SCO technology in grocery retailing: a structured analysis of current SCO systems from a customer and retailer perspective

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Dissertation written under the supervision of André de Almeida Pinho

Abstract

This disertation presents an analysis of the customer and retailer value of SCO technologies in grocery retailing. The increasing competition, such as discounters or online channels, has led to a decrease in growth and profitability for traditional retailers. In order to counteract these increasing problems, retailers have been experimenting with SCO systems to save operating costs and to enhance customer satisfaction. However, research does not indicate that the deployment of various SCO instantly leads to such benefits and emphazises additional risks both for the retailers and customers. Thus, it is necessary to further analyse the impact of SCO devices on the retailer as well as the technology characteristics that drive consumer adoption. In order to destinguish the overall value for each SCO technology, a mixed-methods design is applied where qualitative data is quantized based on a Simple Multi-Attribute Rating Technique. Consequently, the first part of the analysis defines the individual weight and the score of each SCO variable that represents a key driver towards customer adoption. In the second part, the retailer value gets evaluated and added to the following calculation in order to define the definite SCO value. The "Scan Gun" offers the optimal mix of customer and retailer value and slightly outscores the Mobile Scan and Go technology via smartphone by achieving a total value of 15.11 out of 20 points.

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Résumo

A presente dissertação consiste numa análise do valor do cliente e do retalhista em tecnologias SCO, no setor de retalho de produtos alimentícios. A competitividade crescente, com canais de descontos ou canais online, levou a uma diminuição do crescimento e lucro dos retalhistas tradicionais. De modo a combater estes problemas crescentes, os retalhistas têm cada vez mais acudido a sistemas SCO de modo a proteger custos operativos e promover a satisfação do cliente. No entanto, pesquisas realizadas indicam que a utilização de SCO não gera de imediato os objetivos pretendidos, enfatizando que existem riscos adicionais para retalhistas e consumidores. Assim, é necessária uma análise mais profunda do impacto da tecnologia SCO no comércio retalhista, bem como uma análise das características tecnológicas que promovem a sua utilização pelos clientes. De modo a distinguir o valor de cada tecnologia SCO, um mix de métodos de design é aplicado, no qual os dados qualitativos são quantificados com base numa Técnica Simple Multi-Attribute Rating. Consequentemente, a primeira parte da análise define o peso individual e a pontuação de cada variável SCO que represente um fator-chave que promove a utilização por parte dos clientes. Na segunda parte, o valor do retalhista é avaliado e adicionado à equação de modo a definir o valor definitivo da SCO. O "Scan Gun" oferece o mix ótimo de valor do cliente e do retalhista, e supera o scan por telemóvel e go-technology via smartphone, atingindo um valor de 15.11 pontos em 20.

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Título: Tecnologia SCO em retalho de produtos alimentícios: uma análise estruturada dos sistemas atuais de SCO da perspetiva do consumidor e do retalhista

Palavras-chave: SCO, POS, Transformação Digital, Retalho, Transformação da Indústria Grossista, Valor do Cliente, Valor do Retalhista, Modelo de Aceitação de Tecnologia.

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List of Abbreviations

AV	Adoption Value
CV	Customer Value
CAGR	Compound Annual Growth Rate
DSI	Domain Specific Innovativeness
II	Innate Innovativeness
NFC	Near Field Communication
NPS	Net Promoter Score
QR	Quick Response
RV	Retailer Value
RFID	Radio-Frequency Identification
ROI	Return on Investment
SCO	Self-Scan and Checkout technology
SCOV	SCO Value
SMART	Simple Multi - Attribute Rating Technique
TAM	Technology Acceptance Model
u	Utility Factor
USD	US Dollar
PEOU	Perceived Ease of Use
POS	Point Of Sale
PSP	Payment Service Provider
PU	Perceived Usefulness

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1 Introduction

Historically, technical innovations have had a significant impact on the retail industry. With the development of new internet capabilities many retailers could radically apply new business models in the past, which led to new ways to reach and interact with customers, manage supply chains and to provide tools for communication and negotiation among buyer and sellers (Varadajaran et al., 2010). Especially the development of digital channels such as mobile channels or social media have altered the retail landscape, leaving managers confronted with radically changing shopping behaviour (Verhoef et al., 2015).

In 2017, Capgemini Consulting reported decreasing customer experiences in offline shopping. They compared data from 6000 consumers and 500 retail executives, who revealed their shopping experiences at retailers. The results showed a decline in consumer satisfaction, particularly caused by the benefits of online shopping rivals. Also, nearly half of the retailers registered a negative NPS by consumers. While many businesses have invested in the digitalization of their stores to meet the changing customer expectations over 50% of the executives experienced major challenges in the implementation process. Only a few digital leaders realized significant benefits. This indicates that the majority of retailers did not set the right digital initiatives to meet the customer expectations (Jacobs, 2017).

Many retailers have started to develop multichannel and omnichannel strategies by adding new ways to interact with the customers. Retailers are now focused on how customers are influenced by innovations within a retail environment. Also, it is vital to understand how people switch between channels when researching for products or during the buying process. Omnichannel retailing, which represents the complete integration of all channels with no distinction between the online and physical approach, is the new retailing paradigm of today. As recent technological developments possess the potential to disrupt the retail industry, grocers are worried about managing the numerous touch points and channels simultaneously (Aiolfi & Sabbadin, 2017).

Especially technology affine millennials are pushing the limits of customer-facing technologies provided by the retailers even further. Compared to brochures and advertisements that used to serve the older generations better, young customers engage in mobile and social shopping experiences to make more advanced purchasing decisions (Aperion, 2018). Many major grocery retailers have embraced new strategies and others are following this trend. The grocery retailing market, which is marked as a high potential retail sector in terms of digital transformation, is projected to intensify its omnichannel transformations towards the integration

of in-store and online operations (Aiolfi & Sabbadin, 2017). Today several grocery retailers have worked with self-service technologies, just as self-checkouts, informative desk points, interactive displays, digital signages and applications for smartphones. (Pantano & Timmermanns, 2014). The available literature has been showing growing interest for this topic, while many grocery retailers focus on an innovative checkout process. In general, the self-service technology has been tested by the most successful grocery retailers in the world. However, its impact and benefit for the customers has varied a lot and retailers are eager to make improvements. (Renko & Druzijanic, 2014).

In 2018, Amazon launched Amazon Go, a cashier less grocery store that allows customers to enter the shop per smartphone application. This revolutionary design was met with both scepticism and excitement and it has yet to prove its impact on the retail industry. However, the development towards a frictionless shopping experience is a driving force in the industry that has to be further analysed (Perkins, 2019)

Retailers must examine how customers will accept and use SCO technology (Clodfelter, 2010). This means, retailers must understand the relative advantage of new technologies to achieve efficiencies or cost effectiveness. As a result, the success of SCO innovations will depend on the retailers' ability to convince and motivate their consumer to adopt them (Renko & Druzijanic, 2014).

The term "SCO " covers systems in which the checkout process is completely or partially left to the customer (EHI Retail Institute, 2015). Today, SCO are available in different variants and combinations for retailers. Hence, in order to gather new insights into the perceptions of customers and retailers regarding new SCO technologies, the research question of the research is:

Which SCO offers the optimal mix of Customer Value and Retailer Value?

2 Literature Review

In the first part of this chapter the current state of the global grocery retailing industry gets summarized, followed by an introduction to the various SCO options available today. Lastly the various risks of deploying SCO in a retail environment is discussed.

2.1 The grocery retailing industry

The global grocery industry grew at 4.5% annually during the last 10 years and is valued at 5.7 Trillion USD (Kuijpers et al., 2018). However, this is mainly due to new online channels and discounters entering the market, causing decreasing sales and margins for traditional grocers. Particularly in the United States and Western Europe established companies have been facing a decrease in growth and profitability due to higher costs, falling productivity, and aggressive pricing strategies from the competition. As a result, researchers are projecting that 200 Billion to 700 Billion USD in revenues may be shifted to new channels. The main drivers for this trend are changing consumer preferences and new technologies. While new competitors could react to the changing environment, traditional grocery retailers have been battling high commodity prices as well as increasing labour costs especially between 2012 and 2017. During this time, the economic profit of the publicly traded grocery retailers declined by 50% caused by other rivals just as Walmart, Costco, Alibaba, Amazon or other e-commerce competitors. Hence, traditional grocery chains must rebuild their business models towards automation and digitization in order to stay competitive. In order to reduce retail prices and labour costs, retailers have been investing in new payment systems and customer interfaces (Kuijpers et al., 2018).

In 2016, the global revenue of Point of Sale terminals was valued at 7.99 Billion Dollars and is continuing to grow annually. Between 2018 and 2026 the CAGR, which measures the investments return over time, is expected to be 12.5% and by the end of 2026 the number of self-checkouts will increase to 26.04 million units. As this accounts for several industries, the retail sector, with its growing importance for mobile SCO solutions, emerged as the strongest driver in the SCO market and possesses a 32% market share. (Transparancy Market Research, 2019). One reason for this trend is the changing customer preferences. Compared to payments by cash, other payment options like debit cards, credit cards or eWallets are gaining market shares. Especially eWallets are projected to increase by 12% between 2018 and 2022. In contrary, cash will lose 14% in the global payment marked (Global Payments Report, 2018). However, there are major differences in customer preferences across the globe. In some areas, just as in Europe and North America, the development of mobile payments is not as progressed

as customers are more hesitant to switch to new technologies. On contrary, mobile payment solutions have already been highly successful in Asia, particularly in China, Japan and South Korea. In China Mobile Scan and Go technology possesses the highest market share and reached a transaction value of 183 Billion USD in 2016. Key payment services rely mainly on NFC technology, which includes Paypal, Apple Pay, Huawei Pay and Samsung Pay. In addition, services based on QR are widespread by key players such as WeChat Pay, Alipay and Baidu Wallet (Simone & Sabbadin, 2017).

Providing a pleasurable customer experience has been identified as the key differentiation factor for retailers today. In a challenging and saturated market, experience per m² is going to be the metric that drives customer satisfaction, as the consumer determines his purchasing decisions on many factors beyond price (KPMG, 2018). In the future, customers are going to push for even quicker checkout times by one click. However, many of these innovations require considerable effort and budget. At the same time, it is estimated that the reduction of working hours per day with efficient Scan and Go technologies can reach 60%. Moreover, retailers can already save more than 20% of all working hours if they use existing technologies and reshape their daily core processes in the shops (Oliver Wyman, 2018).

In theory, compared to traditional manned checkouts the typical setup for fixed self-ceckout lanes that only get supervised by one staff member promises to save 150 labour hours per week. However, for example in the USA where self-checkouts have been implemented since 1990, there is no evidence that employment decreased until 2018. On the contrary, the number of cashiers even increased compared to a decade ago, even though nowadays more than 75% of retailers in the USA provide SCO solutions (Andrews, 2018).

2.2 Customer Value

In order to measure customer value of the various SCO it is necessary to define what CV from a customer perspective means. Woodruff (1997) describes it as:

"Customer value is a customer's perceived preference for and evaluation of those product attributes, attribute performance, and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations." (Maas, 2008)

In other words, CV describes the value created by a product or service from the customers' point of view (Maas, 2008). In terms of SCO values, it is therefore necessary to understand the various drivers that influence consumer experience (Pantano & Priporas, 2016). In the field of software engineering evaluating consumer technology acceptance has played a significant role

in recent studies. A variety of models has been proposed over the years in order to improve accuracy, most notably around the technology acceptance model (Momani et al., 2017).

2.3 The extended Technology Acceptance Model

The Technology Acceptance Model of F.D. Davis plays an important role due to its' dominance in this field of studies. It has been extended various times, adjusted to the different technologies and areas of interest. TAM is a widely used theoretical framework and serves as the foundation for many technological adoption studies. It aims to predict user acceptance and to highlight potential design issues before the users of the technology interact with the system by analysing the perceived usefulness and the perceived ease of use about the system. PU is defined as "the degree to which a person believes that using a particular system would enhance his job performance" and PEOU as "the degree to which a person believes that using a particular system would be free of effort" (Koul & Eydgahi, 2018).

Studies showed that the TAM model could explain the use of information systems better than other prominent acceptance models, explaining a significant amount of the variance in usage intentions and behaviour (Pikkarainen et al., 2004). Authors additionally described this model as very suitable for the innovations in the retail sector, especially regarding the physical and virtual POS technology (Pantano & Pietro, 2012). For example, it is suggested that consumers tend to focus on potential benefits when choosing SST in a retail environment. According to a study conducted by Childers, perceived usefulness played a crucial role in measuring the attitude of customers towards the SST. Also, perceived ease of use proved in multiple researches about organizational behaviour and SSTs to be positively related to the users' attitude towards the used technology (Weijters et al., 2007).

During a study published by the Journal of Technology Management & Innovation, researchers analysed the most frequent variables added to the TAM model across 130 articles between 2009 and 2012 about technology-based innovations in retailing. They came to the conclusion, that the variable "enjoyment" was used in 31 articles and "trust" in 30 of them, followed by "perceived risk" with 20 times (Pantano & Pietro, 2012). While enjoyment is similar to PU, it rather displays the extrinsic motivation towards using information systems. Many studies have mentioned enjoyment as a major factor in electronic systems adoption, mobile chats and online usages, while other researchers found no significant effects on online banking. Given the state of literature it can be assumed that perceived enjoyment affects the attitude towards the various SCO technologies (Weijters et al., 2007). In order to simplify the process of grouping during the content analysis of the expert interviews, enjoyment will be comprised in PU.

Additionally, numerous studies find relationships between the adoption behaviour and the psychological trait of innovativeness. In context with information and technology it can be described as a "tendency to be a technology pioneer and thought leader" or simply "the willingness of an individual to try out new information technology" (Chauhan et al., 2019). Among many forms of innovativeness, various studies refer to innate innovativeness and domain specific innovativeness. While II relates to the general individual personality trait as possessing the ability to accept innovation, DSI measures the tendency to learn about and adopt new products and services within a specific domain. Past studies found predominately positive relationships between II and DSI on peoples' perception of technology. However, the literature available on the effects on DSI has not been strong and consistent enough and requires further investigation (Chauhan et al., 2019).

In another study on SST acceptance researchers concluded that technology anxiety, which can be treated as the opposite of consumer innovativeness in this regard, led to a negative impact on technology adoption. Similar findings were drawn in a recent study about the acceptance of NFC payments and automated personal shopping assistant. Reasons for this might be the lack of confidence in using new technology in a social setting (Bailey A. et al., 2017). Perceived Risk, namely feelings like anxiety, concern, discomfort and uncertainty about undertaking financial transactions, has shown to reduce consumer's intention to engage in internet transactions, which includes platforms that integrate card or mobile payments (Lai & Zainal, 2015).

2.4   SCO Technologies

In an article published by the Journal of Retailing, the future state of retailing was analysed. The technologies which the researchers identified as the key players for retail transformation were mobile applications, self-checkouts and Scan and Go technologies (Grewal et al., 2016). Also, during a study about the perceived usefulness of SCO technologies, the authors presented a comparison of the most promising SCO technologies for retailers today. In addition to the previously named SCO, payments by biometrics and smart trolley were identified as high potential factors for the future. (Inman & Nikolova, 2017). In the following chapters the various types of SCO are further described.

2.4.1 Fixed SCO

One of the well tested SCO technology is the retail self-checkout. These allow customers to scan, bag and pay for their goods without or little assistance of an employee (Lee H. et al., 2010). During the purchasing process the shopper interacts with the self-scan interface that directs the customer until the payment is finished. Every items' barcode provides the computer with specific information and a security weight scale mitigates the risk of theft. Retailers usually deploy a cashier supervisor for every four to six checkout stations (Inman & Nikolova, 2017). In 2016, fixed POS terminals accounted for the biggest revenue compared to other SCO technologies. However, its' 86% revenue share of the total market was mainly due to its longer presence in the industry (Transparency Market Research, 2019). Worldwide, self-checkout terminals are projected to rise from 191,000 in 2013 to 325.000 by the end of 2019 (Mortimer & Dootson, 2017).

Despite its longterm implementation in the retail industry and its obvious benefits in theory, self-checkouts are not popular among all consumer segments and yet not fully implemented across the retail industry (Lee et al., 2010). Firstly, many customers find self-checkouts confusing or require help from an employee (Herschman, 2017). Apart from a typical setup being costly at around 125.000 USD, many self-checkouts are neither necessarily faster than conventional checkouts, nore result in lower staff numbers. Likewise applying fixed SCO might lead to indirect costs such as theft, reduced customer satisfaction and loyalty (Mortimer & Dootson, 2017).

2.4.2 Scan and Go and Mobile Scan and Go

Mobile devices and new applications for smartphones allow shoppers to scan product barcodes, compare prices across retailers or obtain digital coupons to be redeemed in store (Inman & Nikolova, 2017). With the addition of digital Wallets customers can pay by tapping or beaming with NFC directly from their phones at the self-checkouts. Trough avoiding to unload the trolleys during the payment process, Wal-Mart estimates to save 12 Million USD a year for every second the checkout process fastens via Scan and Go (Desai et al., 2017).

The use of Mobile Scan and Go has increased significantly in recent years because of the ease of use, mobility, and lower total cost of ownership compared to traditional POS terminals. Mobile Scan and Go sees significant demand from small and medium sized businesses due to their affordable initial cost compared to fixed SCO terminals and growing preference for tablets and smartphones at workplaces (Transparancy Market Research, 2019).

However, mobile applications vary vastly on their extent of functionalities. A recent study in the USA highlighted that the capability to see deals, in-store alerts and paying options are desired by the customers (Inman & Nikolova, 2017). In the pre-shopping phase, the usage of the applications could help shoppers to make better decision be being less influenced by the environment while expending less effort inside the store. Therefore, digital tools may have positive effects on both the quality and the efficiency of purchase decisions inside the store. However, according to a study the use of mobiles during the shopping process can lead to reduced attention of the customers. As a result, people may be less attentive on in-store marketing stimuli, which may lead to fewer unplanned purchases. This can be a major issue for retailers who invested many resources and practices on the path-to-purchases (Bellini & Simone, 2017). Many retailers have been struggling to convince the consumers who are hesitant using multiple retailing apps, which represents an additional challenge (Inman & Nikolova, 2017). A similar concept to the Mobile Scan and Go is Scan and Go via hand-held scanners or "Scan Guns". With Scan Guns customers can scan and bag their products directly from the shelves and checkout faster at the self-service kiosks (Desai et al., 2017).

Information on smart trolleys is scarce as there is little evidence on its feasibility for retailers. The first concept of a smart cart, namely the "Videocart", was introduced in 1988. It was mainly used for marketing purposes because the cart could show various ads based on the location of the customer within the store. Despite, this concept suffered from many shortcomings like the bulkiness and the battery drain of the device itself and was soon rejected by retailers and customers (Inman & Nikolova, 2017). Today, Smart Trolleys have gained more attention. However, in literature there is still hardly evidence about the implementation of this technology. The concept is designed into a smaller version of the automated self-checkout system on a shopping trolley with a user interface screen which allows customers to pay for items inside the trolley before leaving the store (Ali & Riaz, 2019). According to an article of the Indian Journal of Science and Technology, their conception of a smart trolley model demands a screen, barcode reader and a wireless card in order to connect the smartphone to the barcode reader. This way the customer has the possibility to pay without waiting at a checkout isle (Shona A. 2017) Also, the use of RFID tags can have a positive impact based on its improved accuracy, response time and durability over barcodes (Manikandan et al., 2017).

Lastly, payment options that complement both fixed or Mobile Scan and Go technologies are paying by biometrics (Clodfelter, 2010). Retailers are now realizing its' potential as it is

estimated that until 2020 approximately 1 Billion smartphones will be equipped with face scanning capabilities (Forbes, 2018).

Especially fingerprint verification technology has been well developed due to its application possibilities in various industries. It is also the preferred biometric technology at the SCO, because it is a cheaper, smaller and more accurate option than face recognition. In a retail environment, this technology could replace credit cards as a reliable paying option (Clodfelter, 2010). Also, there is a large number of additional methods that are currently developed, namely face recognition, eye recognition by iris or retina, palm print recognition and vein recognition. By implementing biometric scan retailers hope for security as well as customer experience improvements by reducing friction (Accenture, 2018).

3 Methodology

In order to fulfil the objective of this research, a qualitative research method was chosen that was further enhanced by multicriteria decision making based on qualitative assessments. Firstly, a qualitative approach was used to gather data about the customer adoption variables. The main advantage over a quantitative design is that it enables a complete analysis of the research subject while not limiting the scope of the research or the participants response. Hence, in order to answer the research question an inductive research approach was applied. By observing a small sample size, in depth interviews were conducted to produce generalized theories and conclusions. In depth interviews are personal and unstructured, whose aim is to analyse the participants feelings and emotions towards the research subject. Unstructured interviews also allow flexibility to the interviewer, providing room for conclusions that were unplanned to derive further assumptions in regard to the research question. The conduction of the interviews followed a semi-structure questionnaire, while some questions were prepared, others were posed to elaborate on certain details as the interview progressed. Some sample questions that were asked during all 6 Interviews were as following:

- Question 1: In your opinion, how can retailers convince different customer segments to use new SCO technologies?
- Question 2: Why are many customers still avoiding SCO technologies?
- Question 3: Do you think that common fixed self-checkouts will prevail in the grocery retailing industry?

- Question 4: Which SCO technologies do you think possess the potential to advance in the grocery retailing industry? (elaborating on Mobile Scan and Go and Scan Guns, Smart Trolleys, payment by various biometric scan, Amazon Go)

With the use of a SMART approach, which stands for "Multi-criteria decision-making technique", the qualitative data was quantized in order to answer the research question. During a SMART approach, the researcher can rate various conflicting criteria based on multiples and alternatives. In the first part of the research, the CV is estimated by multiplying the frequency of variables with their individual importance and the SCO traits retrieved from the expert interviews. In the second part, the RV is estimated by the comparting data from literature and opinions from the interview participants.

The method of purposed sampling, which relates to the non-probability sampling techniques, was used in order to select interview partners based on their knowledge, profession, and expertise regarding the research subject. In this study, two experts were market researchers who recently published substantial studies around the partly unexplored field of SCO in the German and UK market. The other four experts, however, were leaders at global enterprise technology provider of software, hardware and services for retailers.

- Interview Partner 1: Senior Director, User Centred Design at NCR Corporation
- Interview Partner 2: Store Transformation Consultant, leader of UK ROI Store Transformation at NCR Corporation
- Interview Partner 3: Global Head of Self-Service Solutions at Diebold Nixdorf
- Interview Partner 4: Country Sales Leader DACH at Toshiba
- Interview Partner 5: Leader of the Research Unit Inventory Differences + Safety at EHI Retail Institute
- Interview Partner 6: Emeritus Professor at the University of Leicester, UK. Multiple studies on helping retailers better understand the impact of loss and how it can be more effectively managed.

In order to process the data gathered from the interviews, data was categorized in categories and sub-categories to be comparable. Consequently, the collected data was reduced and simplified in order to compare the results to the previous findings. Perceived Ease of Use represents the two main keywords "Comfort" and "Effort" while Perceived Usefulness summarizes "Speed" and "Productivity". "Security" and "Privacy" combine Risk and lastly, Innovativeness comprises the codes "Curiosity" and "Trend".

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$$\overbrace{SCOV = [PU * AV_1 + PEUO * AV_2 + Risk * AV_3)]}^{CV} + \overbrace{[Cost * u_1 + Risk * u_2]}^{RV}$$

Figure 1: Formula for SCO Value (author's own illustration)

4 Benefits of SCO for Customers and Retailers

In order to complement the analysis of the interviews, it is necessary to provide a broad overview over the advantages and disadvantages of SCO for customers and retailers based on the comparison of case studies. Below, an analysis of multiple studies summarizes the key aspects of each SCO.

Type of Technology	Advantages for Customers	Disadvantages for Customers	Advantages for Retailers	Disadvantages for Retailers	Authors
Fixed SCO	• Faster and more convenient checkouts (for some customers) • More privacy while purchasing • Ability to control the checkout process	• Fear of complexity • Slow purchasing process if mistakes are made • Specific products have to be authorized by employees	• Labour efficiencies • Additional way of handling high customer traffic • Potential of shorter payback periods compared to other POS technologies • Display of additional information (e.g. Ads)	• Still requires employees to supervise • High initial cost of purchase • Theft • Scepticism of different consumer groups	Inman, Nikolova Renko, Druzijanic
(Mobile) Scan and Go	• Mobile Coupons • Scanning and buying products with one device • More detailed sales recipes • Fast checkout times • Price comparing • Facilitation of purchase decision	• Complexity of applications • Customers must install an application for every retailer	• Severe Labour Savings • Marketing Instrument • More Information to customers	• Costs of maintenance	Inman, Nikolova Renko, Druzijanic Bellini, Ailofi Aperion
Smart Trolleys	• Fast and convenient items scanning while walking the isles • Additional information on products and overall purchase on the screen on the trolley	• Complexity and mistrust of the technology	• Labour efficiencies • Fast information delivery with information and services to customers • Improved management loyalty program	(Derived from Self-Checkouts) • Requires employees to supervise • High initial cost of purchase • Theft • Scepticism of different consumer groups	Renko, Druzijanic
Biometric payment options	• Payments without any cards or cash • Additional safety measure which leads to less fraud or theft	• Public perception • Privacy concerns • Reliability of technology	• Better information management • Reduced fraud costs and less possibilities on identity theft • Less delays on checkouts due to fast transactions • Replacement of loyalty card	• Costs of implementation • Scepticism of different consumer groups	Renko, Druzijanic Clodfelter

Table 1: Advantages and Disadvantages of SCO (author's own illustration)

As stated in Table 1, common benefits of the various SCO technologies are quicker checkout times and a more convenient shopping journey. The majority of SCO technologies serve the customer with more information coming from the interfaces that these devices provide. However, high levels of complexity might affect the customer perception negatively.

Consequently, this comes at the expense of peoples' privacy and human interaction in a retail environment. Therefore, consumers want justification on how their information is being used. If retailers mishandle this personalization – privacy paradox, they risk a decline of customer engagement and loyalty (Grewal et al., 2016). Also, for retailers there are several implications when investing in SCO. The key benefits are labour efficiencies as well as improved information management. However, when retailers plan to invest in SCO technologies their decision depends on financial factors just as ROI or net present value. In general, only investment opportunities that present a positive ROI can be realized. (Inman & Nikolova, 2017). Lastly, as already described in the literature review, expenditures and revenues for SCO are hardly predictable due to its unclear externalities. However, further research will disclose more details about the retailer value.

5 Customer Value

In this chapter, the CV gets analysed by comparing data from the interviews and the literature. Firstly, the individual weight of variables is assessed. Thereafter, these are attached to the different SCO values for each variable.

5.1 Assessment of the weight of variables

In order to analyse the value of each variable the frequency of key words used within the interviews provided an early indication about their importance. "Comfort" was mentioned 18 times, followed by "Speed" with 13 times. Further, "Effort" was used 6 times, ahead of "Privacy", "Security" and "Productivity" with only a few references. When combining PE, PEOU and Risk, the following Pie Chart shows the Frequency Distribution resulting from this analysis.
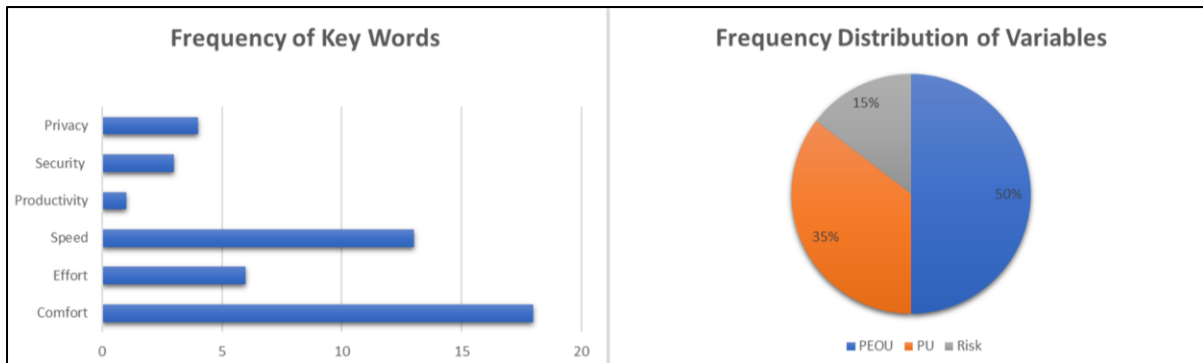
Figure 2: Frequency of Key Words and Frequency Distribution of Variables (author's own illustration)

Perceived Ease of Use measures the comfort of the overall checkout process as well as the amount of effort that has to be undertaken by the customer. Based on the researcher's assessment all of the interview participants agreed that a SCO technology has to be comfortable and 50% also emphasized that the checkout experience has to be effortless. The dominant argument towards the need of convenience was that a successful SCO deployment does not depend on the functionality of the technology itself but rather on its' ergonomics. Customers like to choose the checkout experience that suits their needs. For instance, one participant stated that controlling the processes without feeling pressure from other customers is crucial to many people. Being accustomed to a process that reduces friction points was often highlighted. When purchasing specific items that are difficult to handle with a SCO technology it is not convenient for consumers to use them. Instead they ask for help from an employee or use the traditional manned checkout lane. Considering that there is no unified checkout software across multiple retailers, customers need to learn how to handle SCO anew. This leads to discomfort which may results in reduced customer adoption. There has been resistance by some customers towards various SCO for reasons of uncomfort using the device. Especially towards new Scan and Go technology via smartphone, the interview participants mentioned the its challenges for users. If customers must learn to use a new system that requires a noticeable amount of effort, the SCO technology will face resistance by the customers. As a result, it scored 24 points out of 30 based on the researcher's estimation. Below, in Table 2 the key arguments are displayed:

Perceived Ease of Use			Key Words		Rating
Respondent ID	Question	Strongest Answer	Comfort	Effort	1 to 5
1	In your opinion, how can retailers convince different customer segments to use new POS technologies?	It's a **usability and ergonomics challenge**. If you solve that, we have done that with a couple of customers, customers are more than willing to accept that and do it in their own time, because they are going to be **accustomed to their own process**.	✔	✖	3
2	Why are many customers still avoiding different self-checkout technologies? / do you think that mPOS possess great potential in the future?	(translated) If you look at the systems, they **all run a bit differently** and then there is **no universal interface**. And that also makes it a bit harder for the customer to use it all / This is **not as comfortable as** it is with a device that I get from the dealer.	✔	✔	5
3	Why are many customers still avoiding different self-checkout technologies?	In the UK there are only 10 Percent of the population that don't want to use self-checkouts. Maybe sometimes if they got baskets that are **particularly difficult for SCO**, containing items that need age verification. Scanning items and paying on the mobile phones is **quite difficult** for people to do.	✔	✔	5
4	Why are many customers still avoiding different self-checkout technologies?	So, it's really important that you use the technology **in the right way to enrich that customer experience**, that they still get the right interaction with the brand of your company, and the experience they expect in your stores.	✔	✖	3
5	Do you think that self checkouts in general are too slow?	(translated) I ran a project where the older people prefered to be on the (fixed) self-checkout instead of at the manned checkout line, **because no one pressures them** because they can throw in their cents in the machine and do not immediately have one csustomer behind them.	✔	✖	3
6	Why are many customers still avoiding different self-checkout technologies? Do you think that mSAG and fixed SCO are the future?	The public was not educated why this technology was useful. There was a backlash by this: Why am I having to do this? **It is making my life harder and not easier** because I have to learn how to use this systems. So, it had been a **long road in terms of resistance** in USA, GB and Australia. / The technologies will be are around different store formats, so in small stores, metro stores, **it is all about convenience** and speed.	✔	✔	5
Total			**Overall Score = 24**		

Table 2: Overall Score of PEOU (author's own illustration)

Perceived Usefulness of a SCO technology refers to the speed of the checkout process as well as the customers' performance using a SCO device. Every interview participant used these attributes multiple times when describing different SCO, however, the "Speed" was identified as the most important driver towards technology adoption. Especially in metropolitan cities customers are eager to use the fastest checkout process that is available. If customers experience queueing around traditional manned checkout lanes, new SCO technologies represent an attractive possibility to speed up the process. For this reason, the highest usage rates of SCO are estimated to be within fast paced environments. Having the control over the speed plays an important role regarding the customers overall shopping performance. As with PEOU, according to two participants older people prefer to choose their own pace to avoid mistakes or pressure from other customers. Having the possibility to completely control their own shopping experience is therefore increasing the overall performance. Apart from one interview partner, everyone mentioned "speed" and "performance" multiple times, which puts emphasise on its importance for SCO customer adoption. Hence, based on the researchers' estimation PU is slightly higher valued than PEOU. After considering the strength of all arguments PU scored 28 out of 30 points. A summary of the strongest answers chosen from the interview analysis is stated in Table 3.

Perceived Usefulness			Key Words		Rating
Respondent ID	Question	Strongest Answer	Speed	Productivity	1 to 5
1	In your opinion, how can retailers convince different customer segments to use new SCO technologies?	Front end of the store has become much more **customer taking control of the transaction**. Some of that is customer drive. **Customer don't like to wait** and they feel to make progress when they are doing it themselves, they like to have options that they can get out of the lines when they are waiting for the checkout person. **That way it is quicker for them**.	✔	✔	5
2	In your opinion, how can retailers convince different customer segments to use new SCO technologies?	(translated) For example, the **self-determined pace of scanning** is very benefitial in a way that you also have the **price control,** which is very important for older people.	✔	✔	5
3	In your opinion, how can retailers convince different customer segments to use new SCO technologies?	So, when the customer comes at the end of his journey and he has to make choice between traditional or new technology, **if it does not have a queue its more attractive and they try it**.	✔	✔	5
4	In your opinion, how can retailers convince different customer segments to use new SCO technologies?	If you look at self-service, there is a higher density of checkouts so the customers can take their time and complete their transaction at a leisurely pace that suites the **speed they like** and they **don't have the pressure of a queue behind them pressuring them to go faster.**	✔	✔	5
5	In your opinion, how can retailers convince different customer segments to use new SCO technologies?	(translated) I can pay at the traditional cash register **but here I have to wait** and if I do not want to wait that long I have to **go to the self checkout**.	✔	✘	3
6	In your opinion, how can retailers convince different customer segments to use new SCO technologies? Is it privacy concerns or not trustin the technology?	If you look at the inner-city areas, where you have traffic, and some of the metro stores you have the vast majority in terms of transactions driven by SCO. Simply because the public is realising the **it can be speeding up the process**. / No I don't think it privacy, it is more about **practicability**.	✔	✔	5
Total			Overall Score = 28		

Table 3: Overall Score of PU (author's own illustration)

During the interview analysis, "security" and "privacy" were identified as additional factors that may have a negative influence on customer adoption. However, if the interview participants expressed concerns it was mainly about biometric payment methods and the fear of identity fraud in general. Nevertheless, the potential of fingerprints and face-recognition was seen and eventually biometric scan can have a positive impact on customer security and confidence. Concerning other SCO there was little evidence about risk influencing customer adoption. Only one participant described that some customers do not feel comfortable if they are not getting policed by staff when trying out new SCO technologies. Especially with Scan and Go technologies where the payment process can be done individually on the smartphones, some customers fear to make an error during their checkout process. Thus, if customer use their smartphone during the shopping process, they might risk dropping their devices which also increases risk. Lastly, one participant also described that the grocery industry won't take the risk to deploy dubious payment methods, but simply will react to other industries. After all, the factor risk is valued at 18 out of 30 points. In Table 4 the overall score of risk gets assessed.

	Risk		**Key Words**		**Rating**
Respondent ID	**Question**	**Strongest Answer**	**Security**	**Privacy**	**1 to 5**
1	How do think about biometric scans in Europe? What do you think about data security?	We have areas where we sell ATMs into where you interface with the ATM because of **additional security not only for convenience**. We got customers in Latin America which use fingerprint biometrics or palm biometrics, we've got customers in Turkey where the biometrics in your phone is part of the security.	✔	✘	3
2	How do think about biometric scans in Europe? What do you think about data security?	(translated) The **security risk is of course high**. These technologies must be heavily encrypted. Once a fingerprint appears on the internet, it is gone for a lifetime. Face recognition is the same, because we also have **many problems in Germany,** because the consumer is **already very aware of his security**	✔	✔	5
3	How do think about biometric scans in Europe? What do you think about data security?	I think that the **digital identity is getting a lot of traction**. I don't know how it is in your country. In terms of **protecting** underage children on the internet it is becoming really important to be able to prove your age... also **around privacy**. / There is no **obvious policing...** It's an uncomfortable customer journey, so encouraging customers to use these technologies, retailers have a finalization area at the store. You are going into this area, scan a QR code, and pay.	✔	✔	5
4	How do think about biometric scans in Europe?	It really comes down to what consumers feel comfortable in terms of doing. If they are **worried about data protection, fraud or identity theft** they are not going to be happy with effectively putting that wallet in a virtual environment	✔	✔	5
5	How do think about biometric scans in Europe? What do you think about data security?	No answer	✘	✘	0
6	How about paying by Biometrics?	When you go back 6 years, nobody would say I can walk in the shop and pay with my watch. And now I do it all the time. Undoubtably, there will be development around this.	✘	✘	0
Total				**Overall Score = 18**	

Table 4: Overall Score of Risk (author's own illustration)

Lastly, there were hardly any arguments that supported Innovativeness as a crucial driver towards SCO adoption. One interview participant mentioned that there are consumers who are very early adopter that might be happy using any new technology. This especially applies to the younger generation, but there are also many older customers who want to keep up with current trends and therefore are drawn towards new SCO technologies. However, there is no indication that innovativeness plays an important role on technology adoption. While the impact of PU, PEOU and Risk were confirmed in both the literature review and interview analysis, Innovativeness as an extension of the TAM will be removed from further analysis. As a result following estimations can be drawn from the analysis:

Variable	Frequency	Strength	Absolute Score	Relative Score
AV PU	0,35	28	9,8	40%
AV PEOU	0,5	24	12	49%
AV Risk	0,15	18	2,7	11%

Table 5: Relative Score of the variables (author's own illustration)

Above, in Table 5 the individual Adoption Values are displayed. PEOU ranks first, followed by PU and Risk.

5.2 Estimation of SCO values

In this part, the results of the interview analysis regarding SCO is presented and compared to the previous findings from the literature review as well as the chapter "Benefits of SCO for Customers and Retailers".

5.2.1 Fixed SCO

Until today, fixed self-checkouts represent the dominant technology in the European SCO market. While this technology reached maturity in different markets just as in Great Britain, many grocers in Germany just started to deploy them. The benefits which were previously stated in the literature review are widely confirmed by the experts. Especially the potential staff savings drive retailers to invest in fixed SCO. However, attention is given to how the store and basket sizes may alter the customer experience. Customers are more satisfied with smaller baskets, because one of the main unsolved issues around fixed self-checkouts is the increasing friction with large item quantities. For example, customers frequently experience interruptions when scanning products that require age verification or further steps on the user interface. Consequently, many customers do not accept that long scanning processes are shifted from the staff to the customer. Therefore, SCO manufacturers have been working on an ergonomically better workstations that removes the weight scale in order to reduce friction points.

The majority of interview participants also believes that demographic differences do not play a significant role in customer adoption. Especially the older generation benefits from having the control over the purchasing speed. Usually there is one queue for multiple workstations which reduces the pressure coming from other customers as well. Also, one expert mentions that older people may use these new technologies in order to keep up with the trends. Nonetheless slight differences between country-specific habits may affect adoption rates. For example, in Germany many people prefer to choose manned checkout lanes in order to oppose the reduction of jobs. This is seen as a misconception by the technology manufacturers, who on contrary indicate that proper staff training, and education play a vital role during a successful store transformation. Lastly, future predictions on the success of fixed self-checkouts are mixed. Due to their high costs of investments, it is assumed that the technology only pays off if it achieves usage rates between 10 to 15 percent, which many grocery retailers have been struggling to reach. In addition, its prevalence is expected to depend on other concepts like Amazon Go that offers a frictionless customer experience without any checkouts.

5.2.2 Scan and Go

The mobile checkout technology draws mixed reviews and projections for the future. While all experts are convinced that Mobile Scan and Go will continue to increase, they also mention a variety of its shortcomings.

Mobile Scan and Go provides significant benefits for the retailer, which are primarily low investment and labours costs. Also, the responsibility on the devices are passed to the customers who bring their personal smartphone into the store. This matches the previous findings in the literature review. In contrary, nearly all experts agreed on mobile phones being less suitable in larger footprint shops or for larger basket sizes. The main argument against it, is that handling a smartphone while selecting items and carrying a basket at the same time may leave customers overwhelmed. This complexity increases with the number of items. Thus, policing and surveillance procedures by retailers may aggravate on larger stores to counteract the risk of theft.

On the customers side, there is also the danger of dropping the smartphone whereby the customer bears the costs and additional battery drain may also lead to sudden aborted shopping processes, which both decrease the overall shopping experience. As of today each retailer has to provide its own smartphone application which forces users to download multiple apps, which may differ vastly. As there is no universal application for multiple grocery retailers, the learning process on using mobile apps repeats every time customers visit a new retailer. Some customers might not accept that, as they will only use this technology at the retailer where they learned it at the first time.

Nonetheless, two respondents also believe that mobile checkout technology needs to be incentivised and marketed to gain higher adoption rates. As an example, there are loyalty schemes, couponing or pricing strategies strictly for smartphone users. Additionally, retailers have been experiencing customers being uncomfortable leaving the store without staff controlling their payment process. Hence, technology providers have recommended to install a payment area within the shop for customers, even though this procedure is technically not necessary, to complete the shopping process. This way customers can signalize that they completed their payment process, which positively influences their trust in this technology.

Scan and Go via Scan Gun is widely accepted by the interview participants. However, its future is questioned as the main benefits over smartphones might decrease with further improvements in the Mobile Scan and Go industry. Compared to scanning via smartphone, the scan gun

possesses significant technological advantages due to its reliability. Its dedicated optical scanner reads barcodes and decodes data contained in the barcode at a much faster rate than a smartphone, which relies on its camera. According to the majority of interview participants, customers mainly profit from better usability and handling throughout their shopping process. Especially for larger basket sizes Scan Guns provide better ergonomics than a personal smartphone. Furthermore, the retailer gains more control over the devices which benefits the customer on his shopping journey in various ways. As Scan Guns are serviced by the retailer its functionality can be assured, while Scan and Go varies between different models of smartphones. Additionally, dropping this device does not lead to the customer being responsible for the damage which altogether has led to higher usage rates in the UK market until today. However, as the investment costs of scan guns depends vastly on the size of the shopping environment, large supermarkets may face profound investment costs. In addition, scan guns require more space for its charging docks and payment areas which may result in friction points.

5.2.3 Smart Trolley

Customers using smart trolleys benefit from low friction points and fast checkout times. It is also assumed that security management may improve because a shopping journey via smart trolley is easier to police than via other SCO machines. In theory, smart trolley could benefit the customer a lot, however, according to the interview participants the disadvantages of smart trolleys outweigh the advantages. Its potential for a widespread adoption is highly limited due to high investment costs for the retailer, as its main area of application are large retail establishments with a high demand of shopping carts. Therefore, one interview participant mentioned that this SCO will only be a niche product. Compared to scan guns, smart trolleys require more space and docking stations that might have to be deployed on the outside area of the retailer. Logistically, this demands further investments by the grocer and therefore the future of smart trolleys is assessed negatively. In addtion, a few interview participants could not give an opinion to these devices. This supports the argument that the deployment of these devices in the retail industry remains very low.

5.2.4 Biometric payment options

Paying via biometric scanning in a retail environment can be implemented on smartphones as well as on SCO devices. In general, many benefits are highlighted by the majority of interview participants. Firstly, by adding various biometric scans to the checkout process the retailer adds additional security measures for the customer. Automatic age verification by face scanning could mitigate frictions points when purchasing items just as alcohol or cigarettes. Paying by

fingerprint is also a secure option due to its high technical reliability. However, one counterargument against its implementation in grocery retailing shops is its decreasing functional efficiency when customers touched specific groceries before putting their thumb against the reader.

For smartphones biometric scanning may also provide benefits in terms of security and comfort, however the advantages over other contactless payment options like NFC and QR are questionable. The grocery retailing industry is going to respond to the common payment method of the market, hence, it will not be the first mover. In Germany, for example, many people still prefer cash payments and are conscious regarding data security and data abuse issues. Even though the purchasing process might be quicker and more convenient, they risk being exploited and eventually neglect this payment method. As a result, retailers are hesitant to deploy these options because of backlashes coming from different customer segments.

Nevertheless, an estimation of each type of biometric scan in combination with various SCO technologies or a dedicated POS terminal within a shopping environment is hardly possible considering the current state of literature as well as the interview results. However, according to one interview participant, the use of biometric scanning in combination with a smartphone plays and particularly important role because the technology is already adopted on a consumer device and therefore accessible to a large customer segment. Hence, during the following calculations the value of biometric scan is only assessed in combination with mobile Scan and Go.

5.2.5 Amazon Go

The Amazon Go format is mentioned multiple times throughout the interviews even though the questions were not aimed at the technologies involved in this concept. On one hand, it is reviewed as being too costly and too radically innovated for larger stores. Other shortcomings are that the products have to be prepacked in order to be identified by the cameras which limits the product range. Furthermore, customers may forfeit control of the shopping process which is marked as an important driver towards technology adoption. While at the moment this concept may not be scalable, the majority of the interview partners predict major developments in this area, which might not only serve the customers with an entirely frictionless experience but also the retailer with more efficient back office logistics. As a result of the concepts' multiple appearance within the interviews, AmazonGo will be included in the further research.

5.2.6 Technology vs. Ergonomics

Throughout the interview analysis, store ergonomics emerged as one of the main factors leading to higher customer adoption rates of new SCO technologies. Especially on the question how retailers may convince customers to use new SCO technology, most of the respondents do not refer instantly to faster checkout times or innovative SCO technologies. Rather the optimization of the infrastructure and the education of staff were identified as the key driver to success. The main improvements discussed are:

- Proper staff training
- Better placement of SCO
- Higher density of SCO
- More options of SCO

During the transformation process staff is increasingly responsible for educating the customers on the benefits and handling of new SCO technologies. Especially between the younger and older demographics, there exist different wants for individual customer journeys. For example, the older generation usually demands more human interactions to membered staff. Additionally, they are increasingly aware of the global trend of staff downsizing in case of technological transformation and as the retailers presents new POS technology without the involvement of staff, certain customer segments might not support new technologies.

The placement and density of deployed SCO systems seem to play an important role in customer adoption. If fixed SCO are positioned at the corner of a store where it does not represent the primary checkout option, customers tend to use them less frequently. In order to prevent queuing in early deployment stages it is recommended to invest in higher quantities of a specific technology. As new SCO technologies are heavily marketed for quicker checkout times, retailers must prevent additional friction caused by queuing. Lastly, an assumption can be drawn that a bigger choice of SCO technology leads to higher adoption rates. Customers are not likely to use new technologies if they feel forced by the retailer. If customers are met with several options to choose from, everyone may choose their preferred customer experience. Offering a wide array of payment options can benefit all customers.

Regarding payment options, retailers must accept cash in order to serve all customer segments. Especially in Germany, but also in the UK area cash prevails as one of the main payment options and therefore, retailer should equip their fixed SCO with a cash payment function as well as operate with manned checkout lanes.

5.3 Assessment of Customer Value Scores

Based on the previous analysis about the advantages and disadvantages of the various SCO technologies and the results from the interview analysis, it was able to rank the technologies on PU, PEOU and Risk. Firstly, when estimating the speed of the transaction and the overall productivity level of the SCO, the concept of AmazonGo clearly dominates with its cashier-less format. As the customer is neither committed to repack items nor wait during the payment process, it clearly provides the fastest checkout experience possible. Both smartphones and the Scan Gun provide a fast checkout. On one side, the Scan Gun benefits from faster and more precise scanning technology which enhances its PU, on the other side the smartphone profits from its larger field of functionality which increases performance. In addition, customers are able to pay as they shop whereas Scan Gun holders have to pay at a dedicated payment isle. As a result, it remains open to question whether one technology outweighs the other one in this regard. The smart trolley, however, possesses a clear disadvantage over the above-mentioned SCO. One interview participant mentioned that such devices need a lot of space at a dedicated location possibly at the outside area of a store. That means that customers might have to accept longer walking routes if they use the smart trolleys. It can be assumed that the size and weight of these devices will decrease speed in a smaller to medium sized shopping environment compared to smartphones or Scan Guns. Lastly, fixed SCO suffer from the task of multiple repacking. It is the only SCO where customers are not able to scan their products as they pick them from the shelves. Consequently, waiting times increase as they have to unpack their items at the dedicated checkouts which aggravates queuing. However, fixed SCO benefits from its maturity in the SCO industry. Fixed SCO providers have been improving this technology and mitigated the friction points. Consequently, customers have been accustomed to it compared to new SCO. Nonetheless fixed SCO presents the least favourable SCO in terms of PU.

When analysing the various SCO on PEOU, the smart trolley benefits from its potentially high convenience especially in larger sized shopping environments. One of the main arguments is that compared to smartphones and Scan Guns, the customer does not have to hold the device in his hand while selecting the items. In contrast to smartphones the handling of smart trolleys does not decrease with the quantity of items. Scan Guns benefit from good ergonomics as well. The technology around barcode scanning is very progressed and the devices are handy which increases the comfort levels. Also, customers do not have to fear consequences when dropping the devices. This is a clear advantage over the smartphone in terms of comfort. Smartphones are not dedicated to barcode scanning which results in more malfunctions. Customers often find

it difficult to scan the items while holding their personal device and eventually risk damages. Likewise, concerns were expressed on the payment process with smartphones when there is no obvious policing by the retailer. Compared to the use of Scan Guns, which use dedicated payment areas, paying with smartphones is not supervised. Some customers might feel scared to leave the store without visibly paying for their items. Scan and Go with biometric pay provides the customer with an additional comfortable payment option and therefore a slight improvement in PEOU compared to Scan and Go can be assumed.

Assessing Fixed SCO, is more demanding because of mixed impressions of the interview participants. On one hand, this SCO technology requires the most effort because of the long scanning process and the weight-based system often leads to friction points that are avoided with other SCO. However, many customers are accustomed to this process and especially older generations feels comfortable if they can control the pace and pay by cash. Based on its low learning curve for experienced customers the comfort level of fixed SCO therefore rated medium.

AmazonGo aims at a smaller customer segment than the other SCO. Firstly, entry barriers persist as only customers have access that possess the application on their smartphone. Secondly, all items are prepacked which means that the range of items offered is limited. Thirdly, the majority of interview participants agreed on the importance of staff. Since the concept provides a cashier-less design, some customers might not feel comfortable to use it. However, the shopping process itself provides the most effortless experience out of the other SCO technologies.

Lastly, Risk is highly dependent on the payment options that are used on the various SCO. As already described, biometrics might cause the mitigation of risk based on the customer's aversion. There is no evidence that SCO technologies themseves enhance risk for the individual customer. After all, there is one exception for Scan and Go via smartphone. In this case, the risk of the damage lies on the customers' side compared to other SCO. Hence, it can be assumed that the usage of smartphones slightly increases risk. Scan and Go with biometric payment options, however, slightly decreases risk compared to Scan and Go without biometric pay because it leaves the customer with another choice. Customers who see biometric pay as an additonal safety measure might use that option to decrease risk. Below, in Table 6 the final results of CV of SCO technologies are displayed.

medium - sized retailer			
Customer Value	PU	PEOU	Risk
Fixed SCO	5	7	9
MSAG	9	6	7
MSAG + biometric scan	9	7	8
Scan Guns	8	8	9
Smart Trolley	7	9	9
AmazonGo	10	9	8

Table 6: Estimation of SCO Values (author's own illustration)

6 Retailer Value

In this chapter, the RV is going to be estimated based on the investment costs and the additional losses occurring from SCO. Other externalities just as reduced working hours and staff or back-office efficiencies are hardly predictable because of the lack of data. Hence, they are not included in the following calculations. In addition, because RV comprises two variables related to cost they are both equally valued at 0.5.

6.1 Estimation of SCO investment costs

By deploying SCO systems, the retailer aims to increase his productivity without increasing his costs. For example, this may be achieved through a higher number of fixed SCO systems compared to traditional manned checkout lanes on the same area. Usually, if a retailer invests in a fixed SCO he replaced two traditional checkout lanes with four self-service registers. Nonetheless, the achievable productivity heavily depends on the opening hours of the retailer and SCO, the customer frequency, the size of the shopping carts, the experience of the customer and the payment methods. Due to these diverse influences it is not possible to estimate the average or expected productivity increases on several SCO devices. Under ideal circumstances, it is expected to increase productivity by 40%. As some companies argue, the continuous opening of the self-checkouts may even require more personnel than a traditional manned checkout lane (EHI Retail Institute, 2015). According to a study of EHI on the German retail market, none of the surveyed companies could present ROI analysis of their SCO machines as there were hardly valid numbers on cost savings. On the contrary, it was often argued that the objective was to invest in the customer experience without expecting a direct return on investment (EHI Retail Institute. 2015).

Based on literature research it is possible to estimate the investment costs per SCO. Below there a summary of investment costs is provided.

Approximately, a setup of four SCO cash registers with weight control and sash modules will costs about 120.000€. Compared to a conventional manned checkout lane that is about three to four times the amount. For the same amount invested in scan guns a retailer can purchase 60 devices along with corresponding payment terminals. However, cash modules are an expensive add-on which has to be supplied in certain geographic areas. They make the systems 30% more expensive than the card only machines and regular maintenance costs are necessary (EHI Retail Institute, 2015). The company „Anadea", an international software development company for retailers, provides an overview over the investment costs for Scan and Go software. A Scan and Go application for Web, Apple iOS and Android, which serves all the customers' and

Estimate Breakdown

Web   Apple iOS   Android

Email / Password Login	$1 824
Social Login	$3 648
SSL-based Encryption	$672
Two Factor Authentication	$4 800
DoS Protection	$2 688
Customer checkouts	$5 472
Inventory management	$9 120
Customer database	$3 648
Pricing and discounts management	$3 648
Loyalty programs	$3 648
Barcodes or QR Codes	$2 304
Payment Processing	$3 648
Shopping Cart	$9 792
Estimated cost	**$54 912**

Figure 3: Estimated costs of Mobile Scan and Go software for retailers (Anadea, 2019)

grocers' needs as identified in the previous sections is estimated at 50.000 Euros (Anadea, 2019).

The costs of investment of an AmazonGo store is difficult to calculate based on its large range of technologies used. According to Bloomberg, the first AmazonGo shop in Seattle required more than one Million USD hardware alone. Therefore, the companies' plan to create 3.000 convenience stores will require three Billion US Dollars. (Verbage & Soper S, 2018)

Smart trolleys are a concept that have barely been realized or implemented in retail environments. Yet, there is a company from the USA that currently manufactures its own version of a smart trolley. "Caper" smart carts are equipped with deep learning and computer vision capabilities to provide a frictionless Scan and Go experience. The company uses three cameras and three sensors to identify scanned items to increase the accuracy of the whole system. Estimating the costs of a smart trolley is very difficult based on its early stage of

introduction and its' variety of characteristics. According to Caper, a smart cart roughly costs 1% of an entire Amazon Go infrastructure which is about 10.000 US Dollars. This estimation might be plausible due to the use of a screen, cameras and sensors (Caper, 2019).

Concerninng biometric scans, retailers can either develop its own technology which heavily increases investment costs but improves flexibility. Besides, external providers offer cloud-based services for less investment costs. Contrarily, this might lead to privacy and safety concerns (Accenture, 2018). For this study, this plays a minor role due to the biometric application on Scan and Go whereas the customer bears all costs. Hence, it is assumed that retailers do not face additional expenses.

Moreover, there are further expenditures for the retailer integrating the POS landscape, because SCO systems require a connection to the cash register or enterprise resource planning system. These include payment systems and controls of light signals, exit locks, cigarette vending machines and more. These expenses vary between every retailer (EHI Retail Institute, 2015). Consequently, this cost centre will be neglected in the further calculations.

6.1.1 Cost implications from the interview analysis

Most of the participants highlighted the transformation issues on large scale supermarkets. For example, Scan Guns and Smart Trolleys are technically purposed for large transactions and large basket sizes because the customer is not obligated to empty the trolley or basket at the end of the customer journeys. Anyhow, the obvious counterargument against a store transformation towards such SCO technologies is the increasing investment costs. One of the key success factors of a successful store transformation and improved technology adoption is, according to the interview participants, a high density of a SCO technology. In a large format store, consequently, investment costs would vastly increase. Every concept applied to a larger scale, therefore, demands different measures and planning which may result into implantabilities for certain SCO. This would exceed the scope of this analysis and hence the costs of investments are only estimated on a medium-sized shopping environment.

medium - sized retailer			
Investment costs	Estimation	Score	Relative Value
Fixed SCO	€ 120 000,00	0,2	8
MSAG	€ 50 000,00	0,1	9
MSAG + biomteric scan	€ 50 000,00	0,1	9
Scan Guns (60x)	€ 120 000,00	0,2	8
Smart Trolley (60x)	€ 600 000,00	1,0	1
AmazonGo	€ 1 000 000,00	1,7	0

Table 7: Assessment of the relative value for SCO based on investment costs (author's own illustration)

As displayed above, the concept of AmazonGo suffers from enormous investment costs compared to other SCO. As a result, it could not be used as a benchmark to grade the other technologies since the competition would be rated very low on investment costs. Instead the relative values were measures as a percentage of the Smart Trolley, as it represents the second most expensive SCO. Hence, Mobile Scan and Go represents the cheapest option available, followed by the Scan Gun and fixed SCO.

6.2   Additional risks of SCO

Measuring the impact of SCO-related technologies on the retailer's profitability is a challenging task for retailers, since factors just as customers not using them, retail losses due to inventory shrinkages, actual productivity and staff savings are hardly predictable. In addition, research on this topic is scarce, so retailers need to recalculate their ROI and fully account for negative impacts that may occur. In 2018, the ECR Community tried to quantify the losses occurring by the use of SCOs. They used data from 13 retail companies and two SCO technology providers, with a combined turnover of 586 Billion Euros, in order to measure the losses coming from fixed SCOs, Scan and Go and Mobile Scan and Go technologies.
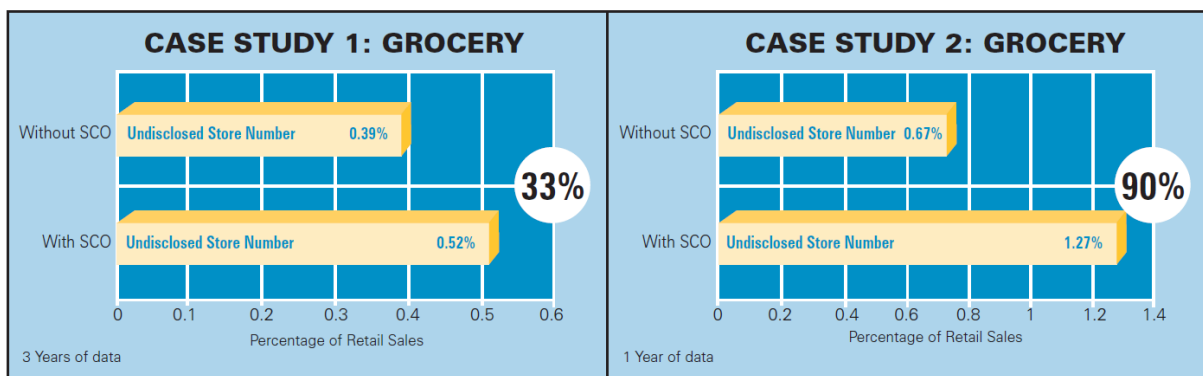

Figure 4: Sales losses due to SCO (Beck, 2018)

As displayed above, according to a study by the ECR community, sales losses for grocery retailers using fixed SCO were 33% higher in a span of three years and 90% throughout one year compared to retailers not using any SCO. When accounting for weight- based SCO the losses where 147% higher. The reasons for this increase in sales losses come in three ways: the direct loss of stock, the direct loss of margin and the indirect loss of sales by stock inaccuracies. These happen due to customer frauds or technical issues, which are summarized below (Beck, 2018).

Customers frauds primarily happen when customers do not scan their items or simply do not pay for them. But also, technical issues lead to lost margins and heavily effect inventory calculations. Examples leading to such are promotion errors like "buy one and get one free" where customers only scan one product instead of two which affects inventory planning. This also happens when products of multiple varieties or flavours are purchased but only one product gets scanned in order to accelerate the checkout process. Another problem is double- and mis-scanning, where a customer scans the same item more than once or a customer weighs his product but chooses a different product on the screen that costs less per grams. For retailers that use Scan and Go technologies one additional issue is customer product switching. Users can simply scan a product but instead take another more expensive one, which is hard to police. For fixed SCOs this also happens when customers switch the barcode of products and scan the cheaper option. Lastly, coupons may be used multiple times on fixed SCOs, which leads to lost margins (Beck, 2018).

Drivers of Loss	Type of SCO		
	Fixed SCO	Scan & Go SCO	Mobile Scan & Go SCO
Non-scanning	✔	✔	✔
Mis-scanning	✔	✔	✔
Walk-aways/Non-payment	✔	✔	✔
Multi-variety Errors	✔	✔	✔
Promotion Errors	✔	✔	✔
Product Switching	✗	✔	✔
Barcode Switching	✔	✗	✗
Coupon Frauds	✔	✗	✗
Double-scanning	✔	✔	✔

Table 8: Drivers of sales losses due to SCO technologies (Beck, 2018)

6.3 Friction vs. Risk

The findings in the literature review about the risk of SCO technology were widely supported by the interview partners. Hence, a negative correlation can be drawn between the amount of friction for a customer during the shopping or payment process and the amount of risk for the retailer. If a grocery retailer removes all friction points, customers may experience the most pleasurable experience possible. However, retailers have to expect increased losses due to theft or technical inaccuracies. On the other hand, if a retailer installs measures to scan every customer on the accuracy of his shopping process, just as doublechecking payments and items in the shopping cart, losses would be minimized but the friction during the shopping process increases tremendously. This poses a challenge for grocery retailers as they have to determine the amount of friction that their customers are willing to accept and minimize the loss potential in light of the low profit margins that are, according to an interview partner, about 4% on average for a European retailer.
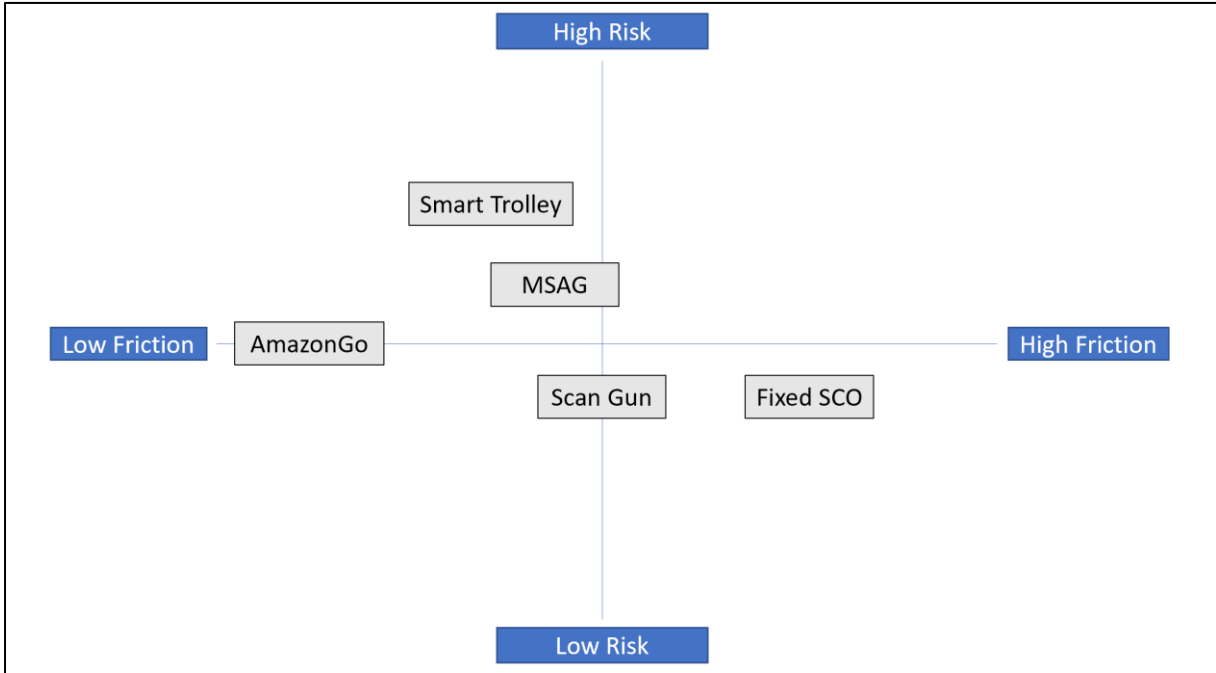
Figure 5:Evaluation of SCO risks for retailers based on Friction (author's own illustration)

As displayed above, based on policing and fraud issues retrieved from the literature and expert interviews, Mobile Scan and Go causes the highest risk for a retailer. It suffers from policing issues that impact the risk of theft tremendously. The same applies to mobile Scan and Go with biometric scan since it cannot be used as a surveillance measure but solely as payment method.

Scan Guns are estimated to be on the same risk level as fixed SCO, because customers pay at a dedicated checkout zone that can be inspected by staff. AmazonGo suffers from its frictionless approach. However, due to cameras installed risk of theft can be mitigated and therefore an average score is supposed. Lastly, Smart Trolleys are very high on risk. Technically, the shopping journey is similar to Mobile Scan and Go because there is no oblgation to pay at a counter. According to the interview participants, the device itself additionally suffers from a high theft potential because a trolley has to be stored in spaces outside the store. This comes a long with further infrastructure changes that conribute to its high risk value. Based on these estimations, following Risk Values are assigned:

medium - sized retailer		
Risk	Estimation	Relative Value
Fixed SCO	4	6
MSAG	6	4
MSAG + biometric scan	6	4
Scan Guns	4	6
Smart Trolley	7	3
AmazonGo	5	5

Table 9: Relative SCO Values for Risk

7 Calculation of Overall SCO Value

By retrieving the numbers from chapter 5 and 6, it is possible to calculate the SCO value based on the formula presented in the methodology. In the table below, the overall score as well as the individual ranking are shown.

SCO Value	Customer Value				Retailer Value			Overall	Rank
	PU	PEOU	Risk	Score	Cost of Investment	Risk	Score		
	0,4	0,49	0,11		0,5	0,5			
Fixed SCO	5	7	9	6,42	8	6	7	13,42	4
MSAG	9	6	7	7,31	9	4	6,5	13,81	3
MSAG+ biometric scan	9	7	8	7,91	9	4	6,5	14,41	2
Scan Guns	8	8	9	8,11	8	6	7	15,11	1
Smart Trolley	7	9	9	8,2	1	3	2	10,2	6
AmazonGo	10	9	8	9,29	0	5	2,5	11,79	5

Table 10: Calculation for the optimal mix of CV and RV (author's own illustration)

As seen above, with 15,11 points, the Scan Gun offers the optimal mix of customer value and retailer value. Although this SCO technology cannot dominate any proposed category it's all-round potential leads to high individual CV and RV. By a margin of 0.7 it outscores the Mobile Scan and Go technology with biometric payment options, which scores 0,6 points higher than Scan and Go without the biometric scan. Fixed SCO suffer from a very low CV caused by their multitude of friction points and therefore falls to the fourth place with a score of 12,54. On the contrary, the smart trolley and AmazonGo lack RV and consequently score low regarding the overall value. After all, Amazon Go promises the highest CV compared to its competitors and displays its' advantages of a seamless shopping journey. Nonetheless, high risk and the unbearable costs of investment for traditional retailers erases most of the RV as of today.

8   Conclusion

In order to overcome the recent threats of new competitors, changing customer preferences and rising labour costs, retailers must rethink their business models. There are many structural changes necessary in order to implement an omnichannel approach and the deployment of different SCO systems is one inevitable measure. Based on this analysis, the Scan Gun offers the best mix of CV and RV, promising various benefits for both the retailer and the customer and may be interpreted as the "Allrounder" within the field of SCO technologies. Customers can expect high comfort levels when walking through the aisles and benefit from the ability to control the speed of the whole shopping journey. Scan Guns also provide a quick and pressureless checkout process due to the reduction of bagging areas that promote queuing and a safer customer experience for risk avers people. For retailers, Scan Guns require a moderate investment compared to other SCO that are available today. Furthermore, the technology is highly developed and retailers can rely on low failure rates. To ensure high adoption rates of the Scan Gun a grocer must consider numerous aspects during the implementation process too. Retailers may rethink store ergonomics in order to improve the PU and PEOU, increase the number of checkout and payment options to serve all the customer segments, deploy a high quantity of devices to mitigate friction points and invest in proper staff education in order to support customers during their checkout process. This particularly applies to those customers who will feel that the workload of grocery shopping is transferred from staff to themselves in order to cut jobs and to save money.

In addition, if grocers deploy multiple checkout experiences, they can create synergies within a retail environment which promotes technology adoption. A technology that might complement the Scan Gun is Mobile Scan and Go. Due to the drastic improvements of the

smartphone technology, this research discloses many benefits that are poised to even develop in near future. Especially with the option of biometric payments, the smartphone offers a wide array of applications that benefit the customer experience. Also, there is a global expansion of smartphones that match the requirements that are needed for Scan and Go purposes which offers retailers new opportunities. Due to the slight difference in overall SCO value Mobile Scan and Go must be mentioned as an additional SCO that offers a good mix between retailer and customer value.

9 Limitations and further research

Although this study provides new insights into the area of SCO technologies and their implication on the customer and retailer, it is necessary to discuss the various limitations of this research. Firstly, as it is mentioned numerous times throughout the interviews, the success of various SCO technologies heavily depends on the store size. For large-sized retailer, investment costs increase because of the high quantity of devices needed to serve all customers. In addition, factors just as rising safety measures or store ergonomics improvements to provide a better shopping experience may appear.

Furthermore, SCO technologies generally require more effort for customers if a large quantity of items is purchased. Measuring to what extend size effects PEOU or PU would have exceeded the scope of this research and was therefore disregarded. Actual staff savings are excluded from this analysis too, as many studies and interview participants cannot assess them. This is due to retailers not being aware of the actual impact of SCO devices, because their availability on the market just happened recently.

Secondly, in this study biometric pay is limited to the Mobile Scan and Go. Theoretically, biometrics can be developed in various ways within a retail environment. They can serve as an add-on to various SCO or as a dedicated SCO technology. Thus, estimations especially around investment costs are extensive and an interpretation of CV and RV might be vague. In addition, the interview participants hardly mentioned actual experiences with this technology in retail but suggested its potential with smartphones. As assumptions about biometrics in combination with Mobile Scan and Go is possible due to prior research, only this option of biometrics is examined.

Lastly, the total values of SCO were estimated by the researcher comparing interviews with the current state of the literature. While all variables for CV include the findings from both data sources, the assessment of RV splits into costs of investment based on literature findings and

risk solely based on interview results. For this reason, it should be mentioned that even though every assessment is aimed to be as objectively as possible, some calculations require further subjective interpretations about the research object.

9.1 Further research

This study might be used as a fundamental analysis for other researchers who want to concentrate on an in-depth evaluation of one specific SCO technology. Ultimately, it would be particularly interesting to repeat the same research during the next 5 to 10 years as it is expected that in the field of SCO there will be serious improvements especially in the area of Mobile Scan and Go and AmazonGo. In addition, biometric scan might further expand from Asian countries to Europe and could deliver new insights about CV and RV. Along with reliable data from retailers as well as industry studies on the financial implications of SCO, the same study in near future could present vastly different results.

9.2 Implications for suppliers

Due to the wide array of SCO technologies available today, SCO technology providers, software developers and security and database architecture experts are going to face increasing demand for their services. Secondly, with the development of Mobile Scan and Go there will be more opportunities for other brands to market their products on the retailer interfaces. As smartphones provide retailers with a large platform, its 'advertising space can be sold for various purposes. Also, payment service providers can even further integrate new payment methods into the retail environment. As the demand for biometric scanning is projected to rise, there will be a variety of business opportunities available.

10 Literature

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11 Appendix

Interview 1

Interviewer: How can retailers convince different customer segments to use new SCO technologies and why are still many people avoiding SCO?

Interviewee: Front end of the store has become much more customer taking control of the transaction. Some of that is customer drive. Customers don't like to wait and they feel to make progress when they are doing it themselves, they like to have options that they can get out of the lines when they are waiting for the checkout person. That way it is quicker for them. Some checkout journeys are more appropriate in doing it themselves. Typically, smaller shops, smaller basket sizes. But as we have had SCO in stores for 23 years, we have evolved from a very early concept with a ATM on a scale with the scanner on one side and the bagging area on the other, to something much more flexible. We have now a mix of things that we can address larger or smaller shopping journeys. The biggest migration has been in the smaller basket environments until now. We do see a number of customers that are working with it in USA or Western Europe and our customers have managed or adopted the smaller basket shops – some prefer some don't. And most of the statistical evidence is that the majority prefer what we are seeing in the small or medium size basket, where 73% -75% of shopping journeys customers are comfortable on the self-service solution. And the predominant one is still the physical workstation. Mobile Scan and Go on mobile phone or scan guns, smart trolleys. Scan guns in particular. The 3 typical self-checkout solutions you are referring to right now would be the Self-Checkout terminal at the end of the shopping journey, with or without cash, scan as you shop with an app on your own device or the gun provided by the stores. That are the biggest 3 self-checkout technologies today. There are emerging ones more but those are the ones. But the adoption is in the small to medium sized basket. We are now working with a number of retailers to see how we could take that customer desire or ability and enable them to do larger basket shops. We are finding that there are 3 major territories here. It is not a technological challenge we need to address. It's actually more and more a shopper ergonomics challenge. With the smaller basket is quite obvious you put it down on a certain place you scan from left to right or right to left and you put it into one or more bag to take your groceries home. When you come into an environment where people come out with a shopping cart, with a lot of items, a sort of north American basket sizes, the scan operation and paying operation is exactly the same. The ergonomics of taking things from a large cart where the things are stacked high and you have got things at the bottom of the cart you need to reach into, and the fact that as you enter you

need an awful number of bags, it's a usability challenge and ergonomics challenge. If you solve that, we have done that with a couple of customers, customers are more than willing to accept that and do it in their own time, because they are going to be accustomed to their own process. What that means, if that actually is a desired way for a large chunk of customers to serve themselves, could we move the remaining relucted consumer base from the dependency on checkout lanes with a staff sitting there, to something that could be assisted rather than pure self-service, using some of the technologies that are typical of self-checkout like the self-scanner technologies. But we are opening into an environment that supports a larger basket shop, so an ergonomically better workstation if you like and have the ability for a more mobile and more flexible staff to assist, not only one customer at a time but multiple. It becomes replaced through checkout, which isn't really purely assisted with an alternative which leverages the benefits of self-checkouts, not only for the consumer but also the store in terms of cash management or security and stock control etc. We move customers into those platforms but those are slightly less able for special needs people who are more reluctant. We assist those people in the migration, and if they don't want to ever migrate, then the staff to assist them at the self-checkouts by an assistant mode. We see a lot of thought at the front end of the store. As we reach a majority of the deployment of the self-checkout, in the most of the new store layouts, more than 50 percent or 60 or 70 of the front-end has a self-checkout option, that can include fulfilment on payment points or scan as you shop on mobile or held gun. In near future, 6 to 8 months, we will see front ends that drop entirely, the belted lane, the fixed membered staff. A number of reasons are driving that, customer adoption is increasing but also a big one is frustration of customers with those fixed lanes where we are all familiar with. More often than not, there are a number of lanes that are sitting idle, no membered staff there. What this kind of hybrid or assisted checkout offers, if there is no membered staff that it is still available as a self-checkout. So the holy grail of a number of retailer is an always open front end. There are no closed lanes to customer due to availability of staff. There may be closed down for security reasons to getting people to certain areas but there would be no technical reason that all lanes are not available, so therefore customer has ultimate reasons to use it.

Interviewer: Is there a difference in store transformation between different countries?

Interviewee: The main areas where store transformation is is in north America UK, Asia, Northern Europe. Those are the main markets for the 3 different types of checkouts. Nothing is unique about those markets, I think the customers everywhere are just as sophisticated and educated. We have no problems in adoption there. We are involved in ATMs as well. ATM

usage or self-service and banking is at a high level as well. So, I don't know about the slow adoption in Germany. I know that there are some using them. I don't see a reason why they could be not as successful.

Interviewer: How do you think about the use of biometric scans in Asia? Do you think that in Europe there could be issues with data security and country specific laws?

Interviewee: That is interesting, I work also in the banking areas, we have areas where we sell ATMs into where you interface with the ATM because of additional security not only for convenience. We got customers in Latin America which use fingerprint biometrics or palm biometrics, we've got customers in Turkey where the biometrics in your phone is part of the security, so if you can get into your phone and present a sort of a QR code in your phone, you can do different interactions with the ATM. We don't necessarily require a card or a pin. I supposed the simple answer is that retail will respond to the predominant payment options in the market place. We have a global trend on less and less cash transactions. But we still see that as we are talking to the leading retailers in the world, even cash transactions are less than 30% of the overall transactions, but they still need to handle cash. As the number of transactions becomes smaller it becomes more an overhead cost for the organisation. But it will take a lot for an organisation to say that they are not going to handle cash, because you are cutting off a segment of your population, and you don't want customers to go somewhere else. You see the rise of the AmazonGo stores. That has been the model that's been showing as too radical innovated, too overhead costly for larger more divers retail environments. But for those pilot activities, that's where they have been started with. In a number of territories, some of these new stores, they have been obliged to have a way for customer to pay by cash. In some states they are going to, they have seen a backlash as the retailers have to accept cash. In the UK, since there is a store where you can only pay per app, no cash or card. There you can still find the people that want to buy a bottle of water but don't want to go through that process, because it's a onetime purchase. So, they have actually got a manned checkout to deal with those exceptions. So, I think for the migration to cashless, to card, to contact less, biometric, it will happen but there is a long tail of legacy there where we won't switch up cash. Will ever be a complete slipover? Maybe not for a long time, but I think the trend is there and what we are actually seeing is more divers ways of paying and not turning off the old ways. In the future we will find more app only or card only smaller footprint self-checkout options. But there will still be the need of manned checkout lanes, there will be still one or two options where people can pay by cash.

Interview 2

Interviewer: Wie können Retailer ihre Kunden davon überzeugen SCO zu verwenden und warum meiden viele Kunden noch immer Self-Checkouts?

Interviewee: Also es gibt da ja altermäßig geringfügige Unterschiede, aber es ist nicht so, dass man sagt es stehen nur junge Leute dies Technologien aufgeschlossen gegenüber. Es gibt sogar viele ältere Leute, die diese Technologien nutzen und zwar aus ganz verschiedenen Gründen. Beispielsweise ist das selbstbestimmte Tempo beim Scannen so, dass man auch die Preiskontrolle hat was für die älteren Leute auch sehr wichtig ist. Ältere Leute haben auch oft das Gefühl, dass wenn sie das selber machen, dass sie mit den modernen Technologien mithalten. Das ist eigentlich ein Grundsatzfrage was der Handel da tun kann. Also es gibt schon einen Großteil der Bevölkerung aller Altersklassen die diesen Technologen sehr aufgeschlossen gegenüberstehen. Was vielleicht wichtig ist, ist man muss das auch sehr erkennbar im Geschäft auch platzieren. Wir wissen, dass bei Self-Check Out Stationen, die oft am Rande des Geschäfts platziert werden, weil das nicht anders geht, dass die halt nicht so stark frequentiert werden als wenn die sehr prominent im Hauptkundenlauf platziert werden. Dann nehmen die Kunden das viel mehr wahr, dass es sowas gibt. Das kann man sicherlich als Geschäft machen. Auch wenn man die innerhalb des Geschäfts erstmalig anbietet, dann ist es auch ganz wichtig die Kunden aktiv anzusprechen ob die Kunden das mal probieren wollen. Mit Hilfestellung des Händlers, also der Servicekraft, die bei Self Checkouts dabei ist - die hat da eine ganz große Funktion umso ein System auch attraktiv für die Kunden zu machen

Interviewer: Und die Kunden, die das noch immer nicht benützen wollen, sind die dann einfach nur überfordert?

Interviewee: Es gibt ein Hauptargument, dass viele Leute hervorbringen und das ist der persönliche Kontakt, den viele Leute noch brauchen. Und es gibt noch ein Argument, dass man nicht aus den Köpfen der Leute rausbekommt, obwohl das so nicht klassischerweise so stimmt. Die sagen: ich will nicht den Arbeitsplatzabbau unterstützen. Viele glauben noch, dass wenn sie diese Self-Checkouts nehmen, dass sie damit den Abbau von Arbeitsplätzen fördern. Also wenn man das so aus der Handelssicht sieht, dann hat das natürlich andere Gründe. Man ist viel flexibler und man spart auch nicht beim Personal ein. Die meisten Händler wollen gar nicht alle Kunden dahin drängen. Also alle die ich kenne, die wollen den Kunden die Wahlfreiheit geben. Und die Kunden sollen die Kasse nehmen mit denen sie sich am wohlsten fühlen.

Interviewer: Glauben sie, dass es hier regionale Unterschiede gibt?

Interviewee: Die Bedürfnisse nicht. Die Bedürfnisse der Kunden sind, dass man Wartezeiten verkürzen will. Das sind auch die Bedürfnisse der Händler, dass man eben zu Spitzenzeiten mehr Kunden durchschleust. Das bietet natürlich für beide Seiten enorme Vorteile. Was es wohl international ein bisschen einfacher macht - wir haben in Deutschland immer noch einen großen Barzahlungsanteil, was für die Händler bedeutet, dass gerade in Geschäften mit kleinen durchschnittlichen Zahlungsbeträgen wie im Lebensmittelhandel, dass diese noch immer eine Bargeldzahlungsoption haben müssen. Also wenn ein Lebensmittelhändler nur Kartenzahlung anbietet, dann sind die Nutzungsraten von SCO deutlich geringer. Das macht aus Händlerseite die Systeme viel teurer. Ein Barzahlungsmodul kostet irgendwo zwischen 8 bis 10 Tausend Euro pro Kasse. Deshalb probieren viele Händler 4 Selfcheckout Kassen, 2 davon mit Bargeldoption und 2 nur mit Karte, aber auch das ist auch für den Kunden ein bisschen schwierig zu erkennen. Der Kunde, der gerne bar zahlt steht dann schon mal falsch und dann gibt es Verärgerungen. Also das ist auch eine ganz wichtige Aufklärung. Aber weil auch in anderen europäischen Ländern auch die Kartenzahlung einen höheren Stellenwert auch bei kleinen Beträgen hat wie im UK, da ist es auch natürlich viel einfacher Self-Checkouts zu nutzen. Und was vielleicht auch ganz wichtig ist, in diesem Zusammenhang. Wir haben ja auch in Deutschland viele Unternehmen, die das einsetzen. Ikea oder der Lebensmitteleinzelhandel oder Decathlon. Wenn man sich die Systeme ankuckt dann laufen die alle ein bisschen unterschiedlich und dann gibt es keine einheitliche Oberfläche. Und das macht es auch für den Kunden ein bisschen schwieriger überall das einzusetzen. Die meisten Kunden gehen auch meistens auch nur dahin wo sie es gelernt haben. Da hat man natürlich auch als Kunde eine hohe Sicherheit das zu machen. Wenn man das im Baumarkt macht dann hat man vielleicht eine Grundaffiniät, aber die sind dann wieder ein bisschen anders und man muss sich auch wieder neu eingewöhnen. Dass ist eine Hemmschwelle, dass diese oft nicht gleich funktionieren.

Interviewer: Weil sie das auch die Kosten angesprochen haben, was halten sie von Alternativen wie mobile Technologien? Denken die gibt es eine Zukunft für diese Technologien?

Interviewee: Wir machen im Moment eine aktuelle Markterhebung, die wir ja 2015 und 2017 gemacht haben und machen das im August wieder. Ich kann Ihnen es leider nicht genau sagen, aber wir werden nächstes Jahr über 1000 Geschäfte haben die SCO anbieten. Bei Mobile Scan and Go gibt es aber noch nicht so viele. Ob sich das durchsetzen wird, muss man mal abwarten, also es ist ja heute so, dass die Smartphone Anwendungen unternehmensbezogen sind. Ich brauch die App des einzelnen Händlers und wenn es eine App gibt, die

unternehmensübergreifend ist, dann ist das viel einfacher. Meiner Meinung nach ist dieses Selfscanning eigentlich gedacht für große Einkaufskörbe. Damit man bei der Kasse nicht mehr auspacken muss, sondern mit einem großen Einkaufskorb die Ersparnis hat, dass man dieses aus und einpacken sich spart sondern nur mehr den Zahlungsvorgang erledigt. Das ist mit dem Handy wieder nur für kleinen Einkäufe gut. Das ist nicht komfortable von dem ganzen Handling her wie mit einem Gerät, dass ich von dem Händler bekomme. Das fängt schon mal damit an, dass ich es wohl schwer am Einkaufswagen befestigen kann. Dass ich immer eine Hand brauche, mit der ich das Handy benutze und auch die Bedienung ist nicht so einfach wie mit einer Scan Gun. Wenn es runterfällt, dann hab ich als Kunde den Schaden – die Geräte vom Händler sind so robust die vertragen das auch mal wenn sie runterfallen, da ist eigentlich kein Schaden zu erwarten. Das ist mit dem Handy anders. Einen geringen Teil der Bevölkerung findet das toll - die wollen alle mit dem Handy machen wie bezahlen. Aber ich glaub für die große Massenanwendung, die wird man nicht erreichen können. Da eher die Handscanner, die ich vom Händler bekomme.

Interviewer: Was halten sie von Smart Trolleys?

Interviewee: Das sehe ich im Moment nur als eine Spielerei. Ich kenne kein Unternehmen wo das großflächig angewendet wird. Ob das nachher so richtig funktioniert wie das die Hersteller sagen, da weiß ich nicht genau. Ich weiß auch nicht von den Kosten wie das ist, die Einkaufwagen müssen mit einer Technik ausgestattet sein, die sehr robust sein muss. Der Einkaufswagen wird auch gegen die Wand gefahren – da kann ich eigentlich nichts dazu sagen.

Interviewer: Was halten sie von Fingerabdruck oder Gesichtserkennung als Zahlungsmöglichkeit? Glauben Sie, dass diese Technologien in Europa Zukunft haben?

Interviewee: Wir haben ja im Moment sehr viele Zahlungsmöglichkeiten gerade was das mobile Zahlen angeht. Bis 20 oder 30 Euro brauche ich ja gar keine Authentifizierung wo ich auch das als Scan and Go machen kann. Diese Authentifizierung brauche ich dann eher bei höheren Einkaufsbeträgen. Da weiß ich nicht ob der Fingerabdruck das geeignete ist – ich kenne nur 1 Unternehmen in Deutschland die das anbietet. Wenn man das einmal registriert hat, kann man das bezahlen. Das Sicherheitsrisiko ist natürlich hoch. Das muss ja natürlich stark verschlüsselt sein. Wenn man ein Fingerabdruck im Netz auftaucht ist er ein Leben lang verbrannt. Gesichtserkennung ist dasselbe, da wir in Deutschland auch viele Probleme damit haben. Da ist der Verbraucher schon sehr stark fixiert auf seine Sicherheit. Da kann ich mir nicht vorstellen, dass das in kurzer Zeit an Bedeutung gewinnt. In unserer neuen Studie haben wir

aber auch Mobile Scan and Go inkludiert und wir haben auch im Anschluss gefragt auch ob sich die Kunden das vorstellen können auch analog mit diesen AmazonGO Technologien im Geschäft einzukaufen. Da muss man sagen da ist das Thema Datenschutz und diese Überwachung, die dahintersteckt und der Kontrollverlust hoch. Da ist der Großteil in Deutschland überzeugt, dass sie das wahrscheinlich weniger oder sogar niemals nutzen werden.

Interview 3

Interviewer: How can retailers convince different customer segments to use new SCO technologies and why are still many people avoiding SCO?

Interviewee: In the UK many customers are not still avoiding technologies, I should say that I am very focused in the UK and Ireland, that's my region. So, we have very strong usages of SCO and very educated consumers in the UK and there are only 10 Percent of the population that don't want to use self-checkouts. Maybe sometimes if they got baskets that are particularly difficult for SCO like items that need age verification or tactile items. So how can retailers to use new POS technologies? The Self checkouts, you can historically improve through education, so we put a big focus on staff-training. So, our trainers have trained retailers staff and the training has been not focused on the features or functions of the SCO, its 80% behavioural training. It is how to invite customers to use new technologies and also body language. Inviting, supporting and educate people that are first time using the technology. We educate the staff on the language to use, we encourage them not to say: "come to a self-checkout". We say: "come and try to do it and I show you how to do it for you or show it to you?

Interviewer: How about older customer segments? Are there any differences?

Interviewee: In the UK we don't see a difference anymore. Maybe we did 15 years ago, today not anymore. What we did in the past is if we were going to a rural area, where there wasn't a self-checkout, we matched the stances to the demographic of the region. In the UK we have retirement towns on the coast, so there is an older demographic, so we match the staff to those older customers. And that worked really well. They were chatting to those regular customers. That is very straight forward. If we apply that to other SCO technologies, we see that retailers in the UK and retailers in general push to the use of smartphones, scanning items and paying on the mobile phones and that's quite difficult for people to do. You have to use your own device, you've got to get the device out and load the app and trying to use the app to scan which is not easy and maybe holding the items in your hands, and there is lots of issues at the end of

the customer journey. You could just pay on your phone and walk out, scan the item put it in the handbag so there is no obvious policing by the staff and a potential loss issue for the retailer. It's an uncomfortable customer journey, so encouraging customers to use these technologies, retailers have a finalization area at the store, you are going into this area, scan a QR code, and pay, but that process is not necessary. However, it feels a bit easier for the consumer. Couse you see people sharing that you are paying even if nobody is looking. It's really difficult to encourage people to use that. Retailers will start to incentivise, so that was done in the very early days. Retailers had loyalty cards and maybe got points using self-checkouts, so we are maybe going to see that today as well. Like money-off certain items and promotions. With Self checkouts, what we have done with every technology, If you want customers to use it, you have to put a high density of the technology in so there is no queue there. So, when the customer comes at the end of his journey and he has to make choice between traditional or new technology, if it does not have a queue its more attractive so they try it. So, we do a lot of works around capacity. We do a lot of capacity modelling, we have a mathematical model based on how long it takes customer to use different technologies and we make sure to put enough capacity of technologies in the stores to make it attractive. Because there is no queue. I think where we are now with a lot of consumers in the UK that they are happy with the technology as a solution without the queue. And that's the main driver, queuing. Consumers don't want a queue to checkout. If you provide them a solution that does not have a que its more attractive.

Interviewer: How do you feel about Scan Guns or Smart trolleys in a retail environment?

Interviewee: Most of the retailers in the UK have retailer providing those devices. That's easier to get customers to use than the mobiles. But clearly its more attractive to get consumers to use their own devices, because they don't have to get the capital on the technology, so it's very attractive to them, but consumers are reluctant to use that because they lose charge or drop the phones. So, retailers have provided those devices. And we know our retailers have about 15% usage in the UK. That's more attractive to consumers. Smart trolleys - a lot of people are looking at that. That's more attractive to larger baskets. And that would be great to just pick up the trolley and all items would have been read already in the trolley.

Interviewer: To sum this up, self-checkouts are not progressing. But mobile phones are the technology that retailers are going to concentrate on?

Interviewee: There is a big push from the business side, that they would like consumers to do that. But the loss prevention department is very keen because it's very difficult to control loss

through that channel. Even with their own scanners, it's a loss through that channel and difficult to police where smart trolley are a better option to control.

Interviewer: Dou you think that Fingerprint or Face unlock in will play a more important role? Also, do you think that these technologies are possible in Europe?

Interviewee: Yes, definitely. We see facial recognition happening now, we have got lots of features on self-checkouts like automatic age verification. It looks at your face and it knows how old that person is. But you can see that it is very attractive to have payment channel associated with that as well or finger print.

Interviewer: But Do you think that there is a problem with the EU privacy policies or information security?

Interviewee: There are issues, but I think that the digital identity is getting a lot of traction. I don't know how it is in your country. In terms of protecting underage children on the internet it is becoming really important to be able to prove your age. There is a lot of joint political party work to try to get a way to digital proving about how old you are, so you are protected in the internet. So, I think that this is going to happen, because these are good things. Bad things happen also around privacy. So, if you could protect children from adult sites on the internet or sort of predators or prevent people that are pretending to be under 18 that are not, that is a positive side. There is governmental backing in the UK so there is lots of talks in the parliament or with Technology companies that are into digital ID. I think with that approach you can get a lot of positive sides.

Interview 4

Interviewer: How can retailers convince different customer segments to use new SCO technologies and why are still many people avoiding SCO?

Interviewee: When you talk about alternative technology, so for example self-service checkout, mobile shopping, scan as you go, and even kiosks online, what I say to most retailers or most CIOs that are embarking on new technology, is that this may be a IT project in terms of the implementation, but actually in doesn't even make a difference whether you use NCR or our technologies, the technology is the same. There are nuances in terms of speed or the costs or the sale rate and of course I would say that we have the best solution. But the key point of focus is on how you make that technology work in your stores, work for your staff and your customers. If you can operationalize that technology in the right way, that's where the real value

is. Your make that technology work for your company. And a big part of customer adoption is actually through staff. If you take self-service for example, there is a big misconception within the market, that Self scanning is there for cutting staff and getting jobs out of the store or taking humans away from the process. But actually, the technology is massively reliant on staff accepting it and pushing the adoption with consumers. When you go to a store and if you have never been to a store that has newly deployed self-checkouts, they you will always have a lot of staff around the self-checkout. The point is really to educate the customer on how to use the system, its' to make the process as painless and enjoyable to the consumer. Also, it is about inviting the customer to use a technology that worries them or where they are not sure how to use it. If a staff member can take a consumer that would not use self-service through the transaction and deliver a pleasurable experience to the customer, this customer is going to go back to the technology and use it every time, because they are happy and comfortable using this technology. It is important to get staff buying the technology because at the end of the time especially with SCO, you lose the human interaction with that customer. So, it's really important that you use the technology in the right way to enrich that customer experience, that they still get the right interaction with the brand of your company, and the experience they expect in your stores.

Interviewer: Are there any differences between older and younger customers?

There is not a different set of requirements. I think when you look at the consumers, if you look at age range, there are different wants in terms of what a customer expects when they go into a store. So, the younger generation typically does not want to speak with someone. They are very technology focused, and they really like to use technology that they have never used before or are not familiar with. And they are quite happy to learn how to use that technology. On the other hand, older people want to have more human interactions, because they go into the store every week, they speak to the same staff member. And for a lot of people that's the only real human interaction apart from other friendship or groups or family. But that's really important for them and what we say to retailers, is to understand who your customers agree. You never force customers to use one technology or one customer journey. What you need to do is to understand your customer demographic and make sure that you are applying multiple types of technology and multiple customer journeys in your stores to suit every need of your customers. That being said, we have a huge amount of older demographic using Self Checkouts. Because if you think about a manned point of sale, you put your item on the belt and you, as a consumer, you have the pressure of putting the item in the bag and pay and leave as quickly as possible so

the next person can begin the transaction. That's a huge pressure. If you look at self-service, there is a higher density of checkouts so the customers can take their time and complete their transaction at a leisurely pace that suites the speed the like and they don't have the pressure of a queue behind them pressuring them to go faster. So, you do see the older demographic using it because of less pressure. They also can have the human interaction because there is always staff to help them. The worst user are middle aged men, because they get frustrated quicker when they can't do something the first time and they don't like being told what to do.

Interviewer: How do you think about Mobile Scan and Go?

Interviewee: Scan and Go is a funny technology because it has been deployed at different rates in different countries. In Italy, they decided to use Scan and Go before normal Self checkouts. In the UK, they have gone very heavily on Self-service checkouts technology before they went to Scan and Go. It's the same principles as the self-checkout, you need to put a lot of work in upfront as a retailer to market the solution in the right ways. Market the benefits that the consumer can get if he uses the technology and incentivise in some kind of way like a loyalty scheme or get your money back on things. That is going to get people interested in terms of using it and then again, it's back to staff to make sure to have a lot of staff around the solution when you launch it. Also, make sure that the customers are aware that the solution is there, promote the use and generally guide the consumers through that first interaction, so that they are happy to use them more often.

Interviewer: What do you think about Scan guns?

Interviewee: I think that it is a technology that it's going to be leapfrogged or superseded by something else. If you think about Mobile Scan and Go, retailers would typically deploy hand held guns or an app for the smartphones. Fundamentally it's the same customer journey. It really depends on the customer, if he wants to use the retailers deployed gun or the phone. It's the same customer journey and ultimately just a different device.

Interviewer: And Smart trolleys? Do you think that this technology has a future in retailing?

Interviewee: I don't see it particularly taking off. I think that the market will go more towards an amazon go type technology. If you put all the technology on the trolley it makes it expensive, also risky when not returned to the store or stolen or thrown in the river. That's a lot of cash for a device not being in your store.

Interviewer: Because you mentioned Amazon Go, how would you assess its' potential?

Interviewee: It will involve but I don't think that it is there yet. It is probably 7 years away from being a scalable solution. But what they have done is interesting. They went into that bleeding edge technology, far in the future, and they pushed the boundaries to what can be achieved. The technology is really expensive, and it requires a huge infrastructure and it is limited on the number of customers in the store and the number of products you can sell. Realistically, because it is a bleeding edge technology, if you put that into your local supermarket, how many people are using that. 2 or 3 % if you are lucky? It's just a too huge of a jump for most consumers from an adoption point of view. And you have to take consumers on an iterative journey where introducing a technology. You can't just get an amazon go type technology into a store and expect customers to use it 100%. You have to bring that technology slowly and bring them on the journey that they are comfortable with the steps so its' not too much of a departure from their current shopping experience from the store. Were the AmazonGo will really get traction is not in consumer facing devices, its actually in the Backoffice efficiency. If a retailer can put the AmazonGo type technology in the store, they can track how many products are in the shelf, they can check what is out of stock and automate that process to say: "tins off beans have been out of stock" and fire an alarm to the Backoffice. They have got 30 cans in stock, so I am going to send an alert to the staff to bring new cans to restock and we have also identified a shortage, so I am ordering new stocks of beans from the supplier. That brings the technology in and you can build a business case on that based on the infrastructure from the store. Once you build the business case you can incrementally bring the technology into a consumer facing world.

Interviewer: So, it really depends on the infrastructure?

Interviewee: Exactly!

Interviewer: And Biometrics in general? How would you assess their potential in Europe?

Interviewee: I definitely think that it can come here, but it ultimately depends on the customer like what kind of consumer is comfortable with it. From a technology-based view, we can use a fingerprint recognition. A safer technological way is looking at the capillaries. We obviously have Android and iPhone with fingerprint scanning and facial recognition so it's starting to come through and ultimately the fact that the technology is adopted on a consumer device, and because of the quantity of devices, the technology is going to advance much quicker, than if you produce a the piece of technology in a retail environment in an embryonic state. Because you have a much smaller market, you are not going to produce that quantity of items. Ultimately, that technology exists now: we could pay by all biometrics, but it really comes

down to what consumers feel comfortable in terms of doing. If they are worried about data protection, fraud or identity theft, they are not going to be happy with effectively putting that wallet into a virtual environment and won't use that face detect. Another consumer who might be a very early technology adopter might be happier using that technology. When the saturation of the market is levelled than you get massed adoption. So, its' really not about the technology curve but the consumer adoption curve.

Interviewer: Do also country specific laws play a role?

Interviewee: Absolutely!

Interview 5

Interviewer: Wie können Retailer ihre Kunden davon überzeugen SCO zu verwenden und warum meiden viele Kunden noch immer Self-Checkouts?

Interviewee: Wenn ich das wüsste. Also was könnten Einzelhändler tun und warum machen die Kunden was sie wollen? Die Einzelhändler können verschiedene Sachen tun. Sie können natürlich ihre Kunden zwingen. In Dänemark gibt es bei den Tankstellen de facto nur Automaten mit Kartenzahlung. Punkt. Es gibt nichts anders. Zwang ist also eine probate Möglichkeit, wenn sich alle einigermaßen einig sind oder wenn ich irgendeinen Vorteil habe. Also wenn ich bei dem Billigsten einkaufen muss dann muss ich eben mit Karte zahlen. Also Zwang ist möglich. Im Einzelhandel kann ich natürlich ladenbautechnisch was tun, dass ich den Laufweg so mache, dass die Leute quasi erstmals auf den SCO stoßen. Dann kann ich, das macht zum Beispiel Ikea. Dann kann ich die Kassen so unterbesetzen, dass es lange Schlangen vor der normalen Kassa gibt und Kürzere vor dem Self-Checkout. Das ist die mal nicht ganz so offensichtliche Variante des Zwangs. Ich hab zwar offiziell noch alle Möglichkeiten - ich kann barzahlen und an der Kasse, aber dafür muss ich warten und wenn ich nicht so lange warten will muss ich zum Self-Checkout gehen.

Interviewer: Wie wirkt sich das speziell bei Lebensmittelgeschäften wie REWE aus?

Interviewee: Da kann ich genau dasselbe machen. Da mache ich nur 2 Kassen auf und hab 16 Selfcheckouts. Dann wissen wir beide, dass es lange Schlangen an den Kassen gibt und bei den SCO es schneller geht. Ich kann natürlich sagen, dass ich mit Couponing arbeite die nur auf den Selfcheckout funktionieren, das macht aber bis jetzt keiner den ich kenne.

Interviewer: Gibt es hier regionale Unterschiede?

Ohne Zweifel gibt's hier Unterschiede. Wir Deutschen sind ganz hinten dran, was die Verkäufe von Selfcheckout gemessen an der Bevölkerung angeht, da sind die Briten ganz vorne, Schweizer sind vorne, Österreich sind oberes Mittelfeld. Frankreich so lala, da gibt's auch was, aber das ist regional sehr unterschiedlich, das ist kulturell. Genauso des Deutschen sehr gerne mit Bargeld zahlen ist ein Faktor. Das ändert sich zwar, da es ja bergab geht mit dem Bargeld. Es gibt zwei Metriken die gerne vermischt werden. Der Umsatz, das heißt wie viel wird bar gemacht wird und wie viel mit Karten. Zweitens, da gibt's die Metrik wie viele Transaktionen mit Karte gezahlt wird. Umsatztechnisch ist die Kartenzahlung schon lange weit vorne. Nur mit den Transaktionen nicht. Wenn man was Kleines bezahlt, wie Zigaretten, dann wird gerne noch bargezahlt. In Dänemark zum Beispiel, da zahle ich beim Bäcker meine 4 Brötchen mit der Karte. Wenn man das mit Bargeld macht, dann werden die Augenbrauen hochgezogen. In Deutschland muss man hingegen lange suchen, wenn man einen Bäcker mir Karte finden will. Die Länder sind aber sehr nahe beinahe und man würde auch sagen, dass die und die Deutschen nicht so unterschiedlich sind. Das ist glaube ich erzogen. Ich glaube persönlich, dass die Deutschen – früher war es so, dass man im Restaurant erst ab 20 Mark mit Karte zahlen konnte, weil die Gebühren so hoch waren – so erzogen wurden. Es ist unhöflich kleine Beträge mit Karte zu zahlen, das hat man uns beigebracht und das hinkt noch nach. Und jetzt wo es einfach wird mit NFC die Karte einfach vorzuhalten und mit 20 oder 25 Euro ohne Pin zahlen zu können, bin ich überzeugt, dass es auch in Deutschland ganz massive Veränderungen geben wird.

Interviewer: Und wenn die Leute die Self-Checkouts nicht nutzen wollen, sind die ihnen dann zu langsam oder zu umständlich? Trifft das dann besonders auf ältere Leute zu?

Interviewee: Ich habe ein Projekt geleitet wo die älteren Leute lieber am Self-Checkout waren als bei der Kassa, weil ihnen da niemand im Nacken liegt. Da können die quasi in Ruhe ihre Cent Stücke in den Automaten reinwerfen und haben nicht unmittelbar einen hinter sich. Meistens gibt es ja eine kombinierte Schlange.

Interviewer: Und Mobile Scan and Go mit Handys? Was halten sie davon?

Interviewee: Anklang findet es daweil nicht. Scrabble heißt die Firma, die ich kenne und die haben 1 oder 2 Piloten. Man muss ja unterscheiden ob Self Scanning mit professionellen Geräten oder eben mit dem Handy. Das gibt es noch kaum und ich meine, dass die Handys besser werden und die sind auch gut was das Barcode Scanning angeht aber die sind 100 Jahre entfernt von dem richtigen Scanner. Wenn man so ein Handy auf den Barcode hält, dann stellt

der einmal scharf und dann ist der da. Beim anderen Gerät ist der einfach sofort da. Das ist schon ein zeitlicher Unterschied, und für den Retailer ist natürlich die Maschine, die ihm gehört attraktiver, weil er die Kontrolle hat. Bei den Handys braucht man halt für jeden Retailer eine App, da sind sich die Retailer natürlich nicht einig.

Interviewer: Glauben sie, dass Scan Guns oder der mobile Checkout in den nächsten 5 bis 10 Jahren an Bedeutung gewinnen. Welche Technologie treibt die Industrie an?

Interviewee: Also ich glaube durchaus, dass scannen mit dem Smartphone oder gar kein scannen, also Amazon Go, massiv zunehmen wird. Und dass speziell die Deutschen, die großen Retailer den Self Check Out einfach auslassen. Das wird's geben aber nicht in großen Maßen. Die Maschinen sind ja auch teuer, dass darf man nicht verkennen. Und die Handscanner, die Self Scanning Hand Guns, die sind unglaublich teuer. Nicht das einzelne Ding, aber man braucht sehr viele. Man braucht sehr viel Platz im Laden, die Akkus gehen permanent kaputt, man hat ständig Ärger mit denen. Da wir der Retailer sagen: lieber nicht. In Holland, das ist ja das Land der Selfscanner, da wollen die das unbedingt so machen. Die wollen das so machen, weil sie sagen ich pack meine Sachen nur einmal rein und meine empfindlichen Bananen und Äpfel werden nur einmal angefasst. Das hat aber in Deutschland wenig Anklang bekommen. Das wird ein Retailer niemals pushen.

Interviewer: Und der smarte Einkaufswagen? Glauben Sie das ein „smart trolley" Anklang finden könnte?

Interviewee: Wir haben sowas auch. Der hat sich dasselbe gebaut hat mit eine Linux Tablet. Kann man machen! Jetzt hat man aber das Problem, dass die Leute das Tablet und den Wagen klauen wollen. Dann brauche ich die auch nicht im Markt, sondern die stehen dann draußen. Das bringt dann wieder ganz andere logistische Herausforderungen. Plötzlich müsste ich ja verschließbar und halbwegs regendicht für 1000 Wagen Platz haben – das halte ich für eine Nische. Das wird sich nicht durchsetzen!

Interviewer: Und die klassischen Self Checkouts werden weiter Anklang finden?

Interviewee: Ich glaube das das auf einem niedrigen Niveau Anklang findet. Für Deutschland gesprochen, wird das nicht mehr sehr viel weitergehen, sondern wir werden direkt von normaler Kassa zu AmazonGo gehen, also gar kein Checkout. Das wäre mein Gefühl.

Interviewer: Und die großen Retailer machen das dann anders?

Interviewee: Ich weiß nicht wie die das machen werden. Es ist halt im Moment gar nicht wirtschaftlich, den 1000 Quadratmeter großen Rewe mit einer AmazonGo Technologie auszustatten, das freut nur den Kamera Hersteller. Die Technologie macht große Sprünge. Das ist der Bereich wo ich die größte Entwicklung sehe. Ich lebe davon Kassen zu verkaufen und ich mach mir durchaus Gedanken was ich machen würde, wenn die Kassen verschwinden. Die Österreicher sind was das Selfcheckout angeht, weiter als wir. Ich glaube nicht, dass ihr zurück seid. In der Schweiz sind sie ganz anders.

Interview 6

Interviewer: How can retailers convince different customer segments to use new SCO technologies and why are still many people avoiding SCO?

Interviewee: Well I think you have to see the usage as a progression Gregor. They have not been around that long. There have been 2 waves of SCO technologies in the last 25 years. We have to move back to 1990 when some companies where trying out SCO technologies. Since then, a number of companies tried fixed SCO. But the technology was very clunky. The consumers did not like it. It was not ready for its time and there was no acceptance for them. From 2000 onwards, it was different, and it improved fairly great. The main driver of the growth of using this technology was to save money by the retailers. So, this was not something that was driven by the public. It was driven by the retailer. It was recognized that there is a tremendous labour saving possible by making it public so you could have free labour. This was brought in very quickly during this time. But the public was not educated why this technology was useful. There was a backlash by this: Why am I having to do this? It is making my life harder and not easier, because I have to learn how to use these systems. So, it had been a long road in terms of resistance in USA, GB and Australia. They believed that it was reducing the amount of service for them and now they have to do it themselves. So that's taking a while as new generation has come through, because the young people are main likely to use new technologies than old shoppers. We have to see the progression. It varies across formats. In small formats you can have easily 70-80% of transactions with SCO Systems. If you look at the inner-city areas, where you have traffic, and some of the metro stores you have the vast majority in terms of transactions driven by SCO. Simply because the public is realising that it can be speeding up the process. Because the retailers are now making more machines available. And even in bigger shops, we are seeing typically now well over 50% of the transactions going over SCO. I was doing a workshop with 23 of the biggest users in the US. I asked them to what they think about how many transactions are going over SCO in the next 5 to 10 years and they were

about 70%. So, I think it is growing, but at the moment not every shopper wants to use it. They think "if you got a big basket, why would you want to do the self-scanning by yourself – its' much slower!". The technology of self-checkouts is not designed to manage big baskets. And if you got large baskets, the customers are driven to staffed checkouts because it is easier. In terms of Scan and Go the number in my article was the average. It was weighted in terms of turnover by the retailers. The number of usage rates were varying a lot. But it is quite a big investment for the retailers as it is not cheap to buy. It may only to begin to break even, when you begin to get 10-15 percent of the people using it. That's the reason why a lot of retailers are looking to Mobile Scan and Go.

Interviewer: Regarding Mobile Scan and Go, what do you think are the reason why some people don't want to use it? Is it privacy concerns or not trusting the technology?

Interviewee: No, I don't think it privacy, it is more about practicability. I don't know if you ever tried it in a shop. The challenge you have is that you need 3 hands. You need one hand for the phone, the other on basket, and another hand to pick the products from the shelf. So, its' actually a hard thing to do if you have a reasonable size of a basket to pick up. People find it awkward to use and eventually drop their phones. Its' difficult. So, in a certain way its good when you do it with a couple of items. For those retailers who tried it, it was less than 1% of transactions going through this technology for the companies I researched. There is variance. There is one company in USA that are pushing the Mobile Scan and Go with smartphones, but they are spending a lot of time or effort to educate the people to use it. But its difficult, it is really tricky for larger basket.

Interviewer: Amazon go?

Interviewee: The thing with the AmazonGo stores is that, on average they are 15 times smaller than the regular stores. The level of technological investments is enormous. A typical amazon go store has 3000 cameras in the store. Every shelf has a weight-based system, so every product is weighing the product, so you have the cameras everywhere monitoring everything so it's a huge investment. In addition, AmazonGo does not work well with variable products. If you say I just want to buy 3 apples, it needs to recognize all the data from them, so you find everything in the AmazonGo store to be pre-weighted and pre-packaged. So, it has limitations for bigger grocers in terms of offering variability to the shoppers. It is not scalable, and it is incredibly expensive, and it limits to a degree what you are going to sell.

Interviewer: So which SCO technology, in your opinion, is going to dominate retailing?

Interviewee: Future scanning is a very dangerous business. Trying to predict is really hard. If you could do it a lot of people are going to be rich. In the industry there is a trend to more SCO technologies and not less. Certainly, when you look at the staff savings to fixed SCO machines are very attractive. Where once you employ 15 staff you now hire 2. You know that the biggest costs to the retailer is labour costs and it is only going to increase over time, so it is increasingly pressure on labour. Certainly, other SCO are really attractive to the retailer no question. So I think you are going to see more fixed SCO and you are going to see various fixed SCO. Certainly what we are seeing is SCO systems without weight-based systems. So, they just allow the consumer to scan without having to weight the product so reducing the friction points around that. I think you will find more development in Mobile Scan and Go for small baskets. And also, the next 5-10 years you will see efforts to try and replicate AmazonGo in big formats, that requires a change in certain video analytics.

Interviewer: What do you think about Scan Guns or Smart trolleys?

Interviewee: I think for really specialist retailers you have a case. But when you look at the Tesco's, Saintsbury's, Carrefours, the big players like Auchan, the investments on those trolleys are profound. The investments on those trolley are incredibly profound. They are incredibly expensive. When you think in the Tesco's you have probably 600 to 800 trolleys on one time that's a big investment putting into this system. And also, if they are going to make sure that the trolley has power, how are you managing that they have power? They have to be docked. How do you make sure to not lose them? That's a huge risk. Trolleys get stolen from so how do you protect those? I think smart trolleys are good to niche retailers, but I don't really see big retailers to invest in those.

Interviewer: and how about paying by Biometrics?

Interviewee: For sure, it is already happening in China and Japan. You just need to go on YouTube to see it. I think there is going to be developments around that. When you go back 6 years, nobody would say I can walk in the shop and pay with my watch. And now I do it all the time. Undoubtably, there will be development around this. Facial recognition – its hitting buttons at the moment, there is a lot off opposition to the expansion to retail. You can see that in the US, where states like California have banned facial recognition or in the UK there is quite a lot of a debate. So, retailers are tremendously nervous about going into that space. I think at the moment technologies like face recognition are at the frontiers of acceptability. It is pushing a bound where the public feels a little uncomfortable. But I certainly think about the flexibility

to payments we are going to see a huge amount of expansion developed around how to use your device. Fingerprints, the fingerprint technology is only as good the reader. And the reader I only as good as how clean the previous persons finger was. So, if the person before ate a hamburger and the finger is in tomato ketchup and they stick the finger in the reader, would it still work? There are some technical issues on how reliable it is. What we see in NFC Technology there will be advances on how I could do that with my phone my watch or a ring around my finger, whether it can go down the line around implants.

Interviewer: So, to sum it up – Mobile Scan and Go and fixed SCO are the future?

Interviewee: There is no wrong or right answer. The technologies will be are around different store formats, so in small stores, metro stores, it is all about convenience and speed, so the SCO will evolve around making the experience getting quicker in faster. In bigger stores you have a different environment where the weight-based Systems will be more important and therefore it is less likely to remove this security. But it may be augmented with other forms of video security to make sure that retailers don't end up losing more than they make through these systems. It's a mixed economy! Different Tec are going to be used in different environments. There is a relationship between the amount of friction for customers and amount of risk for the retailer. I could reduce all the friction but that obviously creates tremendous amounts of risk. It's also the other way around. There is a strong correlation. How much friction is a retailer risking? AmazonGo has gotten rid of friction. But if you don't have your app you are not allowed to enter the store. Imagine that in Portugal for regular stores. That's hard friction if you are not allowed to go in there without the app. AmazonGo has the friction at the beginning but the they get rid of it for friction less experience. So, it's not the question about getting rid of friction it is changing the friction barriers. You might think about the degree the amount of friction the customers accept, and what that means to certain technologies. Never forget, the risk can be huge! A grocery in Europe is making less than 4 percent profit. You can lose up to 50% of your profit.