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**Digital Transformation in Grocery Retail:
An Exploratory Study of Self-Checkout in Germany**

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Abstract

A lack of staff and rising customer expectations jeopardize profits in German grocery retail. While it is known that digital transformation can counter these issues, a lack of know-how and limited financial means to absorb bad decisions restrain adoption. This study uses secondary data and expert interviews to exemplarily investigate factors influencing German grocery retailers' fit for self-checkout. By matching the factors with their business, retailers can circumvent bad decisions and increase their competitiveness. Findings indicate that an average customer age below 60, checkout queues, minimum three checkout employees, low-service products and glass fibre internet are critical fit factors.

Keywords: Digital Transformation, Self-Checkout, German Grocery Retail, Digital Fit

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1. Introduction

Retailers never cease to optimize their products and services and in consequence, customer expectations rise unstoppably. Shoppers require high quality for low prices, a large range of products and convenience, all at the same time (BBC 2020). Only those retailers, who can provide all of the above will survive in the long run. Satisfying these expectations while staying profitable represents an especially big challenge to German grocery retailers. In Germany, much more extremely than in other countries, prices have been reduced to a minimum and product range and quality are very similar across competitors. Thus, convenience remains the only field for differentiation (Herrmann, Möser, and Weber 2009).

No other change has shaped our society and the world of business as much as digital transformation (DT) has throughout the past decade. Digital technologies have had a significant impact on the improvement of customer experience, especially with regard to convenience (Sahu, Deng, and Mollah 2018). Simultaneously, DT has enabled businesses to reinvent themselves, optimize efficiency levels and eventually increase profitability (Shanker 2020).

If, thus, DT seems to be the perfect answer to the German grocery retailers' biggest challenge, one question imposes: Why are they still struggling to adopt it?

1.1 Research Motivation and Objective

Stressed out employees and a consequently miserable service have been a common complaint in German grocery retail for many years (Deutsche Welle 2003). A steadily increasing lack of personnel on the one hand and rising customer expectations on the other further reinforce the issue, jeopardizing consumer convenience and vital revenues (Hilpert 2019). Grocery retailers thus need to find solutions to keep meeting customer expectations while maintaining profitability. One way to obtain this goal is by purposefully engaging in DT.

However, when comparing the current degree of DT in German grocery retail to that of other countries, it is obvious that Germany lags behind (Shanker 2020; Ritter 2020). While, for

example, 69% of UK customers buy the same amount or more food online than in store, the revenue share in Germany accounted for less than 1% in 2019. Even though Covid-19 has drastically increased the topic's relevance, the total share still remains low (Blomaard and Bos 2020). The comparison is even more shocking with regard to the offer of self-checkout (SC) in brick-and-mortar stores. In America and Asia, SC has been the status quo for several years. Same holds true for several European countries, like the UK with almost 100% of grocery retailers offering some type of SC and the Netherlands, where the latter has been part of everyday life for the past decade (Brüggemann 2020a; Nott 2020).

Investigating the reasons for Germany's role as a straggler in DT, three main barriers to adoption stick out: First, grocery retailers often anticipate German consumers to be too conservative and sceptical to use SC. This, however, is a misbelief, as was proven by a study of EHI (2019). Second, three out of four managers in charge lack necessary digital know-how (Konradin Mediengruppe 2017). Even though they are aware of the importance of DT, they lack the time and capacity necessary to deal with it adequately (Sonnenberg 2019). Third, the profit margins in German grocery retail are extremely low. They vary between 1 and 3%, while in most other countries retailers obtain profits between 6 and 8% (Gassmann 2014). Facing the knowledge-based risk of bad decisions and the extremely narrow profit margin to compensate bad investments, German retailers are very hesitant to adopt DT.

Thus, in order to enable more German grocery retailers to meet customer expectations without sustainably risking profitability, a compact format of acquiring know-how about DT, potential application areas and concrete applications is necessary. Among others, retailers further require viable criteria, based on which they can determine their business' fit for each application (Schallmo and Williams 2018)¹. As per Schallmo and Williams (2018), fit is given if a business

¹ A roadmap, from which all know-how requirements for DT adoption may be derived, can be found in Appendix 1. Answers that can be provided based on this research's theoretical background, are presented below the roadmap. Know-how required for adoption stages following the fit determination is out of scope due to this research's spatial restrictions.

is generally suitable for an application and if, on top, the application contributes to the achievement of the set DT goals.

In consequence, it shall be the objective of this research to provide German grocery retailers with a compact overview over DT and its potential goals, information about one exemplary application and the respective fit criteria. Being the most relevant technological trend in grocery retail in 2020, the exemplary application shall be SC (Hoeft 2019).

1.2 Research Structure

The present research is structured into seven integral parts. After introducing the research motivation, objectives and structure in section 1, section 2 deals with the theoretical background relevant for the research's further course. A definition of grocery retail is followed by a presentation of DT and an overview over SC. In section 3, the current state of the German grocery retail industry as well as the prevalence of SC in it are examined. The fourth section deals with the performed empirical research. First, the research problem and the subsequently defined research question are introduced. A second sub-section contains a description of the data collection methods and the sampling. Section 5 presents the interview results. Section 6 consists of a discussion of the results and the research's limitations. The seventh section summarises the main findings and concludes with an outlook on further research possibilities.

2. Theoretical Background

2.1 Grocery Retail

In order to define grocery retail, a preliminary explanation of the term retail is helpful. Literature and relevant institutions commonly define retail as the sale of small quantities of commodities to private consumers (Destatis 2020; Schneider n.d.; Schmid 1996). Retail activities can take place via different touchpoints, comprising the four channels stationary retail, hawking, mail order and online or e-commerce (bpb 2016).

Grocery retail represents one of many industries within the field of retailing. It specifically refers to the retail sale of a variety of goods in the same unit, where food products, beverages, tobacco and selected household products are the predominant assortment (Marketline 2019; EC 2008). Like in overall retail, grocery retail formats comprise stationary retail, hawking, mail order and most recently also online grocery retailing (HDE 2018). Stationary retail channels include supermarkets, discounters, convenience stores, hypermarkets and traditional grocery retailers like for example butchers, organic specialists or bakeries (Euromonitor 2020b).

Within the present research, only grocery retail via stationary retail channels will be considered. Grocery retail in the form of hawking, mail order and e-commerce are out of scope due to a lack of relevance for SC.

2.2 Digital Transformation

2.2.1 Definition

In literature, no common definition of the term DT exists. While some scholars use the expression interchangeably with digitization and digitalization, others stress the need to distinguish the three phenomena (Herbert 2017). According to their understanding, digitization is the technology-enabled transformation of analogue information to a digital format, while digitalization describes the same for operations (Bloomberg 2018; Bockschecker, Hackstein, and Baumöl 2018). Both processes are business-centric (Matt, Hess, and Benlian 2015).

DT, in contrary, refers to the integration of digital technologies into all dimensions of human interaction and communication (Gebayew et al. 2018; Suriano 2018). With regard to business, it describes the process of using (innovative) digital technologies to not only improve existing business processes and models, but to entirely rethink and disrupt them, transforming the way business is done (Reis et al. 2018; Salesforce Inc. 2020). Unlike its predecessors, digitization and digitalization, DT is no longer limited to internal efficiencies. Leaning on recent customer-centric trends, DT enlarges the improvement focus by customer experience (Westerman et al. 2011; Martin 2008). In consequence, within this research, DT shall be defined as the actively

managed assurance of a business' sustainable value creation by enhancing customer-perceived performance and business profitability through technological progress.

2.2.2 Application Areas of Digital Transformation in Business

While scholars list distinct application areas of DT in business, most coincide on the following three: DT of business processes, DT of business models and DT of customer experience.

The *DT of business processes* refers to the re-definition of processes through the use of digital technologies. Process automation, for one, enables businesses to increase efficiency through raising speed and freeing up employee capacities for more strategic tasks. At the same time it facilitates cost reduction. Worker enablement, for the other, describes the technological reinvention of processes related to the organizational culture. It allows employees to work more flexibly and efficiently, enabling e.g. real-time collaboration and organization-wide knowledge sharing. Positive consequences are the acceleration of decision-making, improved outcome quality and cost savings (Bouhdary 2018; Annacone 2019; Kane et al. 2015; Westerman, Bonnet, and McAfee 2014).

The *DT of business models* describes their disruption by augmenting existing products and services through digital facets, like the addition of an online sales channel to the regular business. Simultaneously, DT of business models can mean the introduction of entirely new digital solutions to complement existing products. An example is the inclusion of workout tracking devices to the portfolio of sports apparel manufacturers. Outcomes comprise improved value propositions to consumers, enhanced competitiveness and, optimally, also increased profitability (Bouhdary 2018; Annacone 2020; Westerman, Bonnet, and McAfee 2014).

Finally, the *DT of customer experience* implies the transformation of customer understanding, top-line growth and customer touch points. Digital technologies can be used to pick up or actively request customer expectations toward the own organization. This enables businesses to adapt and promote their brand strategy and portfolio accordingly. Top-line growth refers to the integration and digital analysis of customer data. The latter allows companies to get to know

their customers better, create personalized offers and provide improved customer service, resulting in an increase of sales. Lastly, the DT of customer touch points covers the use of digital technologies to enhance customer convenience and improve business profitability, simultaneously. Examples are the establishment of social media accounts facilitating consumer requests or the offer of self-service via digital tools, so called self-service technologies (Annacone 2020; Westerman, Bonnet, and McAfee 2014).

2.3 Self-Checkout

2.3.1 Definition

Self-service technologies describe technological interfaces which enable consumers to use a service without an employee being directly involved (Meuter et al. 2005; Zhu et al. 2013). By doing so, the consumer is made an active part in the retailers' business process (Abana et al. 2019; Oyedele and Simpson 2007; Meuter et al. 2000). This leads to a perceived reduction of time spent on the service and in consequence to an improvement of the customer-perceived business performance (Hornik 1984). In literature, two types of self-service technologies are distinguished: "off-site" technologies include remote services like online banking or internet shopping, while "on-site" technologies refer to self-service that is offered physically, like for example automated ticketing machines at the airport or SC tools in brick-and-mortar stores. SC, oftentimes also referred to as "self-service checkout", "self-scanning checkout" or "automated checkout", describes the automated process of shoppers scanning, bagging and paying for their purchases without human assistance, using self-service technologies instead (Iqbal, Hassan, and Habibah 2018; Rouse et al. 2020).

2.3.2 Self-Checkout Technologies

Over the years, different SC technologies have evolved (see Appendix 2). Fixed SC describes immobile machines or kiosks in a store's checkout area to which consumers take their selected items in order to scan, bag and pay them autonomously (Johnson, Woolridge, and Bell 2019).

Fixed SC technologies comprise self-checkout terminals (SCOs), tunnel scanners and RFID scanners (Kantarci 2020; ITAB 2020; Happich 2020). On the contrary, mobile SC comprises all SC technologies that can be carried around the store. Depending on the technology, consumers use a retailer-owned device or their mobile phone to scan chosen items. This allows simultaneous selection, scanning and bagging of articles while moving through the store. After completion, the already registered articles can be paid for either at a dedicated SC counter or via mobile payment (Andriulo, Elia, and Gnoni 2015). Another mobile SC technology are smart shopping carts, where items are scanned automatically once dropped into the cart (Statt 2020; Medium 2019). The most advanced SC technology is called “frictionless checkout”. First, customers have to register in an app previous to their shopping trip. When at the store, they can authenticate through the app, grab all desired items and leave without attending any check out process. The latter takes place automatically, based on computer vision, app authentication and the deposited payment method (del Conte 2019; Tippets 2019).

2.3.3 Advantages & Disadvantages

SC’s main advantage for grocery retailers is increased competitiveness and it results from three components: cost savings, increased revenues and improved customer satisfaction and loyalty. Cost savings emerge mainly through reduced labour cost, as one employee can supervise several checkout lanes. Additionally, depending on the SC technology, potential savings with regard to checkout machinery can be obtained. Increased revenues can be achieved through spatial optimization. SC solutions are usually smaller than traditional checkouts and thus, the newly available space can be used to offer more products (Kauffman and Lally 1994; Alpar 1992; Kara and Orel 2014; Litfin and Wolfram 2010). Improved customer satisfaction and loyalty are a result from SC’s customer advantages. The main improvement for customers lies in increased convenience. Usually, the introduction of SC goes along not only with the replacement of traditional cash desks, but with additional checkout units. Therefore, queues are reduced, resulting in an optimization of checkout speed. While the latter means increased speed

for some, who aim to minimize their length of stay, it means decreased speed for others, who are keen on controlling each unit's price during checkout (Kara and Orel 2014; Andrews 2009; van der Velden 2017; EHI 2019). Additionally, reduced queues enhance the chances of keeping spatial distance from other customers, especially relevant with regard to Covid-19 (Brüggemann 2020b). Lastly, the previously mentioned spatial optimization and consequent offer of additional items leads to a greater choice of assortment, further improving customer experience (Hamacher 2017). Apart from convenience, some users further report an increased level of shopping excitement, triggered through the use of SC (EHI 2019c).

The main disadvantage for retailers is an increased risk of shoplifting and a consequent profitability reduction. On the contrary, customers might face anxiety or stress when using the technology (Luyken 2018). Also, if complications come up, customers are likely to be dissatisfied, preventing repeat use and subsequent establishment. Lastly, some customers enjoy the interaction with employees and thus dislike the fact that SC does not involve personal contact (Kara and Orel 2014; Meuter et al. 2000).

3. German Grocery Retail

3.1 Market Overview

With more than 83 million customers, the German grocery retailing market is the largest food and beverage market in the EU (Scott, Faris, and Bielinska 2019). Its overall size totalled €160 billion in 2019, accounting for one third of all accumulated retail revenues in Germany (EHI Retail Institute 2020a; 2020b). The industry has been dominated by discounters, followed by supermarkets ahead of hypermarkets (Hofer 2020b). In terms of retailers, the market is highly concentrated, with four players controlling approximately 60% of the revenues: Edeka Group, Rewe Group, Lidl and Aldi (Euromonitor 2020a). While concentration, customer loyalty and format differentiation have kept the industry relatively stable in the past, market saturation and a declining population are shaking this stability up now (Kantar Consulting 2018). First, the

overall number of offline stores is decreasing continuously (BBC 2020). Thus, retailers can no longer compete through expansion, but are forced to grow through existing stores' sales growth. Second, steadily rising customer expectations have forced grocery retailers to degrade channel differentiation. Nowadays, low prices and a broad choice of high quality products are basic requirements towards discounters, supermarkets and hypermarkets simultaneously (Herrmann, Möser, and Weber 2009). In consequence, German grocery retailers can only differentiate via one remaining field: convenience (Scott, Faris, and Bielinska 2019; Hofer 2020b).

In German grocery retail, convenience comprises three main dimensions: First, customers expect flawless service, including product consultancy and permanently stocked shelves. Second, customers expect to shop at a self-defined pace. Many consumers increasingly face time constraints. For them, grocery shopping has to be made as time saving as possible. Others, mainly seniors, aim to avoid stress and control their purchases. For them, a procedure with reduced speed is favourable. Third, with regard to Covid-19, consumers expect the chance to keep spatial distance (Damm 2018; Funke Mediengruppe 2020; Supermarkt Inside 2020).

German grocery retailers follow different approaches to provide maximum convenience to consumers. Supermarkets like Edeka and REWE, for example, have entered the convenience store business, offering shoppers on the go the opportunity to make small purchases in a fast manner (Hofer 2020b). Another approach, followed by Amazon, REWE and new players like Picnic, is the offer of online grocery shopping. However, even though Covid-19 has increased the acceptance of the latter, observations have shown that German consumers still prefer to shop groceries offline (Adam 2019). An approach to retain customer loyalty in brick-and-mortar stores is the enhancement of customer experience through the adoption of digital technologies, like for example SC (Hoefl 2019; Hofer 2020a).

3.2 Market Characteristics of Self-Checkout in Germany

In contrast to countries like the US, China or the UK, where SC has been state of the art, German retailers are rather hesitant regarding its introduction. Partly, this is caused by the common

believe among grocery retailers that German consumers are too conservative and sceptical to use SC. However, trusting a recent study of EHI (2019), the latter is untrue. While users of 60+ years do show an overproportionate hesitance, the rest of the population is generally open towards the use of SC. The consequences of this misbelief are critical: While in other countries, SCOs are normality and mobile self-scanning is on the rise, SCOs are still a scarcity in German retailing branches and mobile self-scanning is practically non-existent. A study of EHI Retail Institute (2019) has revealed that SCOs account for less than 0.5% of all checkout possibilities in German offline retailing and for less than 3% of German grocery retail stores (EHI Retail Institute 2019; 2020c). Leaders among the German grocery retailers, offering SCOs, are Edeka, with more than 200 branches and Kaufland as well as REWE with more than 100 branches each. Other grocery retailers offering SCOs include Real, Netto (Edeka Group) and Familia-Nord (Supermarkt-Inside 2020). With regard to mobile self-scanning, the same study found out, that only around 100 stores in Germany offered such a service in 2019 (EHI Retail Institute 2019). While the absolute number of offering stores has increased remarkably during the past year, partly in order to increase contact prevention with regard to Covid-19, the share remains alarmingly low. The leading grocery retailers in terms of mobile self-scanning are Penny with 111 stores (5%) and REWE with 50 stores (1.5%) (Penny Markt GmbH 2020; Chip 365 2020). Apart from the Rewe Group, the medium sized companies Globus and Feneberg as well as a handful of independent Edeka businessmen offer mobile self-scanning (Globus 2020; Lebensmittelzeitung 2019; Chip 365 2020). Losers with regard to SC are LIDL and ALDI, but especially small, independent grocery retailers (Chip 365 2020).

4. Methodology

4.1 Research Problem

As the above status quo assessment shows, German grocery retailers lag behind with the adoption of SC. Their hesitance stems from low levels of management know-how as a basis to

make good decisions and narrow profit margins to cover bad ones. Thus, after providing a basic overview over DT and SC in the first part of this study, the following primary research shall help to reduce German grocery retailers' risk of bad decisions in SC adoption. The focus will be on the first critical step: determining business fit with the application. Consequently, the main research question shall be: What factors influence a German grocery retailer's fit for self-checkout?

4.2 Data and Methods

As, thus far, no open data is available to answer the research question satisfactorily, an empirical field research was conducted. In order to confirm the assumed relevance of SC and understand the relevant dimensions to determine a retailer's fit with it, qualitative research with a partly exploratory and partly evaluative approach was chosen. More precisely, one-on-one semi-structured interviews were conducted with a selection of 14 experts. All interviews were conducted in German, online or via telephone and lasted between 30-45 minutes. During the interview, a predetermined list of 13 open questions was discussed. The interview guide was structured into two sections covering general information about SC in German grocery retail and factors influencing a retailer's fit with the application. The interview guide can be found in Appendix 3. After transcribing all interviews, meanwhile applying narrative analysis methods to the data, relevant quotes, so called data units, were aggregated and structured in an analysis grid. In the following analysis and interpretation phase, each data unit was coded and themes were developed and refined in an iterative process, using thematic analysis.

4.3 Sampling

The sampling frame for the present study consists of all SC providers, all German grocery retailers and all independent experts from the field of SC. Using a non-probability sampling approach, the researcher selected and interviewed 14 individuals from this sampling frame, exceeding the required minimum sample size of 12 interviews for a heterogenous group of

experts (Saunders 2012). Participants were assembled based on quota and convenience sampling techniques and stem from the researcher's personal network, LinkedIn and media research as well as expert recommendations. Six experts work for SC providers in Germany, five are representatives of leading German grocery retailers and the three remaining interviewees are independent experts in the field of SC.

5. Presentation of Results

5.1 Relevance of self-checkout in German grocery retail

To start off, all 14 interviewees agree on the fact that SC is still in an early phase, but its relevance is going to rise in German grocery retail. According to the experts, reasons for the establishment are the demographically amplified lack of personnel and the need to offer convenience (E3). “[S]tationary retailers must offer customers better service, if they want to survive. They have to stand out from the competition. And that can be done, for example, by offering self-checkout” (E11). While expert opinions differ with regard to the exact share of grocery retailers offering SC in 2025, what they agree on is a remarkable increase in prevalence. One expert projects the share of SC revenues in German grocery retail to rise to 10% over the next five years (E12). Further, experts agree that, until 2025, SC will only represent an addition to traditional checkouts in most cases. Exceptions comprise rural areas with a business-endangering lack of personnel, test instances in city locations where consumers can evade to other stores and stores extending opening hours, e.g. at night or on Sundays (E5, E6, E8).

5.2 What factors influence a German grocery retailer's fit for self-checkout?

During the interviews, the experts mentioned various suitability factors that, in their opinion, influence a grocery retailer's fit for the introduction of SC². The factors can be clustered under the following eight dimensions: customer characteristics, checkout queues, number of checkout

² The factors will be referred to as *suitability* factors in the presentation of results. According to Schallmo and Williams (2018), the term *fit* factor may only be used once a factor is assumed to have a relevant influence on fit and, on top, to contribute to the business' DT goals.

employees, product assortment, risk of theft, availability of glass fibre internet, spatial conditions and financial situation.

Customer characteristics

With regard to the customer characteristics, experts differed in their opinion. The first discussed factor is the customers' age. While one expert stated that "*[w]ith older people you have more respect whether they'll accept [the technology]. Younger people are more likely to try things.*" (Expert (E) 10). One of the others countered this opinion by saying that "*[d]emographics don't matter. The topic of self-checkout is accepted across all age groups*" (E9).

The second influential factor, mentioned by several experts, is the share of returning customers. As one expert said: "*It's important that I have a large number of regular customers. Self-checkout usage is highly influenced by a learning effect*" (E7).

A third perceived suitability factor of German grocery retailers is the customers' family status. Again, opinions differ on the impact. While one expert assumed that mothers shopping with children are potential first movers, valuing less inactive waiting time for their kids, another one stated the exact opposite (E4). "*The mum with two children is simply happy if she can beguile her children while the cashier scans her purchases*" (E8).

Checkout queues

Also, a store's customer volume was often named as a suitability criterion. "*Are customers queuing at some point during the day?*" (E5) In that case, according to experts, SC can provide three advantages through reducing queues. First, it can help to optimize customer-perceived checkout pace. Believing the experts, some customers want to leave the store as fast as possible and to them, reduced queues indicate a gain in time. Even though "*[self-checkout] may not always be faster, because customers scan slower than trained cashiers, [...] it is at least a perceived gain in time*" (E1). Simultaneously, there are other customers, who feel overstrained by the current checkout speed, because "*the scanning process at the attended checkout is much too fast to control prices*" (E1). They, too, would receive the chance to adapt their checkout

pace to their personal preference. Second, reduced queues can help to improve grocery retailers' cost of space. “[C]heckouts and checkout lanes take up a lot of space in the entrance and exit area. [...] This zone can be dramatically reduced with self-checkout [...]. The newly free space can be equipped with additional products” (E8). And additional products mean additional revenues. The third advantage is related to Covid-19: “[Via self-checkout], I can process more customers at the same time, which results in shorter queues. And currently people do not like to stand in queues” (E13). The possibility to keep spatial distance increases customer-perceived safety from an infection and thus the level of comfort during shopping.

Number of checkout employees

Experts repeatedly mentioned that, for suitable grocery retailers, SC reduces the required number of staff in the checkout area. One provider captioned it “*the opportunity to use staff more efficiently*”, as “[*the employees*] are urgently needed in other areas of the branch” (E5). Another interviewee went more into detail, saying that “[*i*]t is especially suitable for larger shops with more than two [*manned*] cash registers” (E1). Only then does the new minimum number of employees – one at the manned checkout and one supervising SC – fall below the current need, releasing capacities. As per the experts, freed staff capacities can for example be used for optimized shelf stocking, on-floor consultancy or the offer of taste testing.

Product assortment

With regard to the potential influence of a grocery retailer's product assortment on his suitability with SC, all experts were on the same page. As one expert stated comprehensively: “[*Self-checkout*] is easier to implement for retailers who only sell fixed units with EAN codes. Nowadays, though, all grocery retailers offer loose items without packaging. This makes [*self-checkout*] more difficult, but it should ultimately have no influence on the introduction” (E2). Another interviewee mentioned, that the suitability for SC decreases with an increasing range of products. According to him, the limited choice leads to customer familiarity with the products, e.g. the barcode's position on the packaging. “[*This*] speeds up the whole process

and simplifies it for the customer and ultimately also for the retailer, because [the latter] has to help less” (E5). Lastly, interviewees stated a reduced suitability of retailers mainly offering products that require employee cooperation, like e.g. fresh meat or fish (E12).

Risk of theft

Throughout the interviews, the most mentioned risk of SC was an increase in theft. One independent expert estimated that *“[w]ith self-checkout, you have a much higher inventory loss, that cannot be compensated by saved personnel costs. This means there is a risk that the 1% profit margin, which is common in German grocery retail, will be eaten up quickly” (E3).* Another was less general, saying that *“[i]f you have a shop [...] where there is an increased risk of theft anyway, it makes no sense to introduce self-checkout” (E1).* Many mention the risk, but invalidate it right after by arguing that theft is mostly committed before entering the checkout area. *“[M]ost people who want to cheat don't do it in the checkout area, they put what they want to steal into their pockets between the shelves. And whether they end up going through a normal checkout or a self-checkout makes no difference” (E5).* Another confirms this and goes even further saying that *“some grocery retailing customers [...] have compared the situation before and after the introduction of self-checkout and they report no changes in the theft rate within a period of one year” (E7).*

Availability of glass fibre internet

A fourth dimension that was made topic of discussion in several interviews is the store's technological readiness. Several experts mentioned the importance of functioning glass fibre internet for the retailer, highlighting its central role in the transaction-related data transfer (E3, E8). One of them also broached relevance from the customers' point of view, saying that *“[i]f the technology does not work, the customer will be dissatisfied” (E8).* Another interviewee estimated this prerequisite to reduce the suitability of grocery retailers in German rural areas, as *“in [these] areas it is not even possible to pay by card because the internet conditions are very poor” (E4).* This then definitely excludes sufficient data transfer speed for SC.

Spatial conditions

Another suitability factor are a store's spatial conditions. It is some experts' opinion that only stores, in which it is possible to *"integrate it [...] into [the] existing market structure"* (E2) are suitable for SC. Other experts counteract by remarking the broad choice of SC technologies, containing solutions for retailers with a lot and very little space.

Financial situation

The last dimension that was broached by experts is the grocery retailer's financial situation. While one provider said that *„in Germany, retailers typically say that everything taking longer than 2 - 3 years [to amortize] is no longer interesting"* (E5), another one was very firm in his opinion that SC should be introduced regardless of budget. According to him, the introduction of SC is driven by the unstoppable nationwide demographic change and thus all retailers are in need, regardless of their planned budget (E3).

5.3 Impact intensity of fit factors

The experts assign different levels of importance to the above factors regarding their influence on a retailer's fit for SC. While some are of the opinion, that certain factors clearly qualify or disqualify retailers for SC introduction, others think that it is relevant for every grocery retailer regardless of the circumstances. To the latter, the above factors represent catalysts or inhibitors for the fit, but never disqualifiers. One expert broached a middle course, stating that *"Retailers don't have to ask [...] 'if', but 'when'"* (E4) to introduce SC. In her opinion, stores that show fostering factors are suitable to introduce SC near-term. Those, that mainly show limiting factors, should wait for the technology to mature and bypass present obstacles.

6. Discussion

After presenting the expert opinions in the previous section, they will now be critically evaluated. First, a discussion of SC's general relevance in German grocery retail will be led. Then, each suitability factor's relevance and SC's contribution to the overarching DT goals –

customer convenience and improved business profitability (see section 2.2 and Appendix 1) – will be debated. If both, relevance and contribution, are given, the suitability factors are assumed to influence German grocery retailers' fit for SC. A discussion of their influence intensity will close the section.

6.1 Relevance of self-checkout in German grocery retail

Both, interviewees and scholars agree, that SC will be of increasing relevance in German grocery retail. Even though present prevalence is still very limited (see section 3.2), trends like increasing customer expectations and a rising lack of employees will further intensify competition and force German retailers to react. As, according to EHI (2019), time scarcity and the resulting need for convenience are currently the dominant pain points for consumers, SC, as a mean to optimize shopping speed, seems a suitable DT application to examine exemplarily.

6.2 What factors influence a German grocery retailer's fit for self-checkout?

6.2.1 Suitability factors for self-checkout in German grocery retail

Customer characteristics

While some experts agree with EHI's (2019) study results, that the customers' average age has an impact on SC use, several grocery retailers counter the assumption. From their own observation they report simultaneous use throughout all age groups, specifically rejecting the perception that use rates decline with increasing customer age. However, taking into account the proven representativeness of EHI's study, it seems like the experts negating the influence of average customer age are mistaken. It can thus be assumed that an average customer age of below 60 remarkably increases German grocery retailers' suitability for SC.

Knowing that habit pushes the use of SC, it might seem beneficial for success to have a high share of returning customers (Wang, Harris, and Patterson 2013). However, looking at retailers in train stations or airports, where returning customers are the smallest share of visitors, SC adds value, too. By offering timely restricted people in travel hubs the opportunity to

circumvent checkout queues and increase shopping speed, their likelihood to make a purchase increases remarkably (Andrews 2009; van der Velden 2017). Thus, even though the customer return rate might influence SC suitability, this holds true only for some retailers. Hence, it does not belong to the main factors, on which retailers should base their digital fit decision.

Expert opinions differ fundamentally regarding the family status of users, stating both extremes. Scholars do not discuss this dimension at all. As notions among experts are so distinct and no relevance is assigned to the topic in literature, it seems like the customers' family status is not the decisive user characteristic, but only a random, accompanying factor. Thus, German grocery retailers' fit for SC seems to be independent from the customers' family status.

In consequence, an average customer age of 59 or younger is assumed to be a suitability criterion, while the other customer characteristics cannot be classified as relevant factors influencing German grocery retailers' fit for SC.

Checkout queues

Grocery retailers that serve a high volume of customers simultaneously, either generally or at certain times during the day, often experience the formation of checkout queues. The expansion of checkout options via SC provides those retailers with the opportunity to attend more customers at the same time, reducing customer accumulation in the checkout area. Scholars and experts agree, that the latter provides both, customers and retailers with major advantages (Kara and Orel 2014; Andrews 2009; van der Velden 2017; Hamacher 2017; Litfin and Wolfram 2010). Seeing that SC cannot provide those advantages to grocery retailers without the occurrence of checkout queues, the latter can be classified as a criterion indicating a grocery retailer's suitability for SC.

Number of checkout employees

Primary research revealed, that the introduction of SC enables those grocery retailers to reduce staff in the checkout area, that currently operate more than two traditional checkouts. By doing so, retailers can either reduce costs or re-allocate staff to more value-adding tasks to enhance

customer convenience. According to secondary research, both of the above are the two most relevant drivers of business performance in German grocery retail (see sections 1.1 and 3.1). Therefore, the current number of checkout staff seems to be a differentiating criterion with regard to retailers' suitability with SC. The fact that neither of the factors has been discussed by scholars as an explicit advantage of SC, represents a literature gap, that may be closed with the help of this research.

Product assortment

Findings from primary and secondary research oppose regarding the influence of a grocery retailer's product assortment on his suitability with SC. While the interviewed experts are of the opinion, that all products can be checked out via self-service, literature reveals on a representative basis that non-standard products hamper seamless SC use. However, as the respective study is from several years ago, a repeated scientific evaluation is necessary to understand which of the two notions to trust.

The one exception, for which the experts agree with literature, are fresh, service-intensive products. Most staff capacity is already invested in the business process in which customer value is created - product preparation. Therefore, experts argue that freeing staff from checkout would neither optimize customer convenience nor would it allow the retailer to reduce staff-related costs. Therefore, retailers whose focus lies on service-intensive non-standard products seem to have no, or at least a significantly reduced, suitability for SC.

The expert opinion that only retailers with a small assortment can add customer value with SC, seems invalid: Several German grocery retailers who offer SC, offer broad assortments. Those, interviewed by the researcher, state successful initial acceptance and repeat use by customers. The fact, that the criterion doesn't appear in relevant literature, further supports its rejection.

Risk of theft

Increasing theft is an often discussed risk of SC, both by interviewees and scholars. While some expect the impact to be significantly negative, others claim to have investigated inventory

differences for that exact reason, having observed no change pre and post SC introduction. According to them, the level of theft neither depends on the checkout solution nor the neighbourhood, but on the right security measures for the existing circumstances. Again others are of the opinion, that the actual risk of theft can only be determined on an individual basis. According to them, only if estimated theft-based losses exceed estimated SC-based profitability improvements, theft represents a risk. As the latter is not generalizable, it cannot be considered a general suitability factor. With the representative literature being from outside of Germany, thus potentially non-transferrable, and the number of opposing experts being non-representative, a statement regarding the influence of German grocery retailers' risk of theft on their fit with SC cannot be made without further research.

Availability of glass fibre internet

Technological readiness represents a necessary prerequisite for the introduction of SC, as it is the basis for all transactions between customer and retailer. Primary and secondary sources concur in that opinion. In case of failure, customers suffer from reduced convenience. In consequence, they are unlikely to become repeat users, endangering the required minimum SC use rate. And worse, they might even refrain from being customers. Retailers, in turn, will suffer from reduced profitability. Thus, it is obvious, that impeccable technological readiness, and specifically the availability of glass fibre internet, must be given for SC suitability in German grocery retail.

Spatial conditions

While spatial conditions are not at all discussed in relevant literature, several experts brought the topic up, but with diverging opinions. Believing some of them, spatial conditions bar certain retailers from introducing SC. What is important to realize, though, is that those experts commonly refer to fixed solutions like SCOs in their explanation. And for the depicted terminals their statement might be justified. However, with regard to the different available SC technologies, a holistic assessment across all solutions has to be made. Those experts, that did

and also included solutions like e.g. mobile self-scanning into their consideration, came to the result, that spatial conditions should not hinder any grocery retailer from offering SC. Thus, it can be concluded that spatial conditions do not have a relevant influence on the general fit of German grocery retailers for SC, but on their fit for different SC technologies.

Financial situation

While secondary research doesn't discuss the relationship of a retailer's financial situation and SC at all, primary research has revealed different opinions about its influence on retailers' suitability for SC. While some argue that the estimated height of cost savings should influence the decision, others argue that SC's relevance comes from demographics and should thus be introduced regardless of financial means. Based on those findings, further research, investigating the main reason for the introduction of SC – cost savings or demographic change – has to be conducted to understand whether the financial situation should influence the decision for SC. If cost savings are the main driver, the estimated financial consequences of SC introduction positively influence a retailer's fit. If the demographic impact on employee availability is the main driver, budget should not influence German grocery retailers' decision.

6.2.2 Self-checkout's contribution to digital transformation goals

Both, scholars and experts agree, that SC can provide major advantages to German grocery retailers and their customers. If introduced by a suitable retailer, SC can help to improve business profitability. Reasons for the latter comprise increasing revenues, resulting from better customer experience and an expanded supply area as well as decreasing costs from a reduced need for employees. Also, SC can enhance customer convenience by reducing checkout queues and enhancing on-floor services. Comparing these advantages to the DT goals defined for this research, a perfect match is revealed. In consequence, the assumption that the previously defined factors are not only suitability, but fit factors for SC is further enhanced.

6.3 Impact intensity of fit factors

Considering the influence intensity of the factors, all experts seem to be right for some of them. While a lack of technological readiness is a definite disqualifier for the offer of SC, factors like a possible reduction of staff or checkout queues should be classified as fit inhibitors. As experts agree that SC will become more prevalent in Germany, a classification of the factors as an influence on the introduction date seems fair, too. Disqualifying factors should be taken as an occasion to optimize the regarding business area in time for the inevitable advent of SC. For all others, the next possible introduction date of SC should be determined in order to enhance competitiveness as soon as possible.

6.4 Limitations

Throughout this empirically substantiated research, important findings were obtained. The latter can be used by grocery retailers to establish a basic understanding of the main factors that should influence an investment decision for SC. Nevertheless, the research design must be critically examined in some points. First, the researcher's access to suitable interview partners was limited. Even though a heterogenous set of experts from different backgrounds was assembled, further important assessments, like insights from additional leading German grocery retailers, a provider of frictionless SC solutions or independent consultants, remained inaccessible. Second, due to Covid-19-related contact restrictions and geographic constraints, interviews were conducted online, resulting in a less personal dialogue and an increased difficulty in evaluating expressions and gestures. Third, as the research conducted was qualitative and featuring a non-representative sample size, findings might be subject to biases and are not to be statistically generalized.

7. Conclusion and Outlook

Currently, German grocery retailers are above average hesitant to adopt DT because the risk of overextending financial possibilities is high. A lack of know-how and limited financial

surpluses to counter possible bad investments constitute the restrained acceptance. However, a rising lack of staff and increasing customer expectations, especially with regard to convenience, force German grocery retailers to either start adopting DT or sacrifice competitiveness.

Within this research, the adoption of SC as an exemplary DT application was investigated. Specifically, factors were defined that German grocery retailers can use to assess their business' fit with SC. Like that, decision security and the risk of bad investments can be in- and decreased, respectively. The assessment has revealed five main fit factors: First, an average customer age of below 60 years. Second, the occurrence of checkout queues. Third, a minimum of three parallel checkout employees prior to the introduction of SC. Fourth, an assortment that mainly contains low-service standard products. Fifth, the availability of glass fibre internet.

Future research can help to eliminate current limitations. While the addition of further expert assessments can make the qualitative data more profound, a follow-up quantitative study would help to show whether the findings are representative. An examination of currently questionable factors could help to define further relevant criteria. From the interviews it seems like currently, SCOs and mobile self-scanning are the two relevant SC technologies for German grocery retail. An investigation of this assumption and the subsequent definition of fit factors for the two technologies would further complete the decision support. Also, success factors for SC implementation in German grocery retail should be investigated. While primary research revealed, that transparent communication with employees and customers as well as the right choice of partners are critical for SC success, a more detailed analysis would shed light on specific best practices. Lastly, a study comparing the customer-perceived added value of SC with that of other DT applications could help retailers detect the most promising application for their individual circumstances, enabling maximum business improvement through DT.

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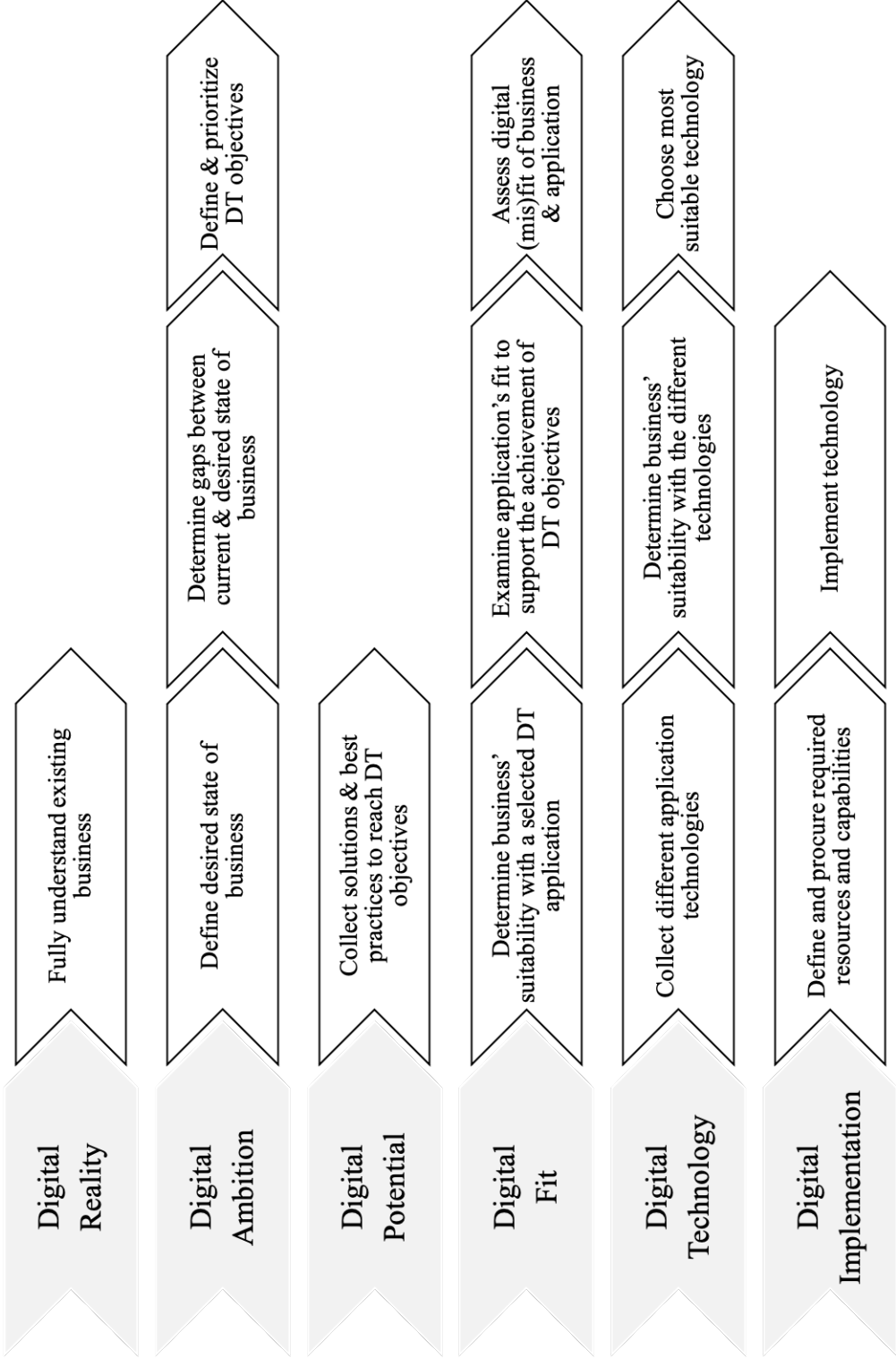
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Appendix

Appendix 1 – Roadmap for Digital Transformation



Own Presentation based on (Bouée and Schaible 2015; Schallmo and Williams 2018).

Roadmap Application to the Present Research

1. Digital Reality

German grocery retail customers are a cross section of the German population. As customer touchpoints, in this case the different retailing formats, are blurring, German grocery retailers face an increased need to differentiate in order to survive in the long-run (see section 1).

2. Digital Ambition

While the possibility to differentiate via price, quality or product range is rather hopeless, convenience is the field to leverage (see sections 1 and 3.1). Therefore, the latter and every business' overarching aim - the improvement of profitability - shall be the relevant DT goals for this study (see section 2.2).

3. Digital Potential

Next to the inauguration of convenience stores or the offer of online grocery shopping, SC is the most promising DT solution for grocery retail in 2020 (see section 3.1). Thus, SC was chosen as this study's exemplary application.

4. Digital Fit (SC)

? → tbd in the present research (see section 4.1 and following)

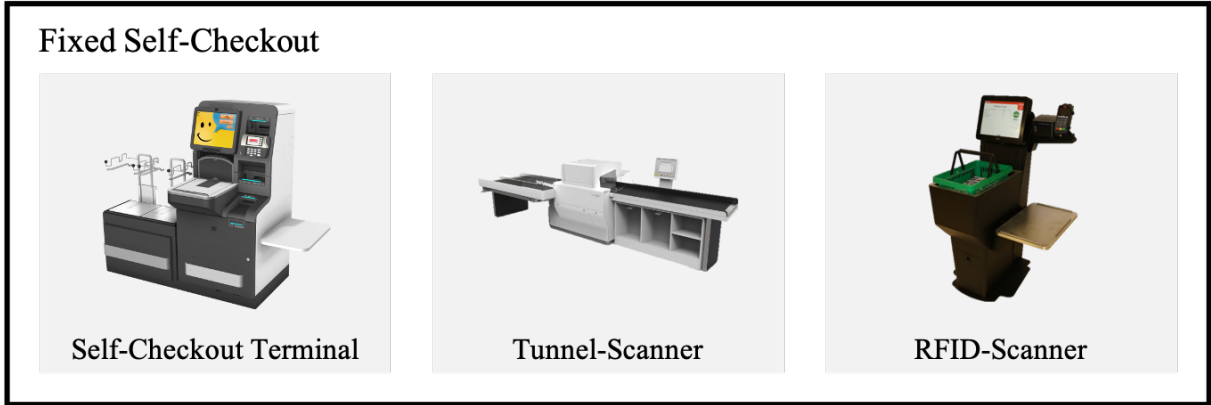
5. Digital Technology (SC)

? → out of scope, tbd in future research

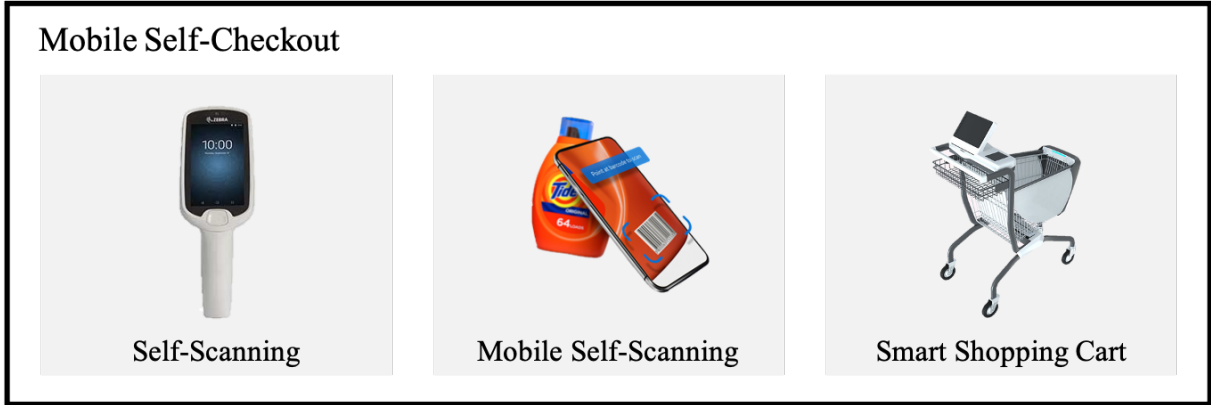
6. Digital Implementation (SC)

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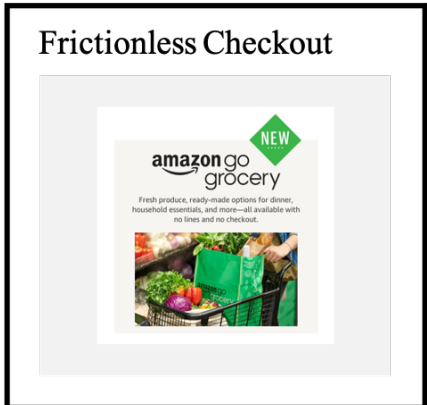
Appendix 2 – Self-Checkout Technologies



Own Presentation (ECRS n.d.; ITAB 2020; Fujitsu n.d.).



Own Presentation (Zebra Technologies Corporation n.d.; Walmart 2020; Lopez 2019)



Own Presentation (Amazon.com 2020).

Appendix 3 – Semi-Structured Interview Guide

Interview Guide: Self-Checkout in German Grocery Retail

Interviewer: Annabelle Fejes

1. What is your current occupation?

Section I

2. What do you understand by the term *self-checkout*?
3. What types of self-checkout do you know?
4. Where do you see current opportunities in grocery retail self-checkout?
5. Where do you see current risks in grocery retail self-checkout?
6. Do you believe in the establishment of self-checkout in grocery retail in Germany?
7. Where do you see self-checkout in German grocery retail in 2025?

Section II

8. What factors should German grocery retailers consider when thinking about the introduction of self-checkout?
9. Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?
10. Is self-checkout feasible for all store types? Why (not)?
11. Is self-checkout feasible for all store locations? Why (not)?
12. Should the product assortment affect the decision to introduce self-checkout? If so, how?
13. Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

Appendix 4 – List of Interviewed Industry Experts

Expert Number	Occupation	Company	Explanatory Note
E1	Head of Self-Checkout Initiative	EHI Retail Institute	Scientific Institute of the Retail Industry
E2	Sales Manager Grocery Retail	Checkpoint	Provider of Security Solutions for Retail
E3	Consultant	Independent	Former Managing Director LIDL
E4	Sales Manager	Snabble	Provider of Self-Checkout Solutions
E5	Pre-Sales Manager North-East EMEA	NCR	Provider of Self-Checkout Solutions
E6	Authorized Representative	Independent Edeka Retailer	German Grocery Retailer
E7	Project Manager Self-Checkout	ITAB	Provider of Self-Checkout Solutions
E8	Managing Director	Independent Edeka Retailer	German Grocery Retailer
E9	Managing Director	Independent Edeka Retailer	German Grocery Retailer
E10	Account Manager Retail	Pan Oston	Provider of Self-Checkout Solutions
E11	Account Manager Retail	Zebra	Provider of Self-Checkout Solutions
E12	Managing Director	Independent Edeka Retailer	German Grocery Retailer
E13	Sales Manager Food Retail	Pyramid	Provider of Self-Checkout Solutions
E14	Managing Director LIDL Foundation	LIDL	German Grocery Retailer

Appendix 5 – Relevant Interview Extracts

E1 – Head of Self-Checkout Initiative, EHI Retail Institute, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“With the stationary systems, there is always an advantage when I can avoid queues. This may not always be faster, because customers scan slower than trained cashiers, but it is at least a perceived gain in time for the customer. The self-determined pace. And the associated price control. There are many people, especially older people, for whom the scanning process at the attended checkout is much too fast to control prices.”

Q5: Where do you see current risks in grocery retail self-checkout?

“Some of the customers are afraid of embarrassment because they cannot handle the technology. One argument that always comes up is the fear of stealing jobs. And also the personal contact.”

Q6: Do you believe in the establishment of self-checkout in grocery retail in Germany?

“Yes, it is establishing. Self-scanning is increasing strongly, especially since Corona. And the conversion of traditional checkouts to stationary self-checkouts can be seen regularly at store openings, conversions or renovations.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“Especially the area of self-checkout via smartphone will be very present. By 2025, 5-15 million customers will have a self-checkout app on their smartphone. Hand scanners will also be increasingly offered. However, their potential in large shops is not so great. And the stationary self-checkout will also grow continuously. I would predict that we will have this in around 8-10k shops in 2025.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“The distribution of customer frequency. If I don't have queuing problems at any time, then self-checkout makes little sense. Then the structural conditions. Can I implement self-checkout?”

That is not the case for all locations. And lastly, my budget. If I have a shop where self-checkout makes sense at peak times, the terminal must also be open at all other times. Then I have to ask myself: Do I have the budget to assign two employees at quiet times as well? Even if I would normally only have one employee? If not, I really have to achieve very high transaction shares so that I can close a staffed checkout instead.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“It is especially suitable for larger shops with more than two cash registers where there are intermittent queues. [...] For discounters, clean processes with few staff are important. One has to ask oneself whether the sophisticated system can be sensibly replaced by SCO checkouts?”

Q11: Is self-checkout feasible for all store locations? Why (not)?

“It makes sense especially near schools, office complexes, transport hubs or train stations, as many customers come in briefly for small purchases. [...] I know a grocery store in HafenCity that has about 800 customers between 12 and 2 p.m., which it can handle well at its 10 self-checkout counters. He couldn't manage that at his 3-4 staffed checkouts. So he was practically forced to introduce self-checkout in order to maintain sales. [...] If you have a shop near a drug scene where there is an increased risk of theft anyway, it makes no sense to introduce self-checkout.”

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

“As long as the products are not service-intensive, this plays more of a downstream role. [...] The existing systems already allow age verification and such, so this is not an obstacle. And customers are also used to weighing fruit and vegetables themselves, so that's not an issue either.”

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“I don't see that we will only have self-checkout in the future. The task for retailers is to find the right balance between staffed checkouts, self-checkout and self-scanning, depending on the

location. The hybrid is the standard system. There will be no exclusive models, as this would inevitably exclude a part of the clientele. In a highly competitive market like food retailing, no one can afford that.”

E2 – Sales Manager Grocery Retail, Checkpoint, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“When I introduce self-checkout, I do it to save costs, of course. But that is of secondary importance. I do it mainly because I have far too few staff in some cases. I know from our customers that they have difficulties getting good staff, or any staff at all. And with self-checkout, I can employ staff more sensibly and in a more customer-oriented way, e.g. in customer advice or service. [...] Corona has supported retailers from the food retail sector to engage even more with the topic of self-checkout. Customers feel safer and more comfortable because they no longer have to stand in line without a large distance. [...] Customers feel they save time when shopping. The customer can have his own speed. He has more flexibility.”

Q5: Where do you see current risks in grocery retail self-checkout?

“There is definitely more theft because there are more options for theft when I use self-checkout. And also for making mistakes. And there are also people who are not professional thieves, but who want to try out what happens. So the risk of inventory loss - intentional and unintentional. Above a certain age, this is not the preferred solution. So certain groups of customers are excluded. And another problem for customers is that they sometimes feel overwhelmed.”

Q6: Do you believe in the establishment of self-checkout in grocery retail in Germany?

“Self-checkout definitely is the way to go.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I really see a solution in every market of every grocery retailer. I see a growing trend towards smartphone solutions. The investment is much lower than with other solutions and it can be implemented quickly, which is why I see the greatest spread there. I don't see something like Amazon Go in Germany in five years. Sure, there will be tests, but that's more like advertising. It is a huge expense. And then we have many customers who don't have cameras in their shops,

mainly because of the works councils. And for Amazon Go, I need many cameras, so that will be difficult.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“When I introduce self-checkout, I do it to save costs. But I also do it because I have far too few staff in grocery retailing these days. I know from our customers that they have difficulties to hire good staff, or any staff at all. [...] And then we have many discounters that are often not that big. I have to look at my space. It must be possible to integrate it as elegantly as possible into my existing market structure.”

Q9: Should a retailer’s customer structure have an impact on the decision to introduce self-checkout? If so, how?

“Yes. Returning customers are good. And it is mainly suitable for people in the younger to middle age.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“From discounters to full-range stores, it makes a lot of sense. I don't think it works for kiosks.”

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

“It is easier to implement for retailers who only sell fixed units with EAN codes. Nowadays, though, all grocery retailers offer loose items without packaging. This makes it more difficult, but it should ultimately have no influence on the introduction.”

E3 – Independent Consultant, Germany

Q5: Where do you see current risks in grocery retail self-checkout?

“With self-checkout, you have a much higher inventory loss, that cannot be compensated by saved personnel costs. This means there is a risk that the 1% margin, which is common in German grocery retail, will be eaten up quickly.”

Q6: Do you believe in the establishment of self-checkout in grocery retail in Germany?

“Yes, retailers will be forced to introduce self-checkout because the retail sector will no longer have enough employees due to demographic change. There is a shortage of staff, which means that the existing staff must be used in a targeted manner. I no longer want a cashier, but a service employee. The pressure comes from demographics and explicitly not from profitability. If the pressure came from profitability, self-checkout would have been more widespread by now.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

„I think self-checkout will be very widespread. There will be small shops that can't handle it financially, but the big shops will have 80% self-scanning and 20% security checkouts.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“The essential question is: How does the inventory result change when you introduce self-checkout? This is the decisive key figure for grocery retailers. Then you need fibre-optic internet to ensure data transmission and evaluation. Costs are explicitly not a criterion because self-checkout is coming anyway.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“Yes, of course, it makes sense for all types of grocery retailers.”

E4 – Sales Manager, Snabble, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“I think self-service is a commodity. Customers no longer want to wait and are becoming increasingly impatient. And retailers have to do something to not lose the associated sales. And then there's the whole issue of upselling, couponing, cross-selling, and so on. If you suddenly have a marketing app that the customer uses for self-scanning, there are completely new possibilities.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I can imagine that traditional cash desks will be reduced by half because they take up so much space. Instead, I think mobile self-checkout in a smart combination with SCOs will be the thing.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“Retailers don't have to ask themselves the question "if", but "when". I have spoken quite openly with many merchants. And they told me that he and he and he are innovative, they lead the way. They have the staff within the branches, they are up for it, they do something like that. We tend to have a slightly older audience. They won't be first movers and that's perfectly fine. There is nothing to be said against having that at some point and waiting for a restructuring of the target group. [...] In the city, where everyone runs to the supermarket at lunchtime to get lunch, there are peak times. These are so-called prime spots. That's where the need is greatest and that's where you should start.”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

“A mother that has to do the shopping for her family and look after her 4-year-old daughter, sitting in the shopping cart, is already fed up. She would tend to be a first mover if she had the opportunity to use an easy, cool solution.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“I think it makes sense everywhere. You just have to see how.”

Q11: Is self-checkout feasible for all store locations? Why (not)?

“I think it makes sense everywhere. But here, too, the question is: in which order do I do the rollouts? Border crossers from France and BeNeLux, for example, know the service and are therefore more affine. Therefore, proximity to neighbouring countries plays a role. [...] I was in a suburb of Mainz and I couldn't pay by card anywhere. That's when I realised: In some rural areas it is not even possible to pay by card because the internet conditions are very poor.”

Here, a later introduction of self-checkout makes more sense. You have to make sure that the technical conditions are present.”

E5 – Pre-Sales Manager, NCR, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“The opportunity for the retailer is, of course, that I improve customer service by reducing waiting times and by putting the customer in the driver seat and not just at the mercy of the situation in the checkout zone. Even if it's not supposedly that much faster, at least you feel like you're doing something, that's a psychological story. And of course it's also an opportunity to use staff more efficiently. Because if I do it well, I need fewer staff in the checkout zone. But that doesn't mean that all these people will be made redundant; they are urgently needed in other areas of the branch. There are very few retailers who have said I'm laying people off now. Most of them say I need more people and I can take them off.”

Q5: Where do you see current risks in grocery retail self-checkout?

“There are branch formats where this technology doesn't work well or where it can't be operated in a way that covers costs. There are always retailers who say I really want this now because it's cool and I want to have great technology in my branch. But basically it's not a good idea for this retailer because the branches are not suitable in terms of shopping size. [...] What you definitely have to address is the issue of shrinkage. That is at least something that retailers are always afraid of. It's like this: with self-checkout, of course you can cheat, that's clear. But most people who want to cheat don't do it in the checkout area, they put what they want to steal in their pockets between the shelves. And whether they end up going through a normal checkout or a self-checkout makes no difference.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“If you simply continue the development of the past years and forecast it into the future, self-checkout will definitely increase remarkably. You can't expect one hundred percent of grocery retailers to adopt it, because it simply doesn't work everywhere. But I still think it will develop very positively. [...] Theoretically, you can introduce any of the technologies. But if you have the whole ceiling paved with technology, as in this Amazon store, then of course it's a great showcase, but it doesn't pay off for most retailers. I think that stationary self-checkout will

continue to grow even more than mobile. And then at some point mobile will overtake when the technologies have improved.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“What are the customer frequencies? How many cash registers does he operate with how many employees? What is the capacity utilisation at the checkouts? Are customers queuing at some point during the day? [...] The advantages that arise must then be compared to the costs - both the acquisition costs for the solution and the operating costs for the solution. And then you can finally calculate: How long does it take for such an investment to pay for itself? And in Germany, retailers typically say that everything taking longer than 2-3 years is no longer interesting. Of course, it's also nice that the wage level is relatively high compared to other countries. In this respect, it pays for itself more quickly here.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“How can I create a solution in branches where the frequency is very different, where there are extended phases in which very few people shop and then suddenly the place is packed on Saturday at noon? How can I create a solution where I can operate self-checkout in parallel with as few staff as possible - because these retailers typically only have one cashier or maybe two?”

Q11: Is self-checkout feasible for all store locations? Why (not)?

“For a retailer with several branches, it can make sense to equip only selected ones with self-checkout because the rest are not suitable. At very small locations, for example, it is rather difficult. If I only have one cashier most of the day and then I introduce self-checkout and need a second person to manage that, I will need double the staff. That can't be worthwhile. [...] There are also branches in socially deprived areas. They usually introduce it anyways. And then they simply configure the security mechanisms very strongly for those branches.”

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

“The fewer articles the retailer has, which is typically the case with discounters, the greater the chance that I, as a customer, will buy the same article again and again. When I shop at Aldi, I always buy the same tomatoes, the same milk, the same yoghurts. That means I know these items very well and know where the barcode is, or maybe it doesn't have a barcode? And when I have to select the products in this menu, I know it's always in the right place. That means it speeds up the whole process and simplifies it for the customer and ultimately also for the retailer, because he has to help less. So that's an advantage when there are relatively few items. Everything can be solved, but it is ultimately more difficult and more expensive.”

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“That is what we have today. Today it's always hybrid. There are only very few retailers who offer self-checkout exclusively. [...] Some are thinking about how they can offer a fully automated store. For example, there are retailers who set up a small glass container and then only put these automated devices in there and often don't have any employees in there. Or I do it at a branch as a small box next to it, where I also sell something outside regular opening hours. Of course, this is also interesting for us because our equipment supports this. And besides the extension of opening hours, this is an option for many retailers to "circumvent" the legal regulations of working hours.”

E6 – Authorized Representative, Independent Edeka Retailer, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“For the most part, I only see opportunities. Self-checkout streamlines the checkout process. The customer has a real advantage: he can leave the store faster than before via the traditional checkout. So he has an effective time advantage. The customer currently no longer has any real advantage from a cashier. It used to be that you built up a personal bond with the cashier, but those days are over because of the many part-time workers and temporary staff. We can't find good cashiers anymore. Temps are often unreliable. And people all want to study these days and no one has the goal of working at the checkout anywhere anymore. There are also advantages on top. We can generate customer data. We have a complete digital signature based on which we can analyse the customer. So far, we don't really know our customers, if I'm honest. Amazon knows customer A buys a high-end TV, then I might buy high-end olive oil. We only

know that the customer comes to us, but the rest is anonymous so far. Another question is: How do we want to address our customer in the next 10 years? That the medium of flyers is no longer the marketing tool of choice because the wastage is too high. Self-checkout with the smartphone offers huge opportunities. As a stationary retailer, we can map a complete customer journey for the first time.”

Q5: Where do you see current risks in grocery retail self-checkout?

“The first question that comes from everyone is: And how do you deal with theft? Don't the customers steal then? The fact is that the customer has registered with our solution, for example with his name, email address and account number. It would be relatively stupid to start stealing. We have all the data and only have to go to the police and report the person. And we have verified the payment method by security direct debit, which means that no fake bank account can be given. We don't think this new option will turn a normal customer into a thief, at least not in the long run. If he ever takes a piece of chewing gum, so be it. But as long as the solution does not have a significant share of the total turnover, it does not matter to us for the time being. One should not concentrate on theft. The issue will be solved. With increasing turnover, the entire checkout zone will change. For example, we have six checkouts in one of our stores. We have now expanded one of them into a fast lane. There we have a gate where you can scan a QR code and quickly go outside. If the share of turnover rises to 10%, we can also assign an employee there to do spot checks and monitor the whole thing.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“We want to roll out self-checkout in all our markets next year and achieve a sales share of around 10%. For the next five years, the target is maybe even 15%. While we might be slightly defensive, retailers will still only achieve a share of 20 to 25% at the most. And regarding the technology, we have decided that Scan & Go will rule the future. Amazon Go is a cool concept, but it won't catch on in the next 10 years. It's just way too expensive. And how will the concept work at our service counters for meat, fish, cheese and sausage?”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“Self-checkout makes sense for all food retailers.”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

No. Self-checkout use is independent of customer characteristics. We see an interest across the different demographic groups. Age and digital literacy play a role with regard to hesitance, but you can develop these people toward self-checkout usage. We once did a small campaign here and our oldest customer was 86 years old. He arrived with his smartphone and said he wanted to try it out. He had read about it in the newspaper and thought it was so great. [...] We have to focus on the growing target group, who recognise the advantage of self-checkout and grow with it."

Q11: Is self-checkout feasible for all store locations? Why (not)?

"I believe that every store, regardless of location, has an advantage if it offers self-checkout for the customer. It's a unique selling proposition that the competition doesn't have yet. And the customer has a clear advantage."

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

"When we were planning our solution, we went through all the departments and thought about how we could solve all the critical articles. And we found good ways. For example, let's start at the beginning: in the fruit and vegetable department, we have goods to be weighed. There is a scale there now. At the beginning, we simply introduced it, but then we found potential for improvement. Because if the customer buys a lot of different fruit and vegetables, he has to walk back and forth every time with the conventional solution. They have to take the banana, remember the number, walk to the scales, put the banana on top and then scan the product. And that's for every item. It's annoying. That's why we now have QR codes on the signs. We can put all kinds of fruit and vegetables in the basket, scan them in advance with the QR code and go to the scales with everything collected. The scales then say, for example, weigh kiwi now, apple now, and so on. That way I can weigh everything at once. We have thought of something similar for the salad bar or the bakery."

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“We believe that a hybrid system must be used in Germany. And this hybrid system must be individually adapted - depending on the share of turnover of the self-checkout solution and the location. [...] We have been thinking about registering small areas in the city centre to try out a pure self-checkout store. You need high frequency and a younger clientele, and that is more likely to be found in urban locations. Here, location, customer structure and digital affinity are crucial. [...] We also thought about opening one of our existing shops two hours longer in the evening or even on Sundays, only with self-checkout.”

E7 – Project Manager Self-Checkout, ITAB, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“Quite clearly the personnel issue. There is hardly a retailer in Germany who is not looking for staff. There are hardly any people left who can be employed. Self-checkout helps, especially at off-peak times when I don't want so many people. The one person who is currently filling up the cigarettes in the checkout zone anyway can also supervise the self-checkout. And where it brings an immense advantage are the office cities, where a lot of people arrive in batches. Between 11:30 a.m. and 2 p.m., the mass of customers come to buy 3-4 items. That's where self-checkouts are becoming massively established.”

Q5: Where do you see current risks in grocery retail self-checkout?

“Omission of personal contact: Many people want personal contact. That's why I have to make sure that the self-checkout zone is really manned. And theft is always a risk factor. But it's the same at the standard checkout: if I put my champagne in my backpack between the shelves, that's theft. Self-checkout doesn't change that. We have some grocery retailing customers who have compared the situation before and after the introduction of self-checkout and they report no changes in the theft rate within a period of one year.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I assume that one in three grocery retail shops will have some form of self-checkout in 2025.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“Do people need very few items very quickly? Then self-checkout is very suitable. Structural conditions do not play a role. We can fit three B2B solutions in a space where there would otherwise be a cash register. But because they are smaller devices, I can also use a corner of a room or a niche where I would never put a cash register. And if aunty Emma comes around the corner and has a single checkout, we would say that we don't do that because she doesn't have the IT infrastructure for it.”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

“Yes. It's important that I have a large number of regular customers. Self-checkout use is highly influenced by a learning effect. [...] Age does not play a role. There are people across all age groups, who enjoy using self-checkout, because there is neither stress nor hectic [...]. I myself set my own pace. Everyone has the prejudice that this is not for old people. In practice, we realise quite massively that this is wrong. There are a lot of old people who use it. My mother is a typical example. She says at 89 years old I'm not old yet, I can do it too. [...] When young people come alone, they like to try it out. When young people come in a larger group, they sometimes don't dare to use the self-checkout for fear of embarrassing themselves in front of the others if it doesn't work. [...] And where self-checkout brings an immense advantage is in office cities where a lot of people arrive in batches. Between 11:30 am and 2 pm, the mass of customers come to buy 3-4 items. Small quantities. Self-checkouts are becoming massively established there. Again, also because I have the advantage of having returning customers.”

Q11: Is self-checkout feasible for all store locations? Why (not)?

“When I have rush hours, self-checkout is extremely useful because I can serve a lot of customers very quickly in a small area. [...] We have a retailer in Augsburg at a very central transfer station where all the trams and buses arrive. And people seem to pick up things very quickly when they change trams and buses. And he has set up three self-checkouts in the entrance area. All the typical things that I pick up quickly were in the entrance area. The customers can then quickly take it, pull it over the self-checkout and immediately leave the shop. So they don't even have to walk through the shop. Even if someone takes a roll and doesn't scan it, he has generated super added value for himself and his customers in this small area due to the significantly reduced personnel costs. Do people need very few items very quickly? Then self-checkout is very suitable. [...] Of course, city people have a greater affinity. But we also

have rural regions, especially in eastern Germany, where there are not so many people. Self-checkout is also available there because the personnel issue is becoming more and more difficult. So whether it's urban or rural doesn't matter.”

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“This is indispensable for Germany. We once tried self-checkout in a branch and it was a complete failure. People still want to see staff. We typically say 1/3 self-checkout, 2/3 staffed checkout.”

E8 - Managing Director, Independent Edeka Retailer, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“One advantage is definitely that the number of employees in the checkout area can be reduced - in other words, a rationalisation effect in terms of staff savings. With the very modern form, customers only have to pick up the items once with their mobile phone or mobile device and do not have to take them out of the shopping trolley a second time, scan them and put them back in the trolley. So it's practically a rationalisation effect for the customer. The customer does not have to wait in a more or less long checkout line. As soon as he has finished scanning, he can leave the shop through a barrier. Space saving. If you go to a normal supermarket, checkouts and checkout lanes take up a lot of space in the entrance and exit area. Then there must also be enough space in front of it for customers to queue with their shopping trolleys. This zone can be dramatically reduced with self-checkout if the customer only has to go through a barrier to leave the shop for the checkout process. The newly free space can be equipped with additional products or checkouts. Hard facts for the business and also for the customer are thus time savings, cost savings, space savings. And young, modern people find this dynamic and cool.”

Q5: Where do you see current risks in grocery retail self-checkout?

“With the classic SCO systems, the risks are very low. What is obvious are inventory discrepancies or risks of loss, especially with mobile scanning processes. This includes customers who intentionally or accidentally make mistakes during the scanning process. I divide the customers into groups. First, the customer who accidentally does something wrong.

[...] Then there are the deliberate perpetrators who want to see what happens when they collect something wrong or not at all. And then there are the professional theft incidents. But I can neglect those, because if someone wants to steal professionally, he wouldn't pay for the goods even at a normal checkout. But the other cases of customers accidentally making mistakes or deliberately testing, those are immense. With so many customers, they can lead to huge losses every day. You can still do additional checks, but it is also an unpleasant feeling for the customer when he is picked out and checked.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I could imagine that larger markets with many checkouts will offer an SCO zone as an add-on for customers willing to use it. It's probably going to be those customers who have few items, prefer a quick purchase and don't feel like queuing as a fourth customer in the checkout line. I can't imagine SCO zones in smaller markets. Here, I see an additional mobile offer at some point. But first, you have to think about how to make it more secure.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“Investment volume. Can I afford it? Do I want to afford it? Space. Technical requirements and WIFI. If the technology does not work, the customer will be dissatisfied.”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

“We have noticed that the use of our self-checkout zone is age-independent. There are pensioners who use the zone and there are young people who don't. [...] Do you have a lot of young, single people around? Or do you mainly have family households? The mum with two children is simply happy if she can beguile her children while the cashier scans her purchases.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“The customer wants to shop quickly and efficiently at a discounter. Therefore, being faster and avoiding contact through self-checkout could create a positive experience. In upscale supermarkets, customers want to be advised and served and talk to staff. Here, it would be a negative experience.”

Q11: Is self-checkout feasible for all store locations? Why (not)?

“Especially at the airport, train station, city centre, etc. where many people shop for few items and want to leave quickly.”

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“In our big Edeka, we have a lot of checkouts, so you can also offer a small self-checkout zone. But only as an add-on. From my point of view, it will not happen in the next few years that many stores will only offer self-checkout and completely do without attended checkouts. That is why we have not yet introduced this in our smaller stores. [...] An exclusive model makes sense at the train station, airport, in the city centre or in a pedestrian zone where no one can get there by car and where only small purchases are made.”

E9 - Managing Director, Independent Edeka Retailer, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“Opportunities do not necessarily lie in cost reduction. People commonly think: Great, if the customer does it himself later, you have less personnel costs. But that's not true. Above all, it is an added value. A service that makes it easier for customers to shop with us because they don't have to queue at our checkouts. That is the main reason. A psychological reason. The customer remembers: I don't have to wait in this shop and I think that's good. You have a space advantage. Where there used to be a normal checkout zone, you can create more checkouts and thus reduce the time customers have to stand at the checkout.”

Q5: Where do you see current risks in grocery retail self-checkout?

“The biggest risk is seeing too many risks. If you approach self-checkout with the premise of maximising pain avoidance - we have to do everything so that customers don't steal from us - then you're going down the wrong path. Because then you build in a lot of security systems and hurdles that spoil the customer's experience. I think theft always happens, regardless of the checkout process.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“In large stores, self-checkout terminals will be a permanent feature. In smaller branches, self-checkout will not yet be found everywhere in 2025. That will only happen with the advance of Scan & Go. And from then on, the use of self-checkout terminals will stagnate.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“I would not allow a generalisation under any circumstances. Not every location is the same. The strength of supermarkets is that each location adapts its service individually to its environment, its customers and its structure. And so, when it comes to self-checkout, you should also look at each location individually: Do we have the right customers for it? Do we have the necessary space in the checkout area?”

Q9: Should a retailer’s customer structure have an impact on the decision to introduce self-checkout? If so, how?

“Demographics don’t matter. The topic of self-checkout is accepted across all age groups.”

Q11: Is self-checkout feasible for all store locations? Why (not)?

“This is more of an issue in urbanised regions. There you have more lower cut purchases and higher customer frequencies and self-service checkouts are an indispensable part of larger shops.”

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

„It does not matter. The easiest products are all those that have a barcode.“

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“I am a great friend of the combination. As a supermarket, we want to leave the decision up to the customer. [...] The ageing society that we are will always maintain a certain service mindset. That's why the mix is important. In my view, a market with only self-checkout loses the character of a supermarket. We would never do that because it gives the customer a feeling of

impersonality. That might make sense for highly frequented locations like train stations or airports where you don't have regular customers.”

E10 – Account Manager Retail, Pan Oston, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“The pandemic also plays into our hands, because at normal checkout counters you still have personal contact with the customer in front of you, the customer behind you, the customer next to you. And then there's the speed. It doesn't go any faster. But you have the feeling that it is faster because you are more active when you check out yourself.”

Q5: Where do you see current risks in grocery retail self-checkout?

“The risk is in the area of theft. The general opinion is that when the retail market switches to self-service, thefts will skyrocket due to lack of control. But there are various ways to prevent this, such as exit gates or control via scales. And from my point of view, it is indispensable that a self-checkout zone is "supervised" by an operator. This personal presence of the operator minimises the willingness to steal something. Various other mechanisms, e.g. algorithms, can also help to check customers who put together unusual shopping baskets. And it is important to work with random samples.”

Q6: Do you believe in the establishment of self-checkout in grocery retail in Germany?

“In summary, it can be said that the German market is still a developing area in the self-checkout sector. In other countries, such as the UK, Belgium and the Netherlands, self-checkout is much more widespread and already much more accepted by customers. But it will also establish in Germany. It's going slowly, much slower than in other European countries, but it's becoming more and more popular in Germany, too.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I am convinced that there will always be traditional checkouts. This will be reflected in a ratio somewhere around 2/3 traditional checkout and 1/3 self-checkout per branch.”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

“What is the customers' age structure in the market? Are they younger or older people? With older people you have more respect whether they'll accept it. Younger people are more likely to try things.”

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

„The product assortment does not matter. Today, there are solutions for everything.“

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“The traditional checkout counter will not die out. There will always be an interplay between a self-checkout solution and attended checkout counters. The ratio will perhaps be 2/3 checkout counters and 1/3 self-checkout per branch.”

E11 – Account Manager Retail, Zebra, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“What customers hate is standing in a long queue when shopping. And the checkout process becomes much faster with a self-checkout system. Self-checkout should enable the process of checkout for the customer without queuing. [...] The retailer gets to know his customer. In the past, cashier and customer knew each other and the cashier knew which products the customer was buying and kept them on hand. Or you noticed that the customer forgot to buy milk and asked him if that was intentional. That's where we can go back to. That way you can potentially sell more. And one can offer more service to the customer and thus gain more relevance. Also, the retailer can concentrate his staff. With self-checkout, one employee can look after up to four terminals, whereas with attended checkouts I need one employee per checkout. I can then use the freed-up capacities for other services. For example, the staff can regularly check whether all items are still on the shelf or offer samples of certain products. For the cashiers, the job is more varied. They advise the customers, they tidy up and clean the equipment, etc.”

Q5: Where do you see current risks in grocery retail self-checkout?

“The first thing we are always asked about is theft. This happens, of course, but studies have shown that theft is neither increasing nor decreasing compared to attended checkouts. With mobile solutions, I can counteract this by requiring the customer to register before using the system. By making the customer personally known to the retailer, I build up an initial inhibition threshold. There are also algorithms in the system that monitor certain issues. For example, they look at how long a customer stays in the store and how many items he buys. Now, if a stay of 2 hours results in the purchase of 3 items, the system would give a message to the employee and recommend a spot check. And then there is the elimination of personal contact.”

Q6: Do you believe in the establishment of self-checkout in grocery retail in Germany?

“Yes. On the one hand, this has to do with the fact that younger people who want to leave the supermarket quickly, are increasingly doing their own shopping. On the other hand, the Corona situation is influencing the spread. Nobody likes to wear a mask for long, which means people want to leave the supermarket as quickly as possible. And that is possible with self-checkout. [...] And it will increase because stationary retailers must offer customers better service, if they want to survive. They have to stand out from the competition. And that can be done, for example, by offering self-checkout.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“There will always be a mix of technologies. And I think that in 2025, at least 40% of grocery retailers will offer some form of self-checkout. If not more.”

Q9: Should a retailer’s customer structure have an impact on the decision to introduce self-checkout? If so, how?

“One retailer I talked to recently, told me that everyone from young to old uses it. Older people like to use self-checkout because they can set the shopping pace themselves.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“Yes, in discounters and supermarkets for sure. In supermarkets, there are more articles that are more expensive and therefore have an anti-theft device. You have to think of a good solution how to deal with that, but there are already possibilities today.”

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

“Self-checkout is independent of the products I offer. Today, it's no longer a problem to solve issues like weighing goods or such. Everything can be operationalized without the customer having to deal with hurdles in the end.”

E12 – Managing Director, Independent Edeka Retailer, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“Customer loyalty: Retaining shopping-savvy customers in brick-and-mortar grocery retail who might otherwise be more likely to migrate to digital grocery retail. Retention of technology-savvy customers. Retaining time-savvy customers.”

Q5: Where do you see current risks in grocery retail self-checkout?

“Profitability is above all. Especially in a low-yield segment. Loss of time and destruction of value due to errors in system decision-making. So then, if you go for a dead-end technology. Inventory differences are not a risk for me. A non-entrepreneurial person commits suicide out of fear of death. He will say: No, there is far too much being stolen from me, I'll leave it. But that is wrong. You have to think big.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“There will be a hybrid solution. A mixture of permanently manned checkouts, a mobile solution and a small proportion of self-checkout terminals. The latter, however, will be marginal and at some point they will be entirely replaced by mobile. [...] In the stores in which we have installed self-scanning, we now have a 5% share of users and a 10% share of turnover, without doing anything about it. [...] What it will look like in 5 years depends a bit on how the big distribution channels behave. If Aldi and/or Lidl say we're going mobile everywhere in Germany, it will happen faster than I'm about to describe. But 5 years is not a long time either, it takes time to equip a whole network of 4000 branches. So I think in 5 years 25% of the grocery retailers in

Germany will have self-checkout. That would be an increase of 5% every year, which is perhaps a bit fast and we'll end up with less. And we will work on the share per store, which will also become more socially established. I assume that the use rate will rise to 20%. At least that is what we have set as our goal. That means 20% of 25% would be 5% of the customers in food retailing. And according to our experience, that would be 40% of the turnover in the markets that offer such a service and therefore 10% of the overall turnover in the food retail sector."

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

"In my opinion, the factors are profitability on the retail side and performance on the customer side."

Q10: Is self-checkout feasible for all store types? Why (not)?

"It is equally suitable for supermarkets and discounters. And in convenience stores, as they already exist at high-frequency locations, e.g. at railway stations, are probably even immanent. I think it is always suitable, except for in service-intensive shops such as butcher's shops."

Q11: Is self-checkout feasible for all store locations? Why (not)?

"It is relevant for all locations. But especially for high-frequency locations and for locations with a small average basket size."

Q12: Should the product assortment affect the decision to introduce self-checkout? If so, how?

"I think a butcher's shop with a service counter is unlikely to introduce self-scanning. It will certainly come at some point, but at the moment there are still certain barriers. [...] There are product portfolios that are not so suitable for self-scanning. But we have found solutions for everything so far. Even for returnable crates. That's not so easy because there is no EAN code. We have solutions for age verification. There are technical solutions for everything. So I don't see any restrictions in the medium term."

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“We would definitely not go for pure self-scanning markets because we still see a very strong need for communication and some customers have an aversion to such systems. [...] I would advise hybrid installations. At the moment, we have 3/4, 1/4. 3/4 of the checkout zone are conventional checkouts and 1/4 are quick checkouts or Tempo or Easy Shopper checkouts.”

E13 – Sales Manager Food Retail, Pyramid, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“The issue of efficiency. I see a huge opportunity there. The issue of space capacity. I think the food retail sector has also benefited from Corona to a certain extent. I have the chance to place several SCOs on the space of one checkout counter. Conversely, I can then process more customers at the same time, which results in shorter queues. And currently, people do not like to stand in queues. You have a new internal productivity, where you can also manage your staff differently. In times of the run on supermarkets, you also have other issues at the back, such as services in the store, refilling products, restocking shelves, being available for queries. I would include all of that under the topic of internal productivity. I see that as a great opportunity.”
Via self-checkout, I can process more customers at the same time, which results in shorter queues. And currently people do not like to be in queues

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I see self-checkout systems - both self-service checkouts, probably higher in number than Scan & Go solutions - as an integral part of the infrastructure of supermarkets and discounters in 2025.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“Self-checkout has the advantage that it can speed up the checkout process. There are smaller shops that have a very small number of checkouts and a low simultaneous occupancy rate. There, it doesn't make much sense. [...] A retailer has to assess: What kind of run do I have? What kind of staff capacity do I have? And as a consequence, he has to evaluate: Does self-checkout make sense for me?”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

„The key is the simplicity of the solution. If the solution is simple and easy to understand for the customer in the process, the customer structure does not matter.“

Q11: Is self-checkout feasible for all store locations? Why (not)?

“I see self-checkout systems as relevant for all locations in the future, as they simplify processes for the retailer and speed them up for the customer. That is a win-win situation.“

Q13: Do you see any relevance in hybrid checkout models? If so, under what circumstances would you recommend a hybrid/exclusive implementation of self-checkout?

“The unmanned theme is particularly suitable for innovative, small-scale shops where I am trying out new things. In existing stores that are being converted, I see the hybrid solution as the future.“

E14 – Managing Director, LIDL Foundation, Germany

Q4: Where do you see current opportunities in grocery retail self-checkout?

“If I were to consider whether I want to do it at all, I can talk about opportunity or non-opportunity. But I would now say that it is a necessary solution that is needed in the checkout area. Why? A: Space reasons. It's much more compact. B: The customer accepts that. C: Certainly not the most wrong thing to do in Corona times. But that was never our primary consideration until now. Corona has now simply been added. And it will probably be gone again in two years. That's why we shouldn't overuse this argument. But at the present time there are enough sections of the population who say they are glad to be standing alone at the terminal.“

Q5: Where do you see current risks in grocery retail self-checkout?

“You have the classic investment risk that you bear if the customer does not accept it. They are already relatively expensive. The investment is not insignificant. It only pays off if you score a certain usage rate. If the quota is only trickling in and you can't relieve the traditional cash

registers, you've invested money unnecessarily and you're also losing space for traditional cash registers.”

Q6: Do you believe in the establishment of self-checkout in grocery retail in Germany?

“Self-checkout must soon be a necessary building block in supermarkets. This is a step that is inevitable.”

Q7: Where do you see self-checkout in German grocery retail in 2025?

“I believe that self-checkout will increase. But I also believe that in 5 years, the classic checkout will still be predominant in Germany. I see the switch happening in 10 years. And then, it might be that one technology step will simply have been skipped in Germany and self-scanning will be predominant. Be it with guns or, what I assume to be more likely, with one's own smartphone.”

Q8: What factors should German grocery retailers consider when thinking about the introduction of self-checkout?

“The smaller the market, the greater the financial risk if things go wrong. [...] I hope that everyone is trying to save money. That should be the main motive. [...] You have to look at your total costs including the conversions. Then you think about what utilisation rate you're calculating with. And depending on the percentage you think you can achieve, you may or may not reach the break-even point. [...] It can always happen that the customer doesn't get along with something. Or the machine has a problem. For that, a staff member has to be on site to take care of it. But you have a different multiplication effect, because one employee now looks after several customers at the same time. Thus, I have the opportunity to check out a higher number of customers in the same time.”

Q9: Should a retailer's customer structure have an impact on the decision to introduce self-checkout? If so, how?

“It has nothing to do with the individual customer. It's a social thing. If you are used to seeing these things in a society, you simply go there, when they're new in LIDL. If you live in a society like Germany, where nobody expects self-checkout at all, you will be more hesitant.”

Q10: Is self-checkout feasible for all store types? Why (not)?

“No. It depends on the capacity utilisation. If I have a market far away in the countryside with a medium to low customer flow, but full shopping baskets. First of all, my shopping baskets are full, which means they wouldn't use self-checkout anyway. In addition, a low customer flow means a lower utilisation of the self-checkouts. The opposite are small branches, e.g. at main train stations. Extremely small basket sizes and great time pressure. You want to be checked out as quickly as possible.”