ongoing globalization process on the retail industry (chapters four to six). ICT is indirectly influencing the business environment of retailers through its impact on globalization. There exist important interactions between ICT and globalization. ICT is one of the main drivers of globalization, as it accelerates global developments through technological innovations, such as the Internet (Aggarwal, 1999, p. 84). Technology is also related to and supports other drivers of globalization, such as multinational enterprises (Rugman and Verbeke, 2004, p. 3), multinational trade and production (Garrett, 2000, p. 942), international finance and foreign direct investment (Cho, 2003, p. 99). On the other hand, globalization provides a favorable environment for developments in ICT (increased international interactions and cooperation, technology and telecommunication infrastructure expansion, increased exchange of information) and increases its profitability by helping technology to cross national boundaries (Aggarwal, 1999, p. 85). Moreover, globalization heavily influences the retail environment through global

trends, such as the liberalization of trade policies (Bishop et al., 2011, pp. 120–121), global sourcing (Howlett, 2005, p. 25), urbanization and megacities (Kraas, 2007, pp. 80–81), natural resource scarcity (Curtis, 2009, p. 427) and global climate change (Bu et al., 2016, pp. 577–578). In addition, globalization affects the global business environment by decreasing communication and transportation costs and barriers to trade, which leads to the increasing fragmentation of production processes and the rise of global production networks and supply chains (Aydin and Savrul, 2014, p. 1267).

The main issue of this Master's Thesis, the importance of ICT in the retail industry, was discussed in the chapters seven to nine. These chapters dealt with the impact of ICT on the retail industry, the challenges and opportunities of ICT and the implications for managers of retail companies. The analysis of the literature showed that ICT plays a crucial role for retailers, as it has revolutionized the retail industry. Technological developments and especially the Internet and e-commerce significantly influence the business models of retailers and change the purpose and design of traditional physical retail stores. Online, multichannel and omnichannel retailers are rapidly gaining importance and market share in the retail industry and threaten the traditional retail business model (Notomi *et al.*, 2015, p. 38). Besides, the involvement of customers and customer centricity are two increasingly important elements of the business models of retail companies (Sorescu *et al.*, 2011, pp. 3-11). The supply chain of the retail industry is also significantly affected by technological innovations, such as the RFID technology. ICT is vital for the communication and coordination in (global) supply chains and also increases efficiency (Finnegan and Longaigh, 2002, p. 159). Social media is another technological development that has important consequences for the retail industry. It provides new ways for retailers to communicate with customers, changes the shopping behavior of customers (e.g. product reviews) and enables the collection of valuable customer data. Retail companies can also use social media for individualized marketing activities (Hennig-Thurau *et al.*, 2010, pp. 311-312). Furthermore, the collection and analysis of valuable market, sales and customer data and information, which is enabled by ICT, can significantly support the marketing, decision-making, logistics and supply chain activities of retail companies. Technologies, such as data mining, are able to generate high-quality information that can be used by retailers to gain a competitive advantage over competitors (Bagga and Singh, 2012, pp. 19-22).

The focus of this Master's Thesis with regard to technologies was on e-commerce, as this technology substantially influences the operations of retailers. The findings showed that e-commerce is the most important and successful technological development in the retail industry. Besides, its importance and success will continue to grow in the future (increasing e-commerce sales) (eMarketer, 2017). The popularity and success of e-commerce can be explained by the unique characteristics and opportunities that it offers, such as interactivity (personalization

possibilities), ubiquity, global reach (expansion of the marketplace) and richness (individualization). E-commerce changes the way services and products are sold and also influences the buying behavior of customers all across the globe by enabling shopping at any time and at any place (Laudon and Traver, 2014, pp. 12–17). E-commerce provides significant benefits for retailers, such as the reduction of fixed costs, the extension of the product assortment (Anderson and Swaminathan, 2011, p. 224), enhanced customer convenience and satisfaction (Notomi *et al.*, 2015, pp. 38-39), higher profitability of selling niche products, enhanced overall efficiency, increased reach (Sorescu *et al.*, 2011, p. 10) and improved communication and interaction with customers (Hart *et al.*, 2000, p. 970). Thus, e-commerce can substantially increase the competitiveness of retailers. On the other side, e-commerce also leads to specific challenges and problems for retailers, such as increased (price) transparency (e.g. online price comparison and online reviews) and competition. Moreover, certain products (e.g. high-value and high-risk products and apparel) are difficult to sell via e-commerce websites, because of the lack of trial and social interaction (Grewal *et al.*, 2004, pp. 704-710).

In addition to the impact of different technological innovations on the retail industry, this Master's Thesis also dealt with the consequences of developments in ICT for the general business environment of retailers. These consequences include the dematerialization of consumption (Bourreau and Doğan, 2018, pp. 106–107), increasingly global supply chains (Leidner, 2010, pp. 69–70), increased transparency, empowered customers (Notomi *et al.*, 2015, pp. 38-39), increasing importance of services (Jetter *et al.*, 2009, pp. 38–39) and the growing importance of network externalities (Goldenberg *et al.*, 2010, pp. 4-5). It is crucial for retailers to understand these developments in the environment and to modify their strategies accordingly.

Furthermore, the influence of ICT on the requirements for competitiveness in the retail industry was examined. According to the literature (Deloitte, 2017a, p. 8; Jetter *et al.*, 2009, p. 43; Notomi *et al.*, 2015, p. 39), flexibility with regard to the business structures, strategies and operations of retail companies is required due to the high volatility in the industry that is caused by rapid and continuous developments in ICT. The competitive environment of retailers is heavily influenced by e-commerce, as it enables new competitors to easily enter the market (e.g. online marketplaces) (Deloitte, 2017a, p. 4). As a result of the increasing competition in the retail market, retailers need to exploit the opportunities and advantages (e.g. improved communication, logistics and efficiency) that ICT offers and have to rework their strategies in order to stay competitive (Ernst & Young, 2016, p. 20). Besides, retail companies need to be aware of the increased customer power due to the improved access to information (e.g. product reviews, search engines and price comparison websites) and have to adapt their business models accordingly (Abraham *et al.*, 2017, pp. 1- 3).

This Master's Thesis also summarized the fundamental opportunities and challenges of ICT in the retail industry. The analysis of the literature showed that increased market reach (Grewal *et al.*, 2004, pp. 706–707), improved external and internal communication (Finnegan and Longaigh, 2002, p. 159), improved customer relationships (Flavián and Guinalú, 2005, pp. 417–418), facilitated access to information and knowledge (Pantano, 2014, pp. 348–349), improved managerial decision making (Grandon and Pearson, 2004, p. 197) and enhanced efficiency (Prater *et al.*, 2005, pp. 138-139) are the most important benefits and opportunities that ICT offers. On the other side, privacy, security and trust issues (Chaparro-Peláez *et al.*, 2016, pp. 1278-1280), information overload (Jetter *et al.*, 2009, p. 43), increasing transparency and competition (Ramanathan *et al.*, 2017, pp. 106-108), lack of ICT infrastructure (Jahanshahi *et al.*, 2013, p. 851-858), costs of ICT adoption and network externalities (Flavián and Guinalú, 2005, pp. 412–414), lack of training and knowledge (Smith, 2008, p. 115) and lack of trial and social experience (Varadarajan *et al.*, 2010, p. 103) represent the most important challenges or problems with regard to ICT in the retail industry.

The last chapter provided some suggestions for managers of retail companies. It is crucial for managers to monitor and analyze technological developments and innovations in the retail industry and to stay flexible, as new technologies can have disruptive consequences for retailing (Varadarajan *et al.*, 2010, p. 108). Furthermore, it is important for the management to ensure a strong digital (e.g. social media and e-commerce) and physical presence and to invest in new digital capabilities in order to exploit the opportunities of ICT (Bain & Company, 2018, p. 4). Managers also need to react to the increasing customer centricity (Ernst & Young, 2016, p. 3) and have to find ways to increase the customer trust with regard to online transactions (Ernst & Young, 2016, p. 20).

To conclude, ICTs, such as e-commerce, social media, RFID systems and data mining, have revolutionized the retail industry. The business models, supply chains, logistics and marketing strategies of retailers and other fundamental elements of retailing have changed substantially due to developments in ICT. Thus, the volatility, complexity, transparency and competition in the retail industry are increasing. Retailers face important opportunities with regard to ICT and also have to deal with its challenges. The success and survival of retail companies significantly depends on their ability to detect, understand and exploit innovative technologies that can have an essential impact on retailing. Besides, the results of this thesis show that e-commerce is the most disruptive and important technological development in the retail industry and that it is crucial for the competitiveness of retailers.

This Master's Thesis discussed the importance of ICT in the retail industry and the fundamental opportunities and challenges of ICT for retail companies. Besides, the influence of ICT on the business environment of retailers and on the requirements for competitiveness in the retail industry was examined. It was shown how ICT influences the retail industry and how important ICT, especially e-commerce, is for the success and survival of retailers. Hence, the research question was answered and the overall objectives of the thesis were achieved. However, further research needs to be done on how retailers can solve the problems and challenges that are linked to ICT, as this issue is hardly covered in the current literature.

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