Customer data utilization in grocery retail

Asiakasdatan hyödyntäminen päivittäistavarakaupassa

Bachelor's thesis

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ABSTRACT

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Competition in the field of grocery retail is fierce and profit margins are small. The volume of data growing each year and the technological advancements in data collection have enabled a much broader utilization of customer data in grocery retail. The objective of this thesis is to study the opportunities, challenges and methods of utilizing customer data in grocery retail.

The thesis begins with examining literature of grocery retail and data analytics. The study continues with exploring the ways grocery retailers can personalize a customer's shopping experience and improve retail operations with customer data. After these, three companies' methods of customer data collection and utilization in grocery retail are studied.

One of the main findings of the thesis was that loyalty programs are still the most significant source of customer data, even though customer data is increasingly being collected from a greater variety of sources. Customer data's biggest benefits were in improving a customer's shopping experience and the efficiency of a store's operations. Creating maximal value from customer data requires considerable investments, but when implemented correctly, it can provide a source of competitive advantage.

TIIVISTELMÄ

Päivittäistavarakaupan alalla kilpailu on kovaa ja voittomarginaalit pieniä. Datan määrän voimakas kasvu sekä teknologinen kehitys ovat mahdollistaneet asiakasdatan aiempaa laajemman hyödyntämisen liiketoiminnassa. Tämän kandidaatintyön tavoitteena on tutkia asiakasdatan tuomia mahdollisuuksia ja haasteita sekä tapoja hyödyntää asiakasdataa päivittäistavarakaupassa.

Työssä tarkastellaan aluksi päivittäistavarakauppoja sekä data-analytiikkaa käsittelevää kirjallisuutta. Näiden jälkeen syvennytään asiakkaiden ostokokemuksen personalisoimiseen sekä liiketoiminnan kehittämiseen päivittäistavarakaupassa asiakasdatan avulla. Lopuksi esitellään kolmen eri yrityksen keinoja kerätä ja hyödyntää asiakasdataa päivittäistavarakaupassa.

Työssä havaittiin, että kanta-asiakasohjelmat toimivat yhä tärkeimpänä asiakasdatan lähteenä, vaikka asiakasdataa kerätäänkin yhä monipuolisemmin eri lähteistä. Asiakasdata pystyy erityisesti parantamaan asiakkaiden ostokokemusta sekä kaupan toimintojen tehokkuutta. Arvon luominen asiakasdatasta vaatii merkittäviä panostuksia, mutta oikein toteutettuna se voi toimia yritykselle kilpailuetuna.

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1 INTRODUCTION

The amount of data keeps increasing each year and for instance Walmart, the world's largest retailer and the most popular store for groceries in the United States, processes 2.5 petabytes of data every hour (Carolan 2018; Marr 2017, 65). At the same time technological advancements are changing the retailing landscape in a way that can benefit both retailers and consumers (Grewal et al. 2017). This changing landscape consists of customers shopping in multiple channels, such as traditional brick-and-mortar stores and online grocery stores. Additionally, technological advancements such as Internet of Things (IoT) and artificial intelligence (AI) are providing new ways of tracking customers and utilizing data for grocery retailers. (Grewal et al. 2018).

Grocery retailers want to be able to understand and satisfy their customers better than competitors (Anderson et al. 2007). This has been one of the driving forces behind retailers seeking to profit from the vast amounts of customer data they collect, such as customers' purchases and behavior while shopping. Their goal is to use customer data in a way to improve decision making in the operational functions of a store and provide additional value to a shopper. (Griva et al. 2018).

According to McKinsey (2020) online grocery shopping saw a surge in customers in 2020 due to the Covid-19 pandemic, and research suggests that online grocery shopping will continue to grow in the future. Grocery shoppers' attitudes towards online grocery shopping are changing and retailers are increasing investments to make the shopping experience as smooth as possible for the customer, and profitable for the retailer (Khandpur 2020). Therefore, it was considered relevant for this thesis to take a deeper look into the utilization of customer data not only in brick-and-mortar stores, but also in online grocery shopping.

1.1 Research questions and objectives

This thesis studies the usage of customer data in grocery retail and how it can bring business value to a company operating in the industry. The objective is to understand what kind of data

is collected from a customer while shopping for groceries at the local grocery store and how the companies use this data to attract as many customers as possible, maximize sales and minimize costs. Grocery retailing is inherently close to the customer; hence this thesis will be customer centric. The main research question of this bachelor's thesis is:

- How can customer data provide a source of competitive advantage in grocery retail?

The main research question can be divided into three sub-research questions:

- What kind of customer data do grocery retailers utilize and how do they collect it?

- What are the opportunities and challenges of using customer data to provide personalized services in grocery retailing?

- What are the opportunities and challenges of using customer data for business development in grocery retailing?

These questions form the basis for the thesis, and they will be answered in detail in the conclusions part of the thesis.

1.2 Research methods, limitations and structure

This bachelor's thesis will be conducted as a literature review and the sources include literature and scientific studies related to the subject. The study will also include practical examples of grocery retailers utilizing customer data for various benefits.

Table 1 displays some of the keywords used in finding research material. The table additionally displays the words used in limiting the search to a specific area of focus. For example, searching "Customer data" in the Scopus database yields 82976 results and as such the search needs to be limited.

Table 1: Main keywords and words used in limiting the search.

Keywords	Search limiters
• Customer data	• Grocery retail
• Big Data	• Online grocery retail
• Customer analytics	• Retail
• Customer Relationship Management	• Supermarket
• Customer tracking	• Grocery store
• Personalization	• E-grocery
• Customer behavior	• Food retail

The subject of the thesis has been limited to focus only on data that is related to customers and grocery retail. Hence, the thesis will not be telling about all the possibilities of data in grocery retail, nor will the customer data applications necessarily be applicable on other retail industries. The purpose of this study is not to focus on data applications in a grocery store's supply chain, warehouse management or in general any functions of a grocery store where the customer is not involved.

The thesis consists of six chapters with introduction being the first one. Chapter two begins with the definition of grocery retail and takes a look at the industry today with an emphasis on customer experience. Chapter three begins with the definition of data and Big Data, along with data analytics. This is followed by the definition of customer data and the benefits and challenges its utilization has. Chapter four combines these two previous theory chapters and looks at customer data in grocery retailing, with a focus on personalization and business development. Chapter five looks at three case companies operating in the grocery retail industry and their utilization of customer data. The final chapter of the thesis contains answers to the research questions based on the findings of the thesis.

2 GROCERY RETAIL

This chapter provides basic information about the grocery retail sector, but also the necessary information concerning the customer interface of a grocery store both online and offline. The first part of the chapter focuses on providing basic information about grocery retailing in the modern world, after which the focus shifts to a more customer-centric view.

2.1 Grocery retailing overview

Throughout history, grocery retailing was dominated by small-scale corner stores that had little bargaining power with their wholesalers or other vendors. In the 1900s they started forming chains which brought along standardized aisles and product offering, and eventually private labels and store brands. (Stanton 2018)

Steeneken and Ackley (2012) define the business model for retailing as purchasing products, warehousing them, distributing them to stores, and then finally selling them to customers. The retailer does not produce its own products but provides a service where it sells the products of others and makes a profit out of that sale (Steeneken & Ackley 2012).

A grocery store is a type of retailer that specializes in selling consumer goods such as food, beverages, and hygiene products. Groceries consist of around 80 percent of the sales in grocery stores. The products a grocery store sells are based on customer needs and expectations. Often a store's product catalog is a mix of the chain's basic range of products and the store's own product range. Stores also sport their own product brands, which are called private labels. (PTY 2020). Private labels aim at increasing consumer loyalty and differentiation from competing stores as well as increasing category profitability (Pepe et al. 2011).

In Finland the grocery retailing industry is very concentrated on two large retailers: Kesko and S-Group. These two retailers have a combined market share of over 80 percent. This is quite uncommon in Europe and results in less competition in the industry and fewer choices for the average consumer in Finland. (Raijas & Järvelä 2015).

Online grocery retailing has been a niche market compared to traditional brick-and-mortar grocery retailing. One of the main reasons for this has been the fact that shoppers do not want to pay shipping charges. Another reason has been that customers want to be able to touch and view the products at the store. On the other hand, the most popular reasons for buying groceries online have been free at-home delivery, cheaper prices compared to brick-and-mortar and free in-store pickup. (Deloitte 2013). Customers have traditionally been willing to shop online, but only when it does not cost them anything extra compared to visiting the grocery store themselves.

The COVID-19 pandemic increased the digitalization of our society and grocery retail was not an exception. Kesko (2020a) states that the amount of traffic for online grocery stores exploded during the pandemic. For Kesko, this meant that monthly online sales during the spring of 2020 were over 800 % larger than the previous year. This was not a temporary spike as during the summer months Kesko's online sales were up 500 % compared to the year before. Other than the increased safety from the virus, customers also have other reasons to choose the online service over brick-and-mortar. One of the main reasons is that it saves the customer time and makes their everyday life easier as someone else collects the products, packs them and, if desired, handles the delivery of the products. (Kesko 2020a).

2.2 Customer interface in traditional grocery retail

For decades, grocery stores have been carefully designed to nudge customers. Background music, lighting, smells, and product placement are all examples of this (Carolan 2018). Businesses in the grocery retail industry continuously try to find ways to attract more customers and keep the current customers satisfied. In this section factors affecting customer experience in a grocery store will be explored.

Nilsson et al. (2015) conduct that there are various factors involved in a customer's choice of a grocery store and it is important for grocery retailers to understand what attracts a customer to a particular grocery store. They surveyed Swedish customers on grocery store attributes, and based on the survey a list of ten factors was created and ranked in terms of importance:

1. **Accessibility by car**: Easiness of reaching the location by car in addition to parking space and cost.
2. **Store condition:** Cleanliness, good lighting, space between the shelves and easiness of finding products.
3. **Store availability:** Opening hours, distance to home and closeness to work route.
4. **Supply range:** The scope of the product range.
5. **Supply quality:** Quality of the products as well as exotic and organic product availability.
6. **Price level:** Low product cost, coupons and loyalty card usage.
7. **Service quality:** The level of service and speed of check-out.
8. **Accessibility by other modes of transport:** Easiness of reaching the store by public transport, bike or foot.
9. **Closeness to other facilities:** Proximity of other types of stores.
10. **Child-friendliness:** A playroom for kids in the store.

The store's accessibility plays a bigger role overall in customer's choices than the store's attractiveness. It is important to note here that these results heavily depend on what the customers value in the surveyed country. If the product quality is great in all the stores, then that is not a differentiating factor for the business. (Nilsson et al. 2015). In markets where car transport is a prerequisite, the store's attractiveness attributes, such as cleanliness, product range and quality as well as price competitiveness, are more important than accessibility (Carpenter & Moore 2006). It is important to note however that the ranking of attributes in the Nilsson et al. (2015) study is based on averages of multiple sub attributes. Therefore, single sub attributes can be considerably more important for customers than the overall attribute would suggest.

Ellickson and Misra (2008) add that a grocery store's competitiveness is based on various dynamic factors, and customers are enticed by an appealing range of products, fair pricing, convenient locations, and a slew of other programs, features, and promotional efforts throughout the entire retail and marketing mix. Store location is one of the most important decisions a retailer makes, not just because it is a long-term choice, but since accessibility is one of the most crucial factors of a customer's choice in choosing a store (Nilsson et al. 2015).

This is because the most essential element in store selection is convenience, and stores that are closer to the customer are more convenient.

2.3 Customer interface in online grocery retail

In comparison to other shopping practices, grocery shopping is generally regarded as practical, goal-oriented, and a chore in literature (Aylott & Mitchell 1998). Despite this, online grocery shopping has not seen as big of an adoption rate as general e-commerce (Klepek & Bauerova 2020). In this part of the chapter, the emphasis is on a customer's online grocery shopping experience.

Grocery retailers are gradually recognizing the value of online stores in retaining loyal customers, and most major supermarket chains already have an online store in addition to their brick-and-mortar stores. Grocery retailers with an online service aim to improve their value proposition and gain a strategic edge over single-channel retailers by providing an alternative distribution channel that complements offline stores and provides unique benefits such as greater accessibility, more convenience, and time savings. (Campo & Breugelmans 2015). Melis et al. (2015) add that grocery retailers hope to enhance customer satisfaction and loyalty, attract, and increase spending by current customers, and boost the chain's overall success and competitive position by promoting their online platforms as an alternative shopping venue for consumers.

According to Khandpur et al. (2020) a customer's path to purchase can be divided into four parts: Pre-Shop, Online Shopping, Pick-up/Delivery, and Post-Shop. First, the customer chooses an online grocery retailer. The next step consists of the customer searching for or discovering products that he/she would like to purchase and then ordering the selected items. (Khandpur et al. 2020). The two main ways of online grocery delivery are pick-up and home delivery (Pan et al. 2017). After that comes the final stage, which in an online grocer's case can be the customer preparing and consuming the ordered foods. All of these affect the customer's online grocery shopping experience and the likelihood of using the online grocer's services again. (Khandpur et al. 2020).

Singh and Söderlund (2020) argue that a customer's experience with shopping groceries online is a dynamic subject which consists of factors such as customer service, and experience with the website, in addition to products and delivery, along with brand experience, since subjective and behavioral reactions to supermarket brands are also essential to the overall grocery shopping experience.

Figure 1: Online grocery shopping experience framework (adapted: Singh & Söderlund 2020).

In Figure 1, the online customer experience consists of 5 different factors. Singh and Söderlund (2020) state that these factors affect customer satisfaction, which can lead to customer loyalty and word-of-mouth marketing for the online grocery retailer.

Customer service. Online grocery shoppers expect attentive and supportive customer service, as well as the ability to speak with someone who can provide reliable details when needed, just as they would in a physical store. Another important part of the customer experience is service reliability. Customers want reliability after shopping for groceries: they want to obtain the items shown on the website on time and in the condition they predicted. (Wolfinbarger & Gilly 2003).

Website experience. Customers rely on the shop's website for information, and they use that information to make purchasing decisions. Customers prefer websites that are simple to navigate and find items on and have a decent product display. Since customers are accustomed to visually inspecting the products they purchase for nutritional values, expiration dates, and ingredients, among other things, it is crucial for label information and accurate product photographs to be easily available. Website features like speed, ease of use, and visuals have a major positive impact on the overall customer experience. (Tanskanen et al. 2002).

Product experience. In terms of freshness, product assortment, and the choice to select fair substitutions in out-of-stock circumstances, online grocery consumers want the same product experience as they get offline. Since consumers are unable to choose their own items, they are also concerned with the products that retailers sell, and as a result, the experience of the grocery product purchased influences the overall grocery shopping experience. (Colla & Lapoule 2012).

Delivery experience. Grocery shoppers who shop online want to save time and effort. The ability to shop for groceries from the comfort of your own home and get items shipped are two of the most compelling reasons to purchase groceries online. Consumers want a positive product delivery experience, which includes receiving the product as expected, not having to pay extra for delivery, and receiving undamaged goods. (Ramus & Nielsen 2005).

Brand experience. Customers' (positive or negative) emotional reactions are directed toward the retailer during and after the customer encounter. In online grocery retailing, the brand experience is the outcome of consumers' reactions to brand-related stimuli such as customer service, product, and website. (Singh & Söderlund 2020).

3 DATA ANALYTICS

This chapter will cover important topics that are a prerequisite to the utilization of data in grocery retail. The essential topics include data, Big Data, data analytics, and customer data, which will be explored profoundly.

3.1 Data and Big Data

Technological advancements have given companies the ability to collect, store and process massive amounts of data (Dogan & Öztaysi 2018). Without data, retailers would be left guessing what is going on. Just collecting a bunch of data is not enough as it needs to have a business value attached to it. (Marr 2017, 87).

According to Sherman (2015) data and information are often confused as meaning the same thing, but the difference is substantial. Data is a simple and isolated fact that turns into information when it is structured and given a meaning. Knowledge on the other hand is information that is put into context. (Tuomi 1999). Essentially, data is raw, unstructured, and unorganized. Meanwhile information is data that has been processed, structured, and organized. Information gives the ability to gain knowledge which helps in making better decisions. (Sherman 2015, 8-10).

Data has multiple types it can be categorized in, which include structured, semi-structured, and unstructured. (Russom 2011). Data that is in a fixed field within a file or record, often in a table or database, is considered structured. It is often managed and queried with SQL (Structured Query Language) that is specifically designed to handle structured data. Examples of structured data include sales data, customer data and website visitor amounts. (Marr 2017, 88). Unstructured data however is not easily analyzable, and it can include data such as text, images, audio and video. It is estimated that unstructured data constitutes around 95 % of Big Data. (Gandomi & Haider 2015).

Between structured and unstructured data lies semi-structured data, which based on its structure is analyzable, but is not in a fixed format in a database or spreadsheet like structured data (Marr

2017, 89). Gandomi and Haider (2015) add that an example of semi-structured data can be Extensible Markup Language (XML), which is in a textual and readable format and is used to transfer data on the internet in the form of data tags.

Nearly everything we do today leaves behind a digital trail. Whether it is purchasing something with a credit card, searching the internet, sending a message to somebody, or just carrying a mobile phone while shopping, you can be sure data is being created. Specifically Big Data is a term used to describe the collection of all this data and the ability to use it for value creation in many areas, such as business. (Marr 2017, 1-2).

Big Data is not just big amounts of data, but it has certain characteristics which are called the Three V's of Big Data. These three V's are: volume, velocity and variety. Volume is considered the primary attribute of Big Data and it is often quantified as including records, transactions, tables or files. Velocity is all about the speed of data generation and it often happens in real time. Variety on the other hand describes how data is coming from a vast number of sources and how it can be categorized based on its structure. (Russom 2011).

Table 2. The 5 V's of Big Data. (adapted: Heremans 2018; Dekimpe 2020).

Volume	Variety	Velocity	Veracity	Value
Data at rest	**Data in many forms**	**Data in motion**	**Data in doubt**	**Data into money**
Terabytes to exabytes of existing data to process	Structured, unstructured, semi-structured	Streaming data, requiring milliseconds to seconds to respond	Uncertainty due to data inconsistency & incompleteness, ambiguities, model approximations	Business models can be associated to the data

As can be seen from Table 2, the V's of Big Data are not necessarily limited to just three as there is no universal agreement on the exact number. Dekimpe (2020) includes two more to the mix: veracity and value. Here veracity means the data's messiness and reliability, which contrasts to the time before Big Data, when most of the analyzable data was clean and

structured. Value is important because working with data that doesn't lead to any value is a waste of time for a business. (Dekimpe 2020).

Data analytics was popularized as a term in the early 2000s and it is defined as using computers to help analyze large sets of data for decision-making (Runkler 2016, 2). It is used to help answer certain questions, explore new insights, and support companies in making better, more data-driven decisions (Qlik 2021).
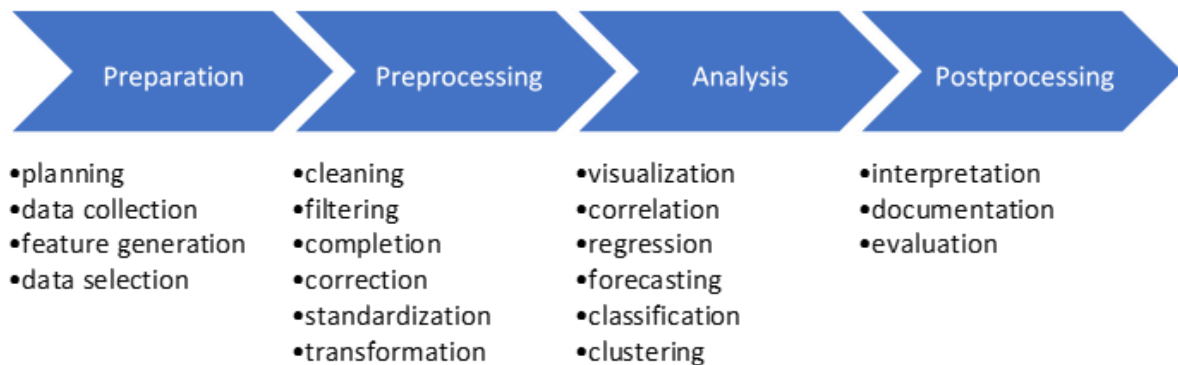

Figure 2. Phases of data analysis. (adapted: Runkler 2016, 3).

As can be seen from Figure 2, the process for data analytics consists of several phases: preparation, preprocessing, analysis, and postprocessing. The first phase includes data collection and selection. The second phase is about cleaning and filtering the data, after which the data can be visualized and analyzed. Finally, the data analysis outcomes are interpreted and assessed. (Runkler 2016, 2).

3.2 Customer data

García-Murillo and Annabi (2002) state that customer data is defined as data about the customer that is generated and produced in a relationship between the customer and the firm, and that the company can often utilize this data in some way in its business. Rollins and Halinen (2005) add that customer data are facts about the customer in IT systems and the data comes in many forms:

transactions, demographics, psychographics, customer contact data, preferences, customer behavior data, interaction data, customer service data, customer feedback, and reactions to marketing campaigns as well as data about potential customers and customer segments.

Customer data can be segmented various ways, depending on how broadly one chooses to do it. Griva et al. (2018) segment customer data into six different types of data:

1. **Demographic data**, such as gender, age, marital status.
2. **Geographic data**, such as place of work or home address.
3. **Psychographic data**, such as values, attitudes, interests and personality traits.
4. **Attitudinal data** reflects a customer attitude and preferences towards products and services offered. Surveys are often used to gather attitudinal data.
5. **Sales data**, such as sales volume, visit frequency, monetary value, time of purchase.
6. **Behavioral data**, such as how the customer moves around a store or website.

Customer data can be combined to build customer profiles (Figure 3). For companies who wish to develop and successfully maintain their relationships with their valued clients, building profiles for individual customers is vital. Customer profiles that are well-crafted offer crucial knowledge to companies, such as what kind of people the most profitable customers are and how the customer behaves. (Apeh et al. 2013)

Figure 3. Customer profile framework (adapted: Griva et al. 2018)

There are multiple ways of utilizing customer data in a business environment: either directly or indirectly. Direct value is generated when the data is sold, traded, or acquired. Indirect value on the other hand is generated when the data is used to improve a service or product or make a new one. (Short & Todd 2017).

Companies can develop their services and products through the understanding gained from customer data. With the help of customer data, the organization thus gets a better picture of the customer's real needs and expectations. Through increased understanding, the company can produce better products and services, which generally leads to higher customer satisfaction and customer retention. (García-Murillo & Annabi 2002.)

Utilizing customer data requires compliance with global privacy laws. In the European Union since May of 2018, General Data Protection Regulation (GDPR) has regulated personal data

collection and processing. GDPR considers personal data to be any piece of information, no matter how insignificant, that can be used to identify an individual when combined with other pieces of information. (Europa 2018).

Mass acquisition of personal information puts customers at risk. Businesses are constantly using customer data for new purposes, such as reaching out to customers in innovative and unpredictable ways; as a result, customer vulnerability is growing. This is due to the possibility of data leaks, identity theft and improper use of personal data. As a result, customers are demanding more privacy as companies become more dependent on the monetization of customer data. In other words, the gap between companies' perspective and customers' is increasing as businesses continue to collect and monetize more customer data, while customers want to minimize shared data. (Palmatier & Martin 2019).

4 CUSTOMER DATA UTILIZATION IN GROCERY RETAIL

The grocery retailing industry traditionally operates with low profit margins, hence it is crucial for them to focus on growing sales and profits compared to their business rivals (Gauri 2013). To succeed in retailing, efficient business operations are required but innovation as well can provide the grocery retailer a competitive advantage (Caro & Sadr 2019). In this chapter customer data collection methods and utilization in grocery retailing are investigated with a customer-centric view.

4.1 Customer data's importance and its ability to affect the grocery shopping experience

The grocery retailing sector is very competitive and in recent times hard discounters such as Aldi and Lidl have managed to capture market share from traditional grocery retailers in Europe (Statista 2019; Gijsbrechts et al. 2018). This is one of the reasons why grocery retailers focus more and more on customer data analytics and customer development to gain a competitive edge on competitors (Sturley et al. 2017). Indeed, the retailers in the sector have moved beyond just collecting data from loyalty programs and into making use of the Big Data in retail, the massive amounts of shopper data from various sources, to become increasingly customer centric as well as to better recognize and meet the needs of customers. (Nikolova et al. 2014).

Companies cannot just blindly collect data and expect value to follow. Customer data has to be translated into an asset about current or potential customers (Davenport et al. 2001). Grocery retailers that can extract useful information from Big Data can make more accurate forecasts about consumer preferences, create more compelling offerings, better target their customers, and build tools that make customers buy their products. As a result, a data-driven attitude can be very advantageous as it can initiate valuable customer consumption and interaction that contribute to increased profitability. (Grewal et al. 2017).

One of the ways grocery retailers use customer data as a source of competitive advantage is in personalizing the shopping experience. According to Aloysius et al. (2016) retailers can utilize

real-time information about the customer and offer customers personalized product recommendations and pricing. Though, as previously mentioned in chapter two, grocery retailers have multiple factors to consider when the goal is to improve a customer's grocery shopping experience. Carolan (2018) argues that a data-driven approach can be much more interactive and with data feeds that are real-time, personalization can be enhanced. Carolan (2018) adds that combining data feeds from multiple sources can prove particularly useful. These can be categorized into three different categories, which can be seen in Table 3 below.

Table 3: Customer data sources used for personalization (Goswami 2020; Carolan 2018).

Data sources	Explanation
First-party data	Data that is collected directly from customers. In grocery retail the most common method is through loyalty card use.
Second-party data	First-party data from external sources. Grocery retailers can have data sharing agreements with other businesses for mutual benefit.
Third-party data	Aggregated data from external sources. For instance, data brokers may sell customer data to grocery retailers.

The most prevalent way of tracking customers and collecting first-party data is via loyalty cards, which shoppers use in exchange for discounts and promotional offers from grocery retailers (Bradlow et al. 2017). Loyalty programs have been going on for decades, but recently grocery retailers have started to see the value of the loyalty program in collecting valuable information and new knowledge about customers and operations, which, if used properly, can lead to the retailer gaining a competitive advantage (Nikolova et al. 2014). One application of this is retailers linking purchase data with personal data to customize targeted marketing activities (Reutterer et al. 2016).

Kirkpatrick (2020) mentions that tracking customers with cameras might feel intrusive, and therefore retailers have adopted other methods. One approach to customer targeting in real-time

is with IoT devices, and one that has seen much use is a beacon, which is a small device that emits a Bluetooth signal to a shopper's mobile phone. It can be used to send customers notifications about location relevant promotions based on their purchase history data as they approach a section of a store. (Carolan 2018; Grewal et al. 2017). This has become much easier due to most customers carrying a mobile phone which allows for a more interactive shopping experience (Aloysius et al. 2016).

Bradlow et al. (2017) add that retailers can combine customer data from multiple sources, such as customer purchase data from a customer relationship management (CRM) system, personal data from a loyalty card, attitudinal data gathered via surveys, and in-store visit data that is tracked via radio frequency identification (RFID) or IoT devices. All of these increase the volume of data a grocery retailer has on the customer and when these are linked together, customer data becomes very valuable and nuanced for personalization (Bradlow et al. 2017). For instance, the IoT data from beacons can be linked with a customer's transaction data that is collected as they pay with debit, credit or customer loyalty cards (Spanke 2020).

Both customers and grocery retailers can benefit from user-specific personalizing technologies. The problem is that personalizing customer information may not increase but decrease customer engagement with the store as customers realize how much data and information grocery retailers have about them and become concerned for their privacy. As a result, retailers must be vigilant to use customer data in a manner that keeps this personalization-privacy paradox in balance. (Aguirre et al. 2015).

It is important to separate customers into separate groups based on whether they make a purchase during their visit or not. Since giving a discount coupon to a customer that would make a purchase anyway lowers sales margins, it should be avoided. (Koehn et al. 2020). Another challenge with coupons is that for them to be the most effective as possible, they should provide a better discount, be a positive surprise to the customer, and be customized individually to the customer's preferences (Venkatesan & Farris 2012).

4.2 Customer data utilization in grocery retailing development

Customer data is often used to target customers with one-to-one marketing, but it has other essential uses for grocery retailers as well. Leonard (2014) states that customer data can be used to improve business processes and practices, such as business monitoring and insights as well as business optimization. These store development activities will be further explored in this section.

Grewal et al. (2018) state that through collecting massive amounts of customer data, grocery retailers can combine different data sets and discover new insights regarding their business. Big Data that is collected from customers can be used in enhancing localization in a grocery store, and in adding value to a store's operations. Some of these elements of localization for grocery retailers include floor space, adjacencies, store design, assortment, price and promotion. (Goad et al. 2018).

Normally a grocery store plans its floor space based on historical sales data and sales estimates. However, with data collected from customers' transactions, floor space allocation can be enhanced as the store can find previously hidden connections between customers' purchases and increase sales through data analysis. Adjacency, which is the distance between two products in a store, can also be improved. For instance, data analysis can reveal whether ice cream sells better when it's next to frozen pizza or frozen vegetables. The overall look and feel of a grocery store, along with service development, can be improved with the use of attitudinal customer data from surveys. (Goad et al. 2018).

Aktas and Meng (2017) mention that customer preferences largely affect assortment and pricing decisions by the retailer. Customer data can help in segmenting customers to small groups and help in assortment optimization decisions, but also in dynamic pricing if digital price tags are available. This customer data can be not only transactional data, but also lifestyle data. (Aktas & Meng 2017). Assortment and layout decisions can additionally be improved by observing

behavioral customer data, such as a customer's reaction to a preferred product being unavailable. Assortment optimization through the utilization of customers' transactional data can be achieved by analyzing how much impact a product in the assortment has on sales and profit margins versus some other item. (Goad et al. 2018). Aktas and Meng (2017) add that transactional data is the most important source for assortment optimization.

Zuo et al. (2016) added RFID tags to shopping carts, which emitted a signal each second that would be received by an RFID receptor on the shop shelves. This data about customers' in-store movement data was combined with customers' purchase data to analyze consumer purchasing behavior. Analysis on customer stay time at a specific location, for example at the snacks shelf, was able to reveal valuable information about in-store behavior and purchasing behavior of specific products for the retailer. This data could also be used to forecast purchasing behavior. (Zuo et al. 2016). Combining several types of data can indeed prove beneficial for grocery retailers. Customer loyalty data, demographic data and geographic information can also be merged to create improved demand models that help handle inventory and labor costs more efficiently. (Grewal et al. 2018).

Customer activities in the store can be reliably monitored with cameras, RFIDs, or other IoT devices, and then used by software analytics. This makes it easier for the retailer to understand customer behavior and improve the store's services. Knowledge acquired this way can be used to optimize the store layout, track customer shopping routes, or place products better, among other things. (Caro & Sadr 2019; Spanke 2020).

Shoplifting is also a major problem grocery retailers face. By tracking customers and using that behavioral data to identify potential shoplifters, grocery retailers can reduce shrinkage and increase profitability. This can be done by combining camera surveillance with machine learning to automatically spot known shoplifters, along with shoppers whose body-language behavior indicates that they are planning to potentially steal something. (Kirkpatrick 2020).

It is important to note however that these technologies and customer data utilization do not only contain benefits but come with challenges as well. What works for one grocery retailer might not work for another. Many success stories include large retailers such as Walmart and Tesco, which might give a false sense of urgency and effectiveness for smaller companies. Rushing the decision on data-driven initiatives can result in suboptimal results and should therefore be thought thoroughly. (Dekimpe 2020).

4.3 Customer data in online grocery shopping

Online grocery shopping differs from offline grocery shopping in various ways both for the retailer and the customer, and as such in this part of the chapter we will examine the ways of utilizing customer data in online grocery shopping. The focus is on two of the four path to purchase stages of online grocery shopping Khandpur et al. (2020) mentioned previously, the shopping and delivery stages.

Most online grocery shoppers use both brick-and-mortar and online grocery stores, and they can be referred as multichannel shoppers (Campo et al. 2020). Today's grocery retailers have an immense volume of customer data not only offline, but online as well. Therefore, the ability to link offline and online purchases for a much more comprehensive customer profile has become crucial, and a common way of linking customer transactions is with loyalty programs. (Bradlow et al. 2017).

According to Yuan et al. (2016), customers buy vastly more products on one trip to a grocery website than other e-commerce websites, but also, customers buy groceries much more recurringly compared to other forms of retail. Consequently, using customer data to recommend products differs from other retail websites. Without modifying a recommender system to specifically groceries, a customer could be recommended always the same items. (Yuan et al. 2016). For instance, due to a large portion of customers buying milk, online grocery shoppers could be always recommended milk based on customer data (Mackenzie 2018).

A customer visiting a website leaves a so-called digital footprint, which the retailer can use to collect the shopper's data regarding their interests, preferences, and overall, answering the questions why and how the customer visited the website (Koehn et al. 2020). A customer's behavior on the online grocery website can be followed by analyzing their clickstream data, which shows how the shopper navigates through the website during their visit (Bucklin & Sismeiro 2009).

Online grocers also take advantage of personalized marketing by utilizing data provided by the customer upon registration with the online service as well as the customer's purchase data and browsing history (Khandpur 2020). According to Khandpur (2020) an example of product-related personalized marketing could be the website's storefront or search results being customized based on customer data, such as the shopper being vegetarian or gluten-free.

Through performing data analysis on the data collected from the customer, grocery retailers can interact with the customer in a personalized manner and even use artificial intelligence driven targeting to reduce marketing expenditures and increase online grocery sales per customer (Koehn et al. 2020). Especially clickstream data can be used to predict online shopping behavior in real-time and target customers with recommendations and promotions based on their actions on the website. (Bucklin & Sismeiro 2009). Giving this data analysis task to AI can enhance the quality of recommendations and overall experience for the customer (Guha et al. 2021).
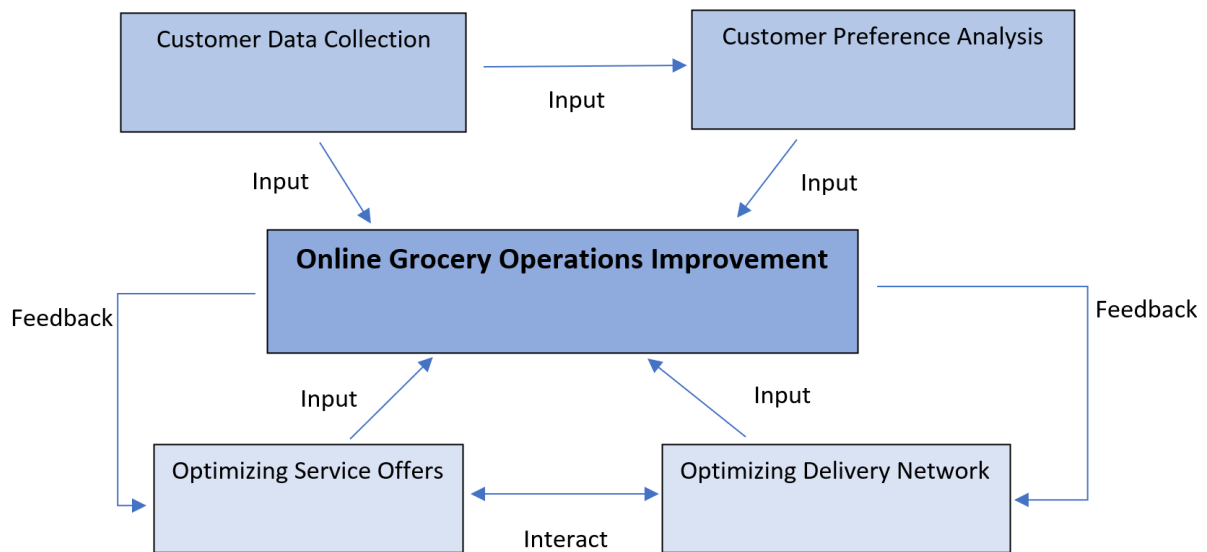
Figure 4. A framework of online grocery operations improvement with customer data. (adapted: Fikar et al. 2019)

As seen in Figure 4, Fikar et al. (2019) developed a decision support system (DSS) that utilizes customer data to improve online grocery operations. The first step is to collect customer data, which can be done by surveying customers or using the retailer's already existing customer data from databases. The next step is to preprocess the data and then analyze it to determine the impact on demand volumes and purchase patterns in the area. The benefits an online grocery retailer can gain from this include: a better understanding of customer preferences, customization of promotional offers, and optimization of delivery strategies. (Fikar et al. 2019).

Home delivery is an important aspect of online grocery retail. According to Klepek and Bauerova (2020), most common reasons for hesitating to do grocery shopping online, included slow delivery times and a reluctance to pay for the delivery. Pan et al. (2017) investigated the usage of customer data on improving home deliveries and they argued that this could provide the retailer a source of competitive advantage. Their approach was to use customer data to estimate probabilities of customers being home at time of delivery and optimize transportation based on it. The customer data used was electricity consumption data of the customer. The approach increased the odds of a successful delivery and could also be used for dynamically pricing delivery time slots based on customer data. (Pan et al. 2017).

5 CUSTOMER DATA UTILIZATION IN CASE COMPANIES

This section explores how three different grocery retailers utilize customer data to gain a competitive advantage. The purpose of the examples is to concretize the applications and collection methods of customer data. The retailers have been chosen mainly based on their advanced usage of customer data, but also based on the companies operating in different market areas and having different solutions for customer data utilization.

5.1 Case: Tesco

Tesco is the biggest grocery retailer in the United Kingdom and one of the largest edible groceries retailers in the world (Sabanoglu 2020; Coppola 2021a). Tesco is not any different from other retailers who want to understand their customers better by tracking their shopping habits and as such, in 1994 the company introduced Clubcard, a loyalty program with the purpose of measuring customer behavior. This helped Tesco develop its business further and gain a competitive advantage. (Marr 2020). Prior to launching the Clubcard, Tesco could collect a bunch of data on the customer but could not trace it to individual shoppers, leaving a lot of value unused (Vakharla 2019).

In addition to the Clubcard, Tesco collects customer data while customers shop at Tesco's online store, as well as when customers use Tesco's mobile application (Tesco 2021). Since Tesco does not have the expertise to analyze all the collected customer data, it has outsourced this task to Dunnhumby, a company focused on data analysis. One of the ways Tesco uses customer data is in conducting experiments to test concepts before implementing them on a broader scale. Some examples of this are experimenting whether changes in product assortment, innovative offers or price cuts have the desired outcome. Tesco can monitor the response automatically thanks to customer data and this leads the company into becoming more analytical instead of relying purely on intuition. (Marr 2020).

Through Dunnhumby, Tesco sells customers' transactional data to manufacturers of consumer-packaged goods such as Nestle. This data cannot identify individual customers, but it can locate shopping habits to the level of postal codes, giving the ability to identify where certain products

are most preferred. (Platt et al. 2014). Tesco can also track which stores customers shop in most often, what they purchase and what they use to pay for their groceries. The retailer can tailor the store's assortment based on local customer's needs and personalize offers to customers throughout all the store formats Tesco has, from hypermarkets to convenience stores. One example of a personalized offer is a coupon for diapers and beer for shoppers buying diapers for the first time. This is due to data analysis revealing that new fathers purchase more beer since they are spending less time at the bar. (Davenport et al. 2011).

Tesco's online grocery store specializes in taking advantage of customer data by recommending shoppers products. The Tesco recommender system asks the customer at checkout "Have you forgotten?" and proceeds to show the customer several products they could want, based on data analysis on the customer. Despite seeming concerned about the customer forgetting something, the recommender system rather wants to substitute and add products the customer never thought of purchasing to begin with. (Mackenzie 2018).

5.2 Case: Amazon Go

Amazon is the world's second largest retailer after Walmart (Richter 2020) and the leading online retailer in the United States, but the company also offers cloud computing, consumer electronics and many other services (Coppola 2021b). In 2018, Amazon Go was launched, and it is Amazon's attempt to break into brick-and-mortar retailing and its goal is to revolutionize the grocery shopping experience. The company introduced a new kind of technology, which they call Just Walk Out, and it allows for checkout-free shopping thanks to technology that's familiar to the general public from self-driving cars: computer vision, sensor fusion and deep learning (Amazon 2018).

A customer's movement is tracked across the store using multiple sensors. The customer's purchase data history is also used to ensure that the selected products are properly identified. To illustrate, if the inventory control system cannot tell if the customer chose a Pepsi or Coca-Cola, it will look up the customer's past purchases and see which is more likely. (HBS 2018).

Product selection is an area where Amazon uses customer sales data and machine learning to enhance the customer's grocery shopping experience. For instance, a shopper looking for a book from their favorite author, may not be willing to settle for a book from anyone else. When it comes to grocery shopping, however, shoppers are more likely to make substitutions, one example of this is when a shopper's preferred brand is out of stock, the shopper is likely to choose a different brand. This is where machine learning comes in and recommends the most suitable substitutions. Customers' purchase data is used as well to forecast future demand and decide what products to order, but also to help decide where to store them. All these decisions are very important in the grocery retailing business as some products have a short shelf life. (Amazon Science 2021).

One advantage Amazon has in its brick-and-mortar business is the data it has on customers through other Amazon services. On the other hand, Amazon Go will also provide customer data that Amazon can utilize in its other services. (Power 2020). One source of this customer data is the cashier-less technology that Amazon has deployed in its stores. It allows shoppers' offline and online identities to be merged to give retailers a better picture of customer behaviors and interests, allowing for personalized offers and targeted marketing. (Latinovic & Chatterjee 2019).

5.3 Case: Kesko

Kesko is Finland's second largest grocery retailer with a market share of 36.5 % in 2019 (PTY 2020). Many retailers have loyalty programs and Kesko is not an exception. Kesko's loyalty program is called K-Plussa and through the data collected by customers swiping their bonus cards, Kesko can personalize discounts and make sure the local store's assortment matches the customer's needs. (Kesko 2020b).

Ronkainen (2019) mentions that one of Kesko's objectives is to share their data. The retailer wants to help customers in their day to day lives and as such they came up with the K-Ostokset service that provides K-Plussa customers a way to follow their consumption habits, set goals based on consumption and make choices that align with their values, all thanks to customer data. The service allows a customer to check how domestic his or her shopping basket is or

what the climate impact of the groceries are. Kesko's research shows that this service has made customers more loyal and increased customer's purchases by over 10 %. (Kesko 2020b).

Figure 5. The data about a customer linked to Kesko's Plussa card. (adapted: Ronkainen 2019).

As can be seen from Figure 5, Kesko can link a multitude of information about the customer together to provide numerous benefits for the customer. Kesko's goal is to utilize customer data to provide a smooth, rich, and improved shopping journey for the customer. One factor that helps enhance customer data utilization is Kesko's K-AI, which helps online shoppers with suggestions, estimations, and automatization. (Ronkainen 2019)

By visiting Kesko's online store or mobile app, K-Ruoka, the visitor is asked to give permission to use cookies for tracking. These cookies are used to collect customer data in order to improve and personalize services and tailor marketing specifically for the customer. The cookies can be used for analytics and customer behavior analysis, such as which services and features are most used. Targeted marketing is also an application Kesko mentions it uses the customer data for. This web behavior can be supplemented with Plussa loyalty card data, such as purchases, to form a customer profile. For instance, Kesko mentions that they will target a customer with

content related to food trends if they determine, based on collected customer data, that you are interested in it. (Kesko 2020c).

5.4 Summary of the studied cases

Retailers collect data from customers using various methods and use the data for a wide range of solutions. The solutions and sources of data found in the case examples are tabulated below.

Table 4. Summary of the case examples.

Retailer	Solution	Source of data
Tesco	• More efficient testing of concepts • Assortment optimization • Personalized offers • Recommender system (online)	• Loyalty card • Mobile application • Web tracking
Amazon Go	• Just Walk Out technology • Product recommendations while shopping • Assortment planning • Demand forecasting	• Mobile application • Camera-tracking • Sensors • Other Amazon services
Kesko	• Assortment localization • Personalized services • Kesko AI • K-Ostokset service	• Loyalty card • Mobile application • Web tracking

There are multiple conclusions that can be drawn from these three case examples. First of all, each of the grocery retailers used customer data to provide personalized services to customers. This is not a surprise since according to Accenture (2018) 91 % of customers prefer interacting with a brand that understands the customer and is able to provide relevant recommendations and offers. Furthermore, 83 % of customers are willing to share personal data in exchange for a personalized customer experience (Accenture 2018). Therefore, these case examples indicate that grocery retailers seem to have followed the trend of customers expecting a personalized service while shopping both online and offline.

Each of the grocery retailers took advantage of customer data in improving assortment. The most common way was to enhance localization of a grocery store to the local customer's needs and demands. Giving the customer exactly what they want can indeed result in a competitive advantage for the retailer. This is increasingly more important as online grocery shopping increases in popularity. Grocery retailers thus need to be able to give the customer a relevant assortment both offline and online.

The sources of customer data had similarities as well since mobile applications were utilized for data collection by each retailer. A loyalty card on the other hand was the most important source of data in two of the three case companies. Overall, each retailer had their own methods of utilizing and collecting customer data but shared many similarities as well.

6   CONCLUSIONS

The objective of this thesis was to study how data collected from customers can provide a grocery retailer a source of competitive advantage. Additionally, data collection methods and challenges in utilization were explored as well. The purpose of the theory section was to introduce the reader to the topic and to help the reader understand the connections between data collection and utilization in modern grocery retail. The sources were mainly peer-reviewed and scientific to make sure the thesis had a trustworthy basis to build upon. The thesis was based upon the research question of:

- How can customer data provide a source of competitive advantage in grocery retail?

To supplement the main research question, three sub-questions were asked, of which the first one was:

- What kind of customer data do grocery retailers utilize and how do they collect it?

Data collection in brick-and-mortar stores was found to be based mainly on loyalty cards but mobile applications and IoT devices were found to be potential sources of customer data as well. Loyalty cards were able to provide plenty of personal data in addition to purchase data to the retailer but missed out on providing information on what the customer did while shopping. IoT, RFID and camera-tracking were among the identified methods used for customer tracking. Mobile phones were also a prominent source of customer data and they were used together with IoT devices to track customers.

In online grocery retailing a customer's personal details were often collected upon registration to the service. In addition to this, loyalty card information could also be used in online grocery retailing to provide more information about the customer. A customer's behavior while shopping online could be collected with various website tracking methods, such as cookies or clickstream data.

Since customer data gives grocery retailers the ability to enhance a customer's shopping experience, the second research question was:

- What are the opportunities and challenges of using customer data to provide personalized services in grocery retailing?

Grocery retailers collect a lot of customer data that can benefit both retailers and customers in various ways. In this thesis the focus was on personalization, which in brick-and-mortar stores included personalized services such as discounts and promotional offers based on the data collected from the shopper. In online grocery stores personalization included many of the same factors, but the opportunities were much broader as customers could be offered services such as recommendations and data sharing much easier than in brick-and-mortar stores. Customers expected personalized services from the retailer, and the best way to achieve this was to combine multiple data sources to form a much more comprehensive customer profile for personalization.

One of the challenges grocery retailers faced with personalization came from the customer fearing their personal information could be abused. Another privacy concern was that customers might not even know that data is being collected from them. Hence, grocery retailers need to be open and ethical about their customer data use.

Since data analytics is an integral piece of business development, the third research question was:

- What are the opportunities and challenges of using customer data for business development in grocery retailing?

Grocery retailers use customer data to improve store operations, with the goal of increased sales and reduced costs. Enhancing localization, which meant using customer data to customize store elements for the local customer, was found to be a major benefit for the retailer. Particularly the use of customer data benefited assortment optimization, and each of the studied case companies mentioned it as a beneficiary of customer data. In addition to the previously

mentioned factors, cost reductions could be found with labor optimization and theft reduction. In online grocery retailing, customer data could be used to understand the customer better and improve online services. Home deliveries could be made more efficient with customer data, but more research needs to be done on the subject to reach definitive conclusions.

Challenges in customer data utilization for business development were identified as well. Grocery retailers have to focus on creating value out of customer data instead of just collecting data and expecting profit margins to significantly increase. This is not an easy task, which is why some grocery retailers have decided to outsource it. Additionally, new technologies and methods for customer data utilization are constantly evolving and grocery retailers need to be alert on what they can adopt in their own stores.

REFERENCES

Accenture. 2018. Personalization pulse check. [online] Available at: <https://www.accenture.com/_acnmedia/PDF-83/Accenture-Pulse-Check-Infographic.pdf> [Accessed 23 March 2021].

Aguirre, E., Mahr, D., Grewal, D., de Ruyter, K. and Wetzels, M. 2015. Unraveling the personalization paradox: the effect of information collection and trust-building strategies on online advertisement effectiveness. Journal of Retailing, 91(1), pp.34-49.

Aktas, E. and Meng, Y. 2017. An exploration of big data practices in retail sector. Logistics, 1(2), p.12.

Aloysius, J., Hoehle, H. and Venkatesh, V. 2016. Exploiting big data for customer and retailer benefits. International Journal of Operations & Production Management, 36(4), pp.467-486.

Amazon. 2018. Amazon Go. [online] Available at: <https://www.amazon.com/b?ie=UTF8&node=16008589011> [Accessed 31 March 2021].

Amazon Science. 2021. How Amazon Fresh is leveraging scientific innovation to meet increased consumer demand. [online] Available at: <https://www.amazon.science/latest-news/how-amazon-fresh-is-leveraging-scientific-innovation-to-meet-increased-consumer-demand> [Accessed 31 March 2021].

Anderson, J., Jolly, L. and Fairhurst, A. 2007. Customer relationship management in retailing: a content analysis of retail trade journals. Journal of Retailing and Consumer Services, 14(6), pp.394-399.

Aylott, R. and Mitchell, V.-W. (1998), "An exploratory study of grocery shopping stressors", International Journal of Retail and Distribution Management, Vol. 26 No. 9, pp. 362-373.

Apeh, E., Gabrys, B. and Schierz, A. 2013. Customer profile classification: to adapt classifiers or to relabel customer profiles? Neurocomputing, 132, pp.3-13.

Bradlow, E., Gangwar, M., Kopalle, P. and Voleti, S. 2017. The role of big data and predictive analytics in retailing. Journal of Retailing, 93(1), pp.79-95.

Bucklin, R. and Sismeiro, C. 2009. Click here for internet insight: advances in clickstream data analysis in marketing. Journal of Interactive Marketing, 23(1), pp.35-48.

Campo, K. and Breugelmans, E. 2015. Buying groceries in brick and click stores: category allocation decisions and the moderating effect of online buying experience. Journal of Interactive Marketing, 31, pp.63-78.

Campo, K., Lamey, L., Breugelmans, E. and Melis, K. 2020. Going Online for Groceries: Drivers of Category-Level Share of Wallet Expansion. Journal of Retailing, 96, pp.1-19.

Caro, F. and Sadr, R. 2019. The Internet of Things (IoT) in retail: Bridging supply and demand. Business Horizons, 62(1), pp.47-54.

Carolan, M., 2018. Big data and food retail: nudging out citizens by creating dependent consumers. Geoforum, 90, pp.142-150.

Carpenter, J. and Moore, M. 2006. Consumer demographics, store attributes, and retail format choice in the US grocery market. International Journal of Retail & Distribution Management, 34(6), pp.434-452.

Colla, E. and Lapoule, P. 2012. E-commerce: exploring the critical success factors. International Journal of Retail & Distribution Management, 40(11), pp.842-864.

Coppola, D. 2021a. Edible grocery: leading retailers worldwide based on sales 2020. [online] Statista. Available at: <https://www.statista.com/statistics/1196035/edible-grocery-value-of-sales-by-retailers-global/> [Accessed 25 March 2021].

Coppola, D. 2021b. Amazon - statistics & facts. [online] Statista. Available at: <https://www.statista.com/topics/846/amazon/> [Accessed 25 March 2021].

Davenport, T., Harris, J. and Kohli, A. 2001. How do they know their customers so well? MIT Sloan Management Review, 42(2), pp.63-73.

Davenport, T., DalleMule, L. and Lucker, J. 2011. Know what your customers want before they do. [online] Harvard Business Review. Available at: <https://hbr.org/2011/12/know-what-your-customers-want-before-they-do> [Accessed 25 March 2021].

Dekimpe, M. 2020. Retailing and retailing research in the age of big data analytics. International Journal of Research in Marketing, 37(1), pp.3-14.

Deloitte. 2013. Digital commerce in the supermarket aisle: Strategies for CPG brands. [online] Available at: <https://www2.deloitte.com/content/dam/insights/us/articles/supermarket-

digital-commerce-cpg-strategies/DUP548_Supermarket_Ecommerce_Final.pdf> [Accessed 13 March 2021].

Dogan, O. and Öztaysi, B. 2018. In-store behavioral analytics technology selection using fuzzy decision making. Journal of Enterprise Information Management, 31(4), pp.612-630.

Ellickson, P. and Misra, S. 2008. Supermarket Pricing Strategies. Marketing Science, 27(5), pp.811-828.

Europa. 2018. Data protection under GDPR. [online] Available at: <https://europa.eu/youreurope/business/dealing-with-customers/data-protection/data-protection-gdpr/index_en.htm> [Accessed 14 March 2021].

Fikar, C., Mild, A. and Waitz, M. 2019. Facilitating consumer preferences and product shelf life data in the design of e-grocery deliveries. European Journal of Operational Research,.

Gandomi, A. & Haider, M. 2015. Beyond the hype: big data concepts, methods and analytics. International Journal of Information Management, 35(2), p. 137-144.

García-Murillo, M. and Annabi, H. 2002. Customer knowledge management. Journal of the Operational Research Society, 53(8), pp.875-884.

Gauri, D. 2013. Benchmarking retail productivity considering retail pricing and format strategy. Journal of Retailing, 89(1), pp.1-14.

Gijsbrechts, E., Campo, K. and Vroegrijk, M. 2018. Save or (over-)spend? the impact of hard-discounter shopping on consumers' grocery outlay. International Journal of Research in Marketing, 35(2), pp.270-288.

Goad, N., Robinson, J. and Aviles, S., 2018. Use big data to give local shoppers what they want. [online] BCG. Available at: <https://www.bcg.com/publications/2018/use-big-data-give-local-shoppers-what-they-want> [Accessed 3 March 2021].

Goswami, S. 2020. Why you should care about first-party data. [online] Forbes. Available at: <https://www.forbes.com/sites/forbestechcouncil/2020/11/09/why-you-should-care-about-first-party-data/?sh=135866e926e6> [Accessed 19 April 2021].

Grewal, D., Roggeveen, A. and Nordfält, J. 2017. The future of retailing. Journal of Retailing, 93(1), pp.1-6.

Grewal, D., Motyka, S. and Levy, M. 2018. The evolution and future of retailing and retailing education. Journal of Marketing Education, 40(1), pp.85-93.

Griva, A., Bardaki, C., Pramatari, K. and Papakiriakopoulos, D. 2018. Retail business analytics: customer visit segmentation using market basket data. Expert Systems with Applications, 100, pp.1-16.

Guha, A., Grewal, D., Kopalle, P., Haenlein, M., Schneider, M., Jung, H., Moustafa, R., Hegde, D. and Hawkins, G. 2021. How artificial intelligence will affect the future of retailing. Journal of Retailing, 97(1), pp.28-41.

HBS. 2018. Amazon Go: the future of retail? [online] Available at: <https://digital.hbs.edu/platform-rctom/submission/amazon-go-the-future-of-retail/> [Accessed 30 March 2021].

Heremans, S. 2018. Market research and big data, presentation at Tilburg University and KU Leuven.

Kesko. 2020a. Miten ruuan verkkokauppa muuttui koronan vaikutuksesta? [online] Available at: <https://www.kesko.fi/media/uutiset-ja-tiedotteet/uutiset/2020/miten-ruuan-verkkokauppa-muuttui-koronan-vaikutuksesta/> [Accessed 22 March 2021].

Kesko. 2020b. Tiedostavampaa ja vastuullisempaa kuluttamista datan ja K-Ostosten avulla. [online] Available at: <https://kesko.fi/grandone2020> [Accessed 17 February 2021].

Kesko. 2020c. Tietosuoja Keskossa. [online] Available at: <https://tietosuoja.kesko.fi/tietosuojakeskossa/evastekaytannot> [Accessed 2 April 2021].

Kirkpatrick, K. 2020. Tracking shoppers. Communications of the ACM, 63(2), pp.19-21.

Klepek, M. and Bauerová, R. 2020. Why do retail customers hesitate for shopping grocery online? Technological and Economic Development of Economy, 26(6), pp.1444-1462.

Koehn, D., Lessmann, S. and Schaal, M. 2020. Predicting online shopping behaviour from clickstream data using deep learning. Expert Systems with Applications, 150, pp.1-16

Latinovic, Z. and Chatterjee, S. 2019. Customer centricity in the digital age. MIT Sloan Management Review, 60(4), pp.1-2.

Leonard, P. 2014. Customer data analytics: privacy settings for 'Big Data' business. International Data Privacy Law, 4(1), pp.53-68.

Mackenzie, A. 2018. Personalization and probabilities: impersonal propensities in online grocery shopping. Big Data & Society, 5(1), pp.1-15

Marr, B. (2017). Data strategy- how to profit from big data, analytics and the internet of things. London, Kogan Page Limited.

Marr, B. 2020. Tesco: measuring customer performance & gaining insights from the clubcard data. [online] Available at: <https://www.bernardmarr.com/default.asp?contentID=1057> [Accessed 29 March 2021].

McKinsey. 2020. How European shoppers will buy groceries in the next normal. [online] Available at: <https://www.mckinsey.com/industries/retail/our-insights/how-european-shoppers-will-buy-groceries-in-the-next-normal> [Accessed 4 April 2021].

Melis, K., Campo, K., Breugelmans, E. and Lamey, L. 2015. The Impact of the multi-channel retail mix on online store choice: does online experience matter? Journal of Retailing, 91(2), pp.272-288.

Nikolova, H., Inman, J., Maurer, J., Greiner, A. and Amoroso, G. 2014. The shopper-centric retailer: three case studies on deriving shopper insights from frequent shopper data. Shopper Marketing and the Role of In-Store Marketing, Vol.11, pp.p.75-102.

Nilsson, E., Gärling, T., Marell, A. and Nordvall, A. 2015. Importance ratings of grocery store attributes. International Journal of Retail & Distribution Management, 43(1), pp.63-91.

Palmatier, R. and Martin, K. 2019. The intelligent marketer's guide to data privacy: the impact of big data on customer trust creator. Springer International Publishing AG, pp.153-167.

Pepe, M., Abratt, R. and Dion, P. 2011. The impact of private label brands on customer loyalty and product category profitability. Journal of Product & Brand Management, 20(1), pp.27-36.

Platt, J., Souza, R., Checa, E. and Chabaldas, R., 2014. Seven ways to profit from big data as a business. [online] BCG. Available at: <https://www.bcg.com/publications/2014/technology-digital-seven-ways-profit-big-data-business> [Accessed 3 March 2021].

Power, D. 2020. Amazon grocery expansion a data play to claim more share of wallet. [online] Forbes. Available at: <https://www.forbes.com/sites/denisepower/2020/07/09/amazon-grocery-expansion-a-data-play-to-claim-more-share-of-wallet/?sh=468ea1ad3ad6> [Accessed 31 March 2021].

PTY. 2020. Finnish Grocery Trade 2020. [online] Available at: <https://www.pty.fi/fileadmin/user_upload/tiedostot/Julkaisut/Vuosijulkaisut/EN_2020_vuosi julkaisu.pdf> [Accessed 17 February 2021].

Qlik. 2021. What is data analytics? definition and guide. [online] Available at: <https://www.qlik.com/us/data-analytics> [Accessed 21 March 2021].

Raijas, A. and Järvelä, K. 2015. Päivittäistavaroiden ostaminen ja kuluttajien näkemykset kaupan kanta-asiakasjärjestelmistä. [online] Available at: <https://www.kkv.fi/globalassets/kkv-suomi/julkaisut/selvitykset/2015/kkv-selvityksia-1-2015-kanta-asiakasjarjestelmat.pdf> [Accessed 25 February 2021].

Ramus, K. and Asger Nielsen, N. 2005, "Online grocery retailing: what do consumers think?", Internet Research, Vol. 15 No. 3, pp. 335-352.

Reutterer, T., Hornik, K., March, N. and Gruber, K. 2016. A data mining framework for targeted category promotions. Journal of Business Economics, 87(3), pp.337-358.

Richter, F. 2020. The World's Largest Retailers. [online] Statista. Available at: <https://www.statista.com/chart/22016/top-10-global-retailers/> [Accessed 25 March 2021].

Rollins, M. and Halinen, A. 2005. Customer knowledge management competence: towards a theoretical framework. Proceedings of the 38th Hawaii International Conference on System Sciences - 2005, 38, pp.p.240-250.

Ronkainen, A. 2019. Digital development in Kesko. [online] Kesko. Available at: <https://www.kesko.fi/globalassets/03-sijoittaja/raporttikeskus/2019/q4/kesko-anni-ronkainen-carnegie-digitalisaatio-seminaari-13.12.2019_web.pdf> [Accessed 29 March 2021].

Runkler, T. 2016. Data analytics. 2nd ed. Wiesbaden: Springer.

Russom, P. (2011). Big data analytics. TDWI Best Practices Report, Fourth Quarter, 19, 40.

Sabanoglu, T. 2020. Tesco PLC - Statistics and facts. [online] Statista. Available at: <https://www.statista.com/topics/3807/tesco-plc/> [Accessed 25 March 2021].

Sherman, R. 2015. Business intelligence guidebook: from data integration to analytics. 1st ed. Morgan Kaufmann.

Short, J and Todd, S. 2017. What's your data worth? MIT Sloan Management Review, Vol.58 (3), p.17-19

Singh, R. and Söderlund, M. 2020. Extending the experience construct: an examination of online grocery shopping. European Journal of Marketing, 54(10), pp.2419-2446.

Spanke, M. 2020. Retail isn't dead - innovative strategies for brick-and-mortar retail success. Springer, pp.64.

Stanton, J. 2018. A brief history of food retail. British Food Journal, 120(1), pp.172-180.

Statista. 2019. Europe: sales share of discounters 2017. [online] Available at: <https://www.statista.com/statistics/1101923/europe-sales-share-of-discounter/> [Accessed 25 March 2021].

Steeneken, F. and Ackley, D. 2012. A complete model of the supermarket business. [online]. Available at: http://www.bptrends.com/publicationfiles/01-03-2012-ART-Supermarket%20Article-steeneken-Ackley%20111226.pdf [Accessed 17 February 2021]

Sturley, C., Newing, A. and Heppenstall, A. 2017. Evaluating the potential of agent-based modelling to capture consumer grocery retail store choice behaviours. The International Review of Retail, Distribution and Consumer Research, 28(1), pp.27-46.

Tanskanen, K., Yrjölä, H. and Holmström, J. 2002. The way to profitable Internet grocery retailing – six lessons learned. International Journal of Retail & Distribution Management, 30(4), pp.169-178.

Tesco. 2021. Your data journey. [online] Available at: <https://www.tesco.com/help/privacy-and-cookies/privacy-centre/tesco-and-your-data/your-data-journey/> [Accessed 23 April 2021].

Tuomi, I. 1999. Data is more than knowledge: implications of the reversed knowledge hierarchy for knowledge management and organizational memory. Journal of Management Information Systems, 16(3), pp.103-117.

Vakharla, S. 2019. Data is the new oil—and more than a decade ago, Tesco started drilling it offline. [online] HuffPost. Available at: <https://www.huffpost.com/archive/in/entry/data-is-the-new-oil-tesco-clubcard-offline-privacy_in_5db683d4e4b006d4917162a2> [Accessed 29 March 2021].

Venkatesan, R. and Farris, P. 2012. Measuring and managing returns from retailer-customized coupon campaigns. Journal of Marketing, 76(1), pp.76-94.

Wolfinbarger, M. and Gilly, M. 2003. eTailQ: dimensionalizing, measuring and predicting etail quality. Journal of Retailing, 79(3), pp.183-198.

Yuan, M., Pavlidis, Y., Jain, M. and Caster, K. 2016. Walmart online grocery personalization: Behavioral insights and basket recommendations. Advances in conceptual modeling, 35(1), pp.49-64.

Zuo, Y., Yada, K. and Ali, A. 2016. Prediction of Consumer Purchasing in a Grocery Store Using Machine Learning Techniques. Asia-Pacific World Congress on Computer Science and Engineering, 3, pp.18-20