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To cite this article: Soeren Aguirre Reid, Georg Vetter, Richard Lackes & Markus Siepermann (2024) Is it all about fun? Self-service technology acceptance in Germany, The International Review of Retail, Distribution and Consumer Research, 34:2, 201-227, DOI: [10.1080/09593969.2024.2342795](https://doi.org/10.1080/09593969.2024.2342795)

To link to this article: <https://doi.org/10.1080/09593969.2024.2342795>



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Published online: 23 Apr 2024.



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Is it all about fun? Self-service technology acceptance in Germany

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ABSTRACT

The introduction of self-service technology (SST), particularly self-checkout and self-scan services, has gained increasing attention from German retail. But to date, end-customer SST use has not developed extensively. The majority of German customers still prefer to use the traditional checkout service counter. The purpose of this paper is to explore how trust, fun, and usefulness can attract inexperienced prospective adopters and experienced customers to use SST. For this, our study investigated the intention to use an SST as a holistic system (self-scan and self-checkout) and considered trust in the SST technology for the first time. Also the interplay between fun and perceived usefulness has not been investigated before. The data were collected using an online questionnaire and in front of a German hypermarket that offers SST. The sample ($n = 222$) consists of both inexperienced and experienced customers. The data were analyzed using structural equation modeling in SmartPLS4. Results demonstrate fun is a decisive factor for a holistic SST system that incorporates the task of self-scanning and self-checkout. This also holds for trust and perceived usefulness. With regard to experienced and prospective users, the results show different effects in the importance of both groups. Fun is crucial for prospective users. For experienced users, benefits and trust become more important for long-term usage. Trust is an essential aspect for both user types. Managerial implications are discussed.

ARTICLE HISTORY

Received 9 May 2023

Accepted 8 April 2024

KEYWORDS

Self-service technology; self-checkout services; self-scanning; trust; fun

Introduction

The rising service competition between pure online and stationary retailers has led to a dramatic change in the retail environment (EHI Retail Institute 2019). Therefore, retailers have started to experiment with new technologies to address their customers' changing needs and to create a sustainable competitive advantage compared to online retail. For instance, retailers use personalized pricing (promotion), smart shelves, or self-service technology (SST) (Inman and Nikolova 2017; Varadarajan et al. 2010). In particular, self-checkout and self-scan services have been among the fastest-growing business phenomena in the past decade in retailing. In general, SST can be defined as 'technological

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interfaces that enable customers to produce a service independence of direct service employee involvement' (Meuter et al. 2000, 50). Two SSTs can be distinguished: self-scanning checkout services and self-scan services. Self-scanning checkout services, also called self-checkout, enable customers to scan, bag, and pay for their purchases after waiting in a checkout line (Djelassi, Diallo, and Zielke 2018; Inman and Nikolova 2017). Self-scan services, also called self-scanner, introduce devices with optical readers into the customer's shopping process. With these devices, customers scan product bar codes in order to display information about a product's price, type, or quantity, and to add the product to the basket (Djelassi, Diallo, and Zielke 2018; Marzocchi and Zammit 2006). SST technologies provide many benefits to retailers and customers. They optimize the purchase process and greatly reduce customers' waiting time. Hence, more customers can be served at higher speed with fewer resources, resulting in lower costs for retailers (e.g. cost in training or operating cost) (Yang and Klassen 2008). This not only enables retailers to offer more cost-effective services to their customers and a more consistent service atmosphere independent of employees' personality and mood (Weijters et al. 2007). It also avoids a huge amount of revenue losses. Waiting queues alone are responsible for a potential revenue loss of 17.9 billion Euros in Germany due to abandoned purchases (Adyen Retail 2018). Customers also receive more information about product ingredients (e.g. origin, allergens), which is important for more and more environmentally conscious customers (Djelassi, Diallo, and Zielke 2018; Marzocchi and Zammit 2006).

In stark contrast to the high usage levels of SST in Europe (e.g. UK, Switzerland) or the U.S.A. (Leung and Matanda 2013), the usage level of SST in Germany is quite low. A major pushback is the low availability of SST in retail stores. By the end of 2021, a total of around 7,240 self-checkout systems is offered by 1,687 stores in the German retail market. Among these, hypermarkets account for 49% of the self-checkout systems. With regard to self-scanning, only 983 stores offer self-scanning and only 368 stores offer self-scanning as well as self-checkout systems in combination in the German retail market (EHI Retail Institute 2021). In contrast to Germany, self-checkouts account for one out of every six sales points in the UK (Deutsche Welle 2021).

But customer behavior also seems to account for SST's low diffusion. Despite being aware of the advantages of SSTs, only 18% of German customers use a self-checkout system, and only 3% use a self-scanner (EHI Retail Institute 2019). A recent study among 1,591 customers about the SST system usage in Germany revealed that reasons for the German customers' reluctance are manifold. 26.5% of the German customers are worried that using SST discloses too much user information. 25.7% still prefer to use the traditional counter out of habit and as a matter of principle to protect retail sector jobs. 14.7% do not trust the technology in general (EHI Retail Institute 2019).

The intention to use SST is still considered an understudied field in the retail context (Fernandes and Pedroso 2017), particularly when it comes to self-scanning and self-checkout as a single holistic system (see next section). A holistic system consists of self-scanning and self-checkout functionalities (Inman and Nikolova 2017). With the further development and diffusion of SST varieties in the retailing context (e.g. loyalty-based SST, mobile Apps), it is important to shed more light on these holistic systems as they provide additional advantages. Moreover, a single holistic system is in line with the customer behavior's reality and addresses the main advantage of an SST system: reducing the customer waiting time during the service experience (EHI Retail Institute 2019; Meuter et al. 2000; Weijters et al.

2007). For instance, SST as a single holistic system removes the hassle of scan and bag at the self-checkout. This helps the customer save time during the shopping trip. Moreover, 68% out of 116 big retailers in Europe believe that a holistic system (e.g. scan-and-go technology) would make shopping in a retail store more attractive (e.g. speed, easier, fun). 57% out of 116 retailers agreed that customers prefer to use an app-based solution for product scan and check-out instead of a physical scanner (Scandit 2020). Even in Germany, retailers like Edeka and Rossmann have started to offer holistic systems. Despite the increasing scan and go apps and customer demand, only one study investigated the usage of such a holistic SST system (Vučkovic et al. 2017).

However, advantages alone do not draw German customers towards SSTs. Obviously, a lack of trust plays a critical inhibiting role, particularly for German customers (EHI Retail Institute 2019). But trust is usually formed between people while IT artifacts like SST systems are not human beings. Hence, the question arises of how organizations that offer self-checkout or self-scan services can gain customers' trust when human contact is absent and limited to the human-computer interaction (Fernandes and Pedroso 2017; Leung and Matanda 2013; Meuter et al. 2000; Robertson et al. 2016). In particular, in the field of SST, this is still unanswered (Leung and Matanda 2013), while studies in the field of online recommendation agents, mobile payment, or website usage already demonstrate the importance of trust for adopting new technologies or services (Benbasat and Wang 2005; Gefen, Karahanna, and Detmar 2003; Zhou 2013). Therefore, this study aims at shedding more light on the importance of trust for the intention to use SST.

The question is how retailers can encourage their customers to use SSTs (more frequently). Besides usefulness (e.g. Elliott, Meng, and Hall 2012) and waiting time (e.g. Collier et al. 2015), fun has been found to be an essential factor for new technology. Research in various IS contexts (e.g. live-stream shopping, fitness wearable technology, fast-food ordering) show the importance of fun as a primary driver of technology or service usage (Dabholkar and Bagozzi 2002; Ma 2021; Park and Lin 2020; Talukdar, Gauri, and Grewal 2010). Not surprisingly, study results in the SST domain also indicate that increasing the fun of using an SST helps to improve customers' attitude (e.g. Elliott, Meng, and Hall 2012). Also, German customers consider the fun aspect as important for SSTs (EHI Retail Institute 2019). When SST can be considered fun, the chances of engaging with it in the long-term may be increased (Carroll and Thomas 1988; Leng and Wee 2016; Lepper, Greene, and Nisbett 1973; Weijters et al. 2007). However, former studies primarily focused on enjoyment (=fun) or the entertainment value of fun (e.g. Leng and Wee 2016; Orel and Kara 2014; Weijters et al. 2007). The current study extends the view of fun with the escapism value (Mathwick, Malhotra, and Rigdon 2001) (see subchapter fun). Hence, the following research question shall be answered:

RQ1: How do trust and fun beside usefulness affect the intention to use self-checkout and self-scan?

When investigating the usage behavior concerning innovative IT artifacts, the initial attitude of users towards the innovation driven by usability and usefulness is mostly in focus. This also holds for SST studies (Djelassi, Diallo, and Zielke 2018). However, the usability of innovation like SST becomes less important once users have had enough experience with the innovation (Karahanna, Straub, and Chervany 1999). Therefore, a retail company's success depends on the continued use rather than first-time use

(Bhattacharjee 2001). In particular, in the retail sector with low switching costs and high competition, retailers need to know what drives people to adopt and then what makes them continuously use the technology (Djelassi, Diallo, and Zielke 2018). Previous studies have shown that the factors do not only differ. They can also become significant over time or lose their importance. In the worst case, the same factor may have the opposite effect in the post-adoption stage than in the pre-adoption stage (Bhattacharjee 2001; Karahanna, Straub, and Chervany 1999). Surprisingly, research on differences among prospective adopters and experienced users concerning SST in the retail context is scarce (Fernandes and Pedrosa 2017; C. Wang, Harris, and Patterson 2013; Weijters et al. 2007). Previous studies solely focused on the differences between prospective and experienced users and consider the SST characteristics without investigating the impact on intention (Leng and Wee 2016), or limited the difference between both user groups to the dependent variable (Weijters et al. 2007). In contrast, this paper focuses on the difference between prospective adopters and experienced users concerning the evaluation of the SST characteristics and the intention to use. To address the research gap, we follow former studies and asked our participants to indicate if they already used the SST system to answer the following research question (Leng and Wee 2016; Oyedele and Simpson 2007):

RQ2: How does the intention to use self-checkout and self-scan differ among inexperienced prospective adopters and experienced users?

The remainder of this paper is organized as follows: The following section reviews the existing literature in the field of SST adoption and highlights the contribution of this paper in more detail. In the third section, we review the background on trust, as well as, adoption theories and develop our research model. To test our research model, we surveyed 273 German experienced and inexperienced SST users. The analysis of this survey is presented in the fourth section. The paper closes with a discussion of the results, the according implications, and the study's limitations.

Literature review

To the best to our knowledge, there has been no excessive literature review of SST. To position our paper in the SST research field, we conducted a structured literature review following the approach outlined by Webster and Watson (2002). In the first step, we identified the database (AIS, ScienceDirect, EbscoHost) for our review. Moving to the second step, we performed the literature review using a specific search string to retrieve published papers from 1990 to 2023: 'self' AND ('technology' OR 'checkout' OR 'scanning'). In total, we identified 57 publications. In the third step, we considered the following criteria for the title, abstract and full analysis: the paper should analyze the physical retail store and also focus on the customer adoption perspective. For instance, we do not consider studies that focused on other self-service contexts like airline ticketing machines (e.g. Meuter et al. 2000), financial aspects of SST systems for the retailer (e.g. Yang and Klassen 2008), railway ticketing machines (e.g. Reinders, Dabholkar, and Frambach 2008), restaurant reservation systems (e.g. Collier and Kirmes 2012; Dabholkar and Bagozzi 2002), hotel check-out systems (e.g. Rosenbaum and Wong 2015), season ticket passes (e.g. Robertson et al. 2016) or failure recovery (e.g. Collier, Breazeale, and

White 2017). An additional backward search found two additional publications, leading to 26 relevant publications (see [Appendix A](#)).

Eight out of 26 papers look solely at users' demographic and psychographic characteristics in determining the acceptance of SST technology without investigating the SST characteristic (Bulmer, Elms, and Moore 2018; Djelassi, Diallo, and Zielke 2018; H.-J. Lee 2017; H.-J. Lee et al. 2010; Leung and Matanda 2013; Schweitzer and Simon 2021; P. Sharma, Ueno, and Kingshott 2021; C. Wang, Harris, and Patterson 2013). In contrast to our study, they do not explain users' evaluation of the SST characteristics. The study of Lee, Fairhurst and Cho (2013) investigated consumer characteristics like technology anxiety and the need for interaction but also considered SST characteristics. Therefore, we keep this study (see the discussion of SST self-check-out). Moreover, we also keep the study of Oyedele and Simpson (2007) and Demoulin and Djelassi (2016) because both studies investigated the users' demographic and psychographic characteristics but also considered the experience level (see the discussion of the experience level).

15 of the remaining 18 papers included the users' evaluation of the SST characteristics for a single SST self-check-out (Collier et al. 2015; Dabholkar, Michelle Bobbitt, and Lee 2003; Demoulin and Djelassi 2016; Fernandes and Pedroso 2017; Jia et al. 2012; H.-J. Lee, Fairhurst, and Cho 2013; Leng and Wee 2016; Marzocchi and Zammit 2006; Mukerjee, Deshmukh, and Prasad 2019; Orel and Kara 2014; C. Wang, Harris, and Patterson 2012) or self-scan system (Eastlick et al. 2012; Elliott, Meng, and Hall 2012, 2013; Weijters et al. 2007). The results indicated that usefulness is a decisive factor for using SST (Collier et al. 2015; Demoulin and Djelassi 2016; Elliott, Meng, and Hall 2012; Jia et al. 2012; Weijters et al. 2007) but also for the extrinsic motivation (Eastlick et al. 2012). The studies also highlight the importance of fun (Elliott, Meng, and Hall 2012, 2013; Fernandes and Pedroso 2017; Jia et al. 2012; H.-J. Lee, Fairhurst, and Cho 2013; Leng and Wee 2016; Marzocchi and Zammit 2006; Orel and Kara 2014; Weijters et al. 2007), as it seems fun is more important for self-scanning systems than for self-checkout systems (Elliott, Meng, and Hall 2012, 2013). However, previous research solely incorporated fun basically as an enjoyment (fun) or entertainment value (Elliott, Meng, and Hall 2012, 2013; Fernandes and Pedroso 2017; Jia et al. 2012; H.-J. Lee, Fairhurst, and Cho 2013; Leng and Wee 2016; Orel and Kara 2014; C. Wang, Harris, and Patterson 2013; Weijters et al. 2007). In contrast, this study also considers escapism as an influencing factor. Moreover, previous research in the IS field indicated that increasing the fun of using a system helps to get a productive system like an SST accepted by users. But, none of the former SST studies investigated the interplay between fun and usefulness like we do in this study.

The remaining three studies investigated a holistic system (Inman and Nikolova 2017; Vučkovic et al. 2017). The study of Inman and Nikolova (2017) investigated how participants' perceptions of the retailer would change when a holistic system (scan & go app) is installed. They found that adding this technology would positively change the customers' value perception, trust or satisfaction in the retailer. Moreover, Inman and Nikolova (2017) is the only study that took trust into account. However, they focused on customers' perception of the retailers' reliability and integrity when an SST is installed. They neither considered the trust between the customer and the SST, nor the impact on the intention to use. This holds for most of the SST papers. A reason for this research gap may be that most papers – except for the loyalty card-based SST system of Weijters et al. (2007) and the SST scan & go systems of Inman and Nikolova (2017) and Vučkovic et al. (2017) –

investigated SST systems that can be used without prior registration. To better understand the trust-based relationship between the customer and the technology, our study explicitly focuses on this aspect. The study of Vučkovic et al. (2017) used one-year transaction data to investigate conversion, usage, and time performance for a fully autonomous self-checkout solution that combines self-scanning and mobile payments. The study revealed that, on average, app users save 60 seconds compared to regular shoppers during peak hours. However, the impact of this effect on the perception of SST and its usefulness has not been investigated. Also, both studies did not consider fun or the difference between prospective and experienced users for a single holistic system.

Only six out of 26 studies focused on the difference between prospective and experienced users. Four studies investigated the difference in the context of a self-checkout system (Demoulin and Djelassi 2016; Leng and Wee 2016; Oyedele and Simpson 2007; C. Wang, Harris, and Patterson 2012) and two in the context of a self-scan system (Eastlick et al. 2012; Weijters et al. 2007).

Demoulin and Djelassi (2016) surveyed 143 users and 150 non-users of self-checkout systems and analyzed how situational drivers between both groups significantly influence their intention to use and actual use. With regard to actual use of SSTs, they used a frequency scale. They identified that the probability of customers not using SSTs increased with longer queues at the SST or decreased when customers were under time pressure. Nevertheless, they only investigated the differences concerning the situational variables and did not consider the SST characteristics.

Leng and Wee (2016) identified significant differences between prospective and experienced users for the relative advantages, fun, compatibility, reliability, and complexity. However, they only investigated the differences concerning the perception of SST characteristics and did not consider the usage intention of SST. Oyedele and Simpson (2007) studied control-related customer difference variables (self-efficacy, autonomy, locus of control (LOC), technological anxiousness, and time pressure) on the decision to use SST in various contexts (e.g. shopping context). The results show that prospective and experienced users differ concerning their locus of control and technology anxiety in the shopping context. However, they did not investigate differences regarding the SST characteristics. The study of Wang, Harris and Patterson (2012) explored the impact of the SST experience (e.g. first time usage) on attitudes and actual use or choice of the SST. The results show that a good first-time experience will lead to a positive attitude and thereby encourage future use. However, the study solely investigated if the first-time experience was good or bad and did not consider the impact of the experience on the perception of SST characteristics and the usage intentions. Eastlick et al. (2012) collected information about the experience level via surveying customers with a five-point Likert frequency scale. They empirically showed that the construct of previous self-scanning experience significantly influences customers' perceived role clarity and perceived ability to use the self-scan. Moreover, previous self-scanning experience also significantly influences customers' future usage intention of self-scan. Nevertheless, they solely focused on the experience influence instead of investigating the perception of experienced users among all other variables. Weijters et al. (2007) investigated the antecedents of attitude toward SSTs (e.g. perceived usefulness), the moderating effects of SST use (e.g. gender, age) and two outcome variables of SST usage (perceived waiting time and actual time in-store). They only investigated the difference among prospective and experienced users for the two outcome variables of the SST usage

and not for the SST characteristics. For instance, they revealed that only perceived waiting time significantly differs between both user groups.

Theoretical framework and hypotheses development

To understand the determinants of the intention to use SSTs, we draw on technology-adoption and SST literature. We consider the determinants of the intention to use SST by applying the TAM and extending with identified relevant factors from the SST literature.

Technology acceptance model

Historically, IS researchers have derived models for IS acceptance from social psychology as a theoretical basis for investigating the determinants of user behavior (Venkatesh, Morris, and Davis 2003). Davis (1989) uses the theory of reasoned action (TRA) as a theoretical basis for the technology acceptance model (TAM) model. Unlike the broad approach of the TRA, the core TAM is tailored explicitly to IS contexts. It was designed to predict information technology adoption behavior in organizations, focusing on whether users perceive the innovation as useful or easy to use. Moreover, the TAM excludes the constructs of attitude and subjective norm, aiming to explain intention more parsimoniously (Venkatesh, Morris, and Davis 2003).

Despite the increasing usage of the unified theory of acceptance and use of technology (UTAUT) model, researchers still use the TAM model to explain adoption due to its simplicity or parsimonious and very high explanatory power (Gentry and Calantone 2002; Mathieson 1991). However, this simplicity is also the reason for much criticism (Y. Lee, Kozar, and Larsen 2003).

In the foundational framework of the TAM, Davis, Bagozzi, and Warshaw (1992) identified two fundamental constructs for forecasting users' acceptance in an organizational setting: perceived ease of use and perceived usefulness. These results also hold for the non-organizational setting as studies in different contexts confirm, like with mobile payment (Dahlberg, Guo, and Ondrus 2015), mobile banking (Shaikh and Karjaluoto 2015) or SST adoption (e.g. Elliott, Meng, and Hall 2012; Inman and Nikolova 2017). Notably, ease of use is a critical factor for SSTs, acting as a hygiene factor, which we presume to be inherent and therefore not examined in this study.

Intention to use

Apart from its simplicity and high explanatory power, the TAM offers the dependent variable 'Intention to Use,' a variable that numerous studies have empirically proven successful in predicting and explaining behavior (Davis 1989; Fishbein and Ajzen 1975). Based on the concept of Fishbein and Ajzen (1975), Davis (1986) suggests that intention to use predicts actual behavior. In technology acceptance studies, behavioral intention consistently precedes and predicts actual system use, as demonstrated in numerous studies validating the Technology Acceptance Model (TAM) (Venkatesh and Davis 2000; Yousafzai, Foxall, and Pallister 2007). Turner et al. (2010) found strong evidence in a meta-analysis that behavioral intention reliably predicts system use, both subjectively and objectively. Therefore, intentions have a significant predictive power over behaviors, especially in technology adoption contexts. These also hold for studies in the field of SSTs (e.g. Blut, Wang, and Schoefer 2016;

Demoulin and Djelassi 2016; Eastlick et al. 2012). Therefore, we will also employ intention to use to predict users' intention to use an SST (e.g. Fernandes and Pedroso 2017; Leung and Matanda 2013; Marzocchi and Zammit 2006).

As this study takes place in a consumer context, it is crucial to use constructs tailored explicitly to consumers' needs and behaviors. For this reason, the intention to use construct in this study is based on the intention to use construct developed by Venkatesh et al. (2012). Accordingly, the first item corresponds to the aspect 'I will always try', the second item to the aspect 'I intend to continue', and the last item to the aspect 'I plan to'. Furthermore, in the last item, the aspect 'frequently' from the intention to use construct by Venkatesh, Thong, and Xu (2012) was adjusted due to the fact that customers use SST instead of the cash register when purchasing. The third item design is explained by the fact that customers always have the choice between an SST and no SST when shopping. This approach is also applied in SST studies (e.g. Curran and Meuter 2005; X. Wang et al. 2022) or other IS areas like Mobile Payment (e.g. Baersch et al. 2020).

Perceived usefulness

The introduction of SST is not a sure-fire success. Customers tend to use a system based on their belief in its ability to help them perform their job. Otherwise, customers are likely to refuse to use it (e.g. Inman and Nikolova 2017; Mukerjee, Deshmukh, and Prasad 2019; Vučkovic et al. 2017; Weijters et al. 2007). Perceived usefulness is originally defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance' (Davis 1989, 320). This job-focusing perspective has been broadened to the wider scope of any system. In this study, we therefore adopt Venkatesh's definition of perceived usefulness as 'the degree to which a person believes that using a particular system would enhance his or her performance' (Venkatesh, Morris, and Davis 2003, 428). Concerning SST, the concept of perceived usefulness aligns with the utilitarian perspective on shopping, where consumers prioritize buying products in a timely and efficient manner (e.g. Childers et al. 2001). The system must provide the user with a corresponding usefulness to increase user performance. In line with the cost-benefit paradigm, which is important for usefulness, usefulness is assessed from the user's subjective perspective (Davis 1989). For example, the user must feel that he can save time by using an SST or realize some other positive outcome. A positive evaluation of usefulness, therefore, increases the intention to use (Rosenberg 1956; Vroom 1964).

Concerning the existing literature, the following essential benefits of usefulness were applied for the measurement of usefulness from the customer's perspective: reduced waiting time (e.g. Leng and Wee 2016; Vučkovic et al. 2017; C. Wang, Harris, and Patterson 2012; Weijters et al. 2007), efficiency (Elliott, Meng, and Hall 2012; Weijters et al. 2007), faster shopping (Elliott, Meng, and Hall 2012; Weijters et al. 2007), better control of the checkout process or the basket (Leng and Wee 2016), and a continuous overview of the total amount of the shopping trip. The latter is of particular interest as German customers are afraid of losing control and spending too much money (EHI Retail Institute 2019).

Interestingly, perceived usefulness seems to be less critical for female than for male customers (Leng and Wee 2016; Weijters et al. 2007). Hence, different assessments among user groups are conceivable. Furthermore, the usefulness of an SST can mostly be observed and experienced when using it. Therefore, the evaluation of the benefits is challenging for prospective adopters, such that they need an adequate level of support to

experience them (Dabholkar, Michelle Bobbitt, and Lee 2003). As a result, inexperienced prospective customers' attitudes are based solely on cognitive beliefs formed potentially via second-hand information (Bettman and Sujan 1987) (e.g. social media, friends). These influencing sources may be biased in the evaluation of the usefulness of prospective users. In contrast, experienced users have first-hand experience and can evaluate the SST more realistically and without bias (Bhattacharjee 2001; Fazio and Zanna 1981). As studies from different contexts like mobile payment (e.g. Talwar et al. 2020), online banking (Bhattacharjee 2001), or software adoption (Karahanna, Straub, and Chervany 1999) have proven, perceived usefulness is a salient factor for experienced users to use the technology continuously. Users undergo a learning process to understand how things work and make judgments about more specific criteria (Bettman and Sujan 1987) (e.g. time-saving) which increases the importance of usefulness over time for the usage intention (Leng and Wee 2016). Hence, we expect a significantly stronger influence of usefulness for the intention to use among experienced users. We hypothesize:

H_{1a}: Perceived Usefulness of SST positively influences the intention to use SST among inexperienced prospective adopters.

H_{1b}: Perceived Usefulness of SST positively influences the intention to use SST among experienced users to a greater extent than among inexperienced prospective adopters.

Fun

The motivation behind customer consumption behavior has been attributed to functional, social, emotional, and epistemic utility (Sheth, Newman, and Gross 1991). That is why it is important to consider the numerous intangible and emotional aspects related to the shopping trip (Babin, Darden, and Griffin 1994; Weijters et al. 2007). The consumption experience itself holds rich value, and the perception of experiential value is based on interactions involving either direct usage or distanced appreciation of goods and services. Customer interaction with products or services forms the foundation for the relativistic preferences held by the involved customers (Holbrook and Corfman 1985). Therefore, experiential value offers both extrinsic and intrinsic benefits (Babin and Darden 1995). An extrinsically oriented shopper is often happy to get through and focuses on the task completion. In contrast, intrinsic value derived from the appreciation of an experience for its own sake and therefore, the perception of the intrinsic values of shoppers, results from the fun (enjoyment) (of an experience), rather than from task completion (B. J. Babin, Darden, and Griffin 1994; Holbrook 1994). Holbrook (1994) broadens the extrinsic-intrinsic conceptualization of experiential value by including an active or participative value which implies a collaboration (e.g. game-like exchange experience) between the customer and companies' broad range of value sources (e.g. SST) (Mathwick, Malhotra, and Rigdon 2001). In contrast to the active value, reactive or passive value derives from the customers' response to a consumption product or experience (Holbrook 1994). Based on the typology of Holbrook (1994), Mathwick et al. (2001) developed four dimensions of experiential value: The intrinsic value playfulness incorporates escapism and enjoyment (fun) as an active value, and aesthetics with visual appeal and entertainment as reactive value. The extrinsic value incorporates customers' return on investment (active value) and service excellence (reactive value) (Mathwick, Malhotra, and Rigdon 2001). Former studies focused solely on the enjoyment (fun) and entertainment value of SST (Elliott, Meng,

and Hall 2012, 2013; Fernandes and Pedroso 2017; Leng and Wee 2016; Orel and Kara 2014; Weijters et al. 2007). In general, they revealed that enjoyment (fun)/entertainment is an essential component of service quality (Orel and Kara 2014), service satisfaction (Marzocchi and Zammit 2006), perceived quality of the service (Fernandes and Pedroso 2017), attitude toward SST (Dabholkar, Michelle Bobbitt, and Lee 2003; Elliott, Meng, and Hall 2012; Weijters et al. 2007), and intention to use SST (Elliott, Meng, and Hall 2013).

Furthermore, in line with existing research, we consider that SST is fun (e.g. Elliott, Meng, and Hall 2012) and interesting (e.g. Weijters et al. 2007) as factors. Additionally, we also added escapism as a new item that incorporates the customers' aspect 'to get away from it all' temporarily (Huizinga 2016). Especially within the framework of the literature on technology adoption, it has been demonstrated that the perceived enjoyment of technology has a significant impact on cognitive absorption (e.g. Agarwal and Karahanna 2000; Balakrishnan and Dwivedi 2021; Reychar and Wu 2015). A careful examination of the SST literature underscores the centrality of enjoyment as a key factor (see Literature Review). It can therefore be assumed that cognitive absorption also plays a role for the intention. For instance, inexperienced prospective adopters need to believe that they can enjoy new technologies like SST. The enjoyment or fun experienced is then likely to exert a positive influence on their intentions to use them (Agarwal and Karahanna 2000).

Regarding experienced and inexperienced prospective adopters, previous research indicated that fun is generally important for the usage of an SST (Elliott, Meng, and Hall 2012; Orel and Kara 2014). In particular, studies that distinguished between the user types show that fun is less important for prospective adopters than for experienced users (Fernandes and Pedroso 2017; Leng and Wee 2016). Interestingly, prospective adopters in Germany reported fun as an important driver for using SST (EHI Retail Institute 2019). For two reasons, we argue that fun is more important for inexperienced users. First, Davis et al.'s (1992) research suggests that in systems with limited perceived benefits, the impact of fun on usage intentions decreases, while for systems with high perceived benefits, fun has an increased effect. For SST systems, making them more enjoyable increases the usage intentions of SST systems, but it does not have as much influence as the usefulness. Looking at various studies of the IS adoption stream, especially those focusing on long-term use, usefulness consistently stands out as a key factor. This means that initially, having fun is more important for inexperienced prospective adopters, while the deciding factor for long-term use shifts more towards how useful the system is. Second, users often tend to overlook the enjoyment of an activity and justify the time spent on it by emphasizing its practical value. Taking this assumption into account, experienced users interpret fun as follows: 'I am voluntarily spending a lot of time on this and enjoying it, therefore, it must be useful' (Agarwal and Karahanna 2000, 676). Therefore, we expect fun is less relevant for experienced users.

Hence, we hypothesize:

H_{2a}: The Fun using SST positively influences the intention to use SST among inexperienced prospective adopters to a greater extent than among experienced users.

H_{2b}: The Fun using SST positively influences the experienced user's intention to use SST.

Trust

Trust is crucial in social interaction and many economic activities. Especially, with regard to the business-to-consumer context (e.g. Gefen, Karahanna, and Detmar 2003; Shao et al. 2019; Williamson 1985). Therefore, it is not surprising that the origins of trust research lie outside the IS domain (Söllner et al. 2018). Previous research has conceptualized trust in many ways. For instance, researchers view trust as a set of specific beliefs dealing with the integrity, benevolence and ability of another party (Doney and Cannon 1997); a general belief that people can be trusted by another party (Gefen 2000), 'the willingness of a party to be vulnerable to the actions of another' (Mayer, Davis, and Schoorman 1995, 7), or a combination of these elements. Four overarching clusters of trust relationships were investigated in IS research (Söllner et al. 2018): between (1) people or groups, (2) people and an organization, (3) organizations, and (4) people and technology. With regard to the object of this study, SST, we focus on the trust relationships between people and technology. The trust relationships between people and technology is defined as 'the extent to which one believes that the new technology usage will be reliable and credible' (Ha and Stoel 2009, 566). In this context, we examine the concept of trusting stance-general technology, which refers to the extent to which users believe using technology will lead to positive outcomes if they rely on it. When a customer has higher trusting stance-general technology, s/he is likely to trust technology until provided a reason not to (McKnight et al. 2011).

With regard to experience and inexperienced users, prior research has shown that trust develops over time with the accumulation of trust-relevant knowledge resulting from experience with the other party (e.g. Lewicki and Bunker 1995; Xiao and Benbasat 2007). From this, trust theorists implicitly assume that trust levels start small and gradually increase (McKnight, Cummings, and Chervany 1998). Therefore, the trust level of experienced customers should be greater than for prospective adopters because of prior successful interactions with the system (Gefen 2000). In addition, trust is built among experienced users based on their actual experience with a technology (Gefen, Karahanna, and Detmar 2003). In contrast to this implicit assumption, researchers have been surprised at how high early (initial) trust levels of prospective adopters were (e.g. Berg, Dickhaut, and McCabe 1995; Kramer 1994). This initial trust is not based on experience or firsthand knowledge of the innovation (McKnight, Cummings, and Chervany 1998). With regard to the IS context, for prospective users, trust is a mechanism helping to reduce uncertainty and to get a positive picture of an innovation (e.g. Gefen, Karahanna, and Detmar 2003; Mayer, Davis, and Schoorman 1995; Söllner 2020). Furthermore, trust reduces their need to understand, monitor, or control the situation and creates a reservoir of goodwill (Chircu, Davis, and Kauffman 2000; Pavlou 2003). Moreover, studies in related IS fields (e.g. mobile-payment/banking) show the significant importance of trust for inexperienced prospective adopters (Shaikh and Karjaluoto 2015; Shao et al. 2019). Hence, we hypothesize:

H₃: Trust toward SST positively influences the intention to use SST among inexperienced prospective adopters, as well as experienced users without significant difference.

The resulting research model is depicted in Figure 1.

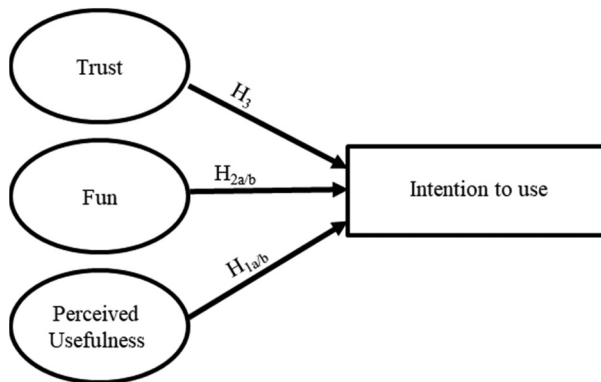


Figure 1. Research model.

Analysis

Data collection

The standardized survey with 19 questions started with an introduction to the topic of self-checkout and self-scanning as a single holistic process. In line with actual SST usage in Germany (EHI 2019), we considered SST as self-checkout and self-scanning via device and not mobile app. The first part of the survey collected data on the exogenous variables and SST adoption (see Appendix B). All exogenous variables and intention to use were measured from disagree to agree on a 5-point Likert scale. The second part focused on demographic variables about users' experience, gender, and age. The data was gathered in Germany with the online survey tool 'LimeSurvey' and a paper-based version in front of a hypermarket that already established a self-checkout and self-scanning system as a single process. Using the snowball principle for the distribution of the survey, we collected 273 responses in total. 31 completed the paper-based and 242 participants completed the online questionnaire. We found no differences in age and gender between participants who completed paper or online questionnaires. Considering the recommendation of Hair et al. (2014), 51 observations with more than 15% missing values had to be eliminated resulting in a total of 222 observations. 167 participants answered the questionnaire completely, which is beyond the recommended sample size of 30 for receiving stable results of the model estimation (Chin 1998a). The demographics of the sample show that 53.6% are male, and 43.7% are female; 10% are under 20 years old, 34.3% are between 20–29 years old, 13% are between 30–39 years old, 12.2% between 40–49 years old, 11.7% between 50–59 years old, 6.3% are between 60–69 years old, and 5% are older than 70 years. 7.5% did not provide any information regarding age and 2.7% regarding gender. 47.7% (106) can be categorized as experienced users, and 48.6% (108) as inexperienced prospective adopters based on their self-reports. 3.7% did not provide any information regarding their previous experience.

Measurement model

We applied a structural equation modeling approach that consists of an outer and an inner model (Hair, Ringle, and Sarstedt 2011). The outer measurement model defines the relations between constructs and items. The inner structural model represents the

relations among the constructs (Fornell and Larcker 1981). We ran the statistical data analysis with SmartPLS 3 to address the identification problems of formative indicators with a covariance-based approach (Hair, Ringle, and Sarstedt 2011; Jarvis, MacKenzie, and Podsakoff 2003). Another advantage is that PLS has no distributional prerequisites and no sample size limitation (Hair, Ringle, and Sarstedt 2011). All items were adapted from extant literature to improve content validity (Straub, Gefen, and Boudreau 2004). In addition, we used a new formative measurement for the perceived usefulness in parallel (see Appendix B and Table 1). By using a formative construct, we can identify the drivers for perceived usefulness (Hair et al. 2017), from which specific recommendations for action can be derived. The challenge with formative constructs is the need to ensure the indicators describe the construct as completely as possible. To test this, an established procedure is the redundancy analysis, in which the same construct is measured reflectively and the correlation between these two constructs is measured (Hair et al. 2017). If the formative indicators describe the construct sufficiently, the correlation with the reflective construct is sufficiently high.

Table 1 presents the means, standard deviation (Std.dev) values for all scales, and their correlations. The dimensions of each construct are correlated as theoretically expected. In evaluating the structural equation model (SEM), we follow the guidelines of Hair et al. (2017). For a non-parametric bootstrapping, 5,000 samples were drawn with 222 cases (Hair et al. 2014; Hair, Ringle, and Sarstedt 2011).

For the assessment of the reflective constructs reliability, we checked the Cronbach's alpha (CA) and the composite reliability (CR). Both exceed the recommended threshold of 0.7 for all constructs (Nunnally 1978): Intention to Use (CA: 0.806; CR: 0.885), Fun (CA: 0.885; CR: 0.929), Trust (CA: 0.883; CR: 0.928). For the construct Perceived Usefulness, the level of CR even exceeds 0.95, which may indicate redundant items. However, since CR tends to overestimate reliability, it should only be considered in conjunction with CA (Hair et al. 2017), which reflects the internal consistency (Cronbach 1951; Hair et al. 2014). In our case, CA lies in the recommended range of (0.7; 0.95) so that the criteria for internal consistency reliability are met (Hair et al. 2014). We test the validity of reflectively specified constructs via convergence validity and discriminant validity. For convergence validity, we examine indicator reliability and average variance extracted (AVE): Intention to Use (AVE: 0.720), Fun (AVE: 0.813), Trust (AVE: 0.811), Perceived Usefulness (AVE: 0.841). To examine the discriminant validity, the cross-loadings and the Fornell-Larcker criterion are used. For the indicator reliability test, we consider the loadings of the items, which display the commonality of the items with their respective construct. All items of the reflectively specified constructs are significant and have loadings above the required minimum value of 0.708 (Hair et al. 2017). The AVE for all constructs is above the critical value of 0.5 (Chin 1998b; Fornell and Larcker 1981; Hair et al. 2014, 2017), so that the majority of the variance

Table 1. Latent construct correlation.

	Mean	Std.dev	Fun	Intention to Use	Perceived Usefulness	Trust	Reflektiv_ usefulness
Fun	3.89	1.12	1.000				
Intention to Use	3.28	1.28	0.641**	1.000			
Perceived Usefulness	3.76	1.20	0.680**	0.627**	1.000		
Trust	3.55	1.12	0.599**	0.615**	0.573**	1.000	
Reflektiv_usefulness	3.90	1.07	0.776**	0.697**	0.775**	0.615**	1.000

**Correlation is significant at the 0.01 level (2-tailed).

in the items can be explained by their associated construct (Hair et al. 2014). The cross-loadings, which are important for discriminant validity, make it possible to check whether the items describe the right construct. For this, the loading of an item to its construct must exceed all other loadings (Fornell and Larcker 1981) to the other constructs, which is the case (Hair et al. 2014). The Fornell-Larcker criterion requires for the discriminant validity that a construct should share more variance with its associated items than with any other construct (Hair et al. 2014, 2017). To meet this condition, the squared AVE of a construct must be greater than its highest correlation with another (Fornell and Larcker 1981) construct, which is also the case (Chin 1998a; Fornell and Larcker 1981; Hair et al. 2014). We test the goodness of formatively specified measurement models via content validity, convergence validity, collinearity between items, and the strength and significance of their weights. First, we ensured the content validity by an intensive comparison with the existing literature (Straub, Gefen, and Boudreau 2004). Second, we conducted a redundancy analysis for the formative construct by measuring the same construct but reflectively specified (Chin 1998a). The size of the path coefficient provides information about convergence validity and should be above 0.8 (Hair et al. 2017), which holds in our case. In addition, the measured R^2 of 0.669 is above the required threshold of 0.64. Thus, the convergence validity is given. Third, we test for collinearity using the variance inflation factor (VIF), which describes the increase in the standard error of an estimator due to collinearity (Sarstedt et al. 2014). The highest VIF is 4.50, so that the limit of 5 is undercut (Hair, Ringle, and Sarstedt 2011, 2014). Fourth, the weights of formative items describe the relative contribution that this item provides to explain the corresponding construct. All items (time saving: 0.512; overview of shopping basket: 0.272; overview of expenses: 0.396) have a significant weight. Therefore, they contribute to the formation of the respective construct and can be retained. Testing for common method bias (CMB) involved four steps in this study. First, we adopted the items from extant literature. Second, we checked for overlap in items in the different constructs (Conway and Lance 2010). Third, the correlation matrix showed that all correlations are below 0.81, while CMB is evidenced by high correlations ($r > 0.90$) (Bagozzi, Yi, and Phillips 1991). Fourth, we also considered the approach of Kock (2015). The results show that all VIF values relationships are below 3.3 at the factor level, which indicates that the CMB is not a concern.

Structural model

The quality assessment of the structural model examines the extent to which the model explains the variance of the dependent variables. This is done by testing the multicollinearity, the relevance and significance of the path coefficients and the coefficient of determination R^2 . The quality of the estimation will be further checked by the effect size f^2 and the predictive relevance Q^2 . We tested the VIF of each construct to identify potential multicollinearity. The highest VIF (2.284 between fun and intention to use) are below the critical value of 5 (Hair, Ringle, and Sarstedt 2011; Huber 2007). Thus, multicollinearity cannot be assumed. The path coefficients (PC) indicate the relevance of the significant influence. All postulated relationships have significant PC at the 1% level in the full model (see Table 2). Fun has the most relevant influence on intention to use (H_2). Perceived usefulness is the second most influential construct on intention to use (H_1). Trust has the weakest influence on intention to use (H_3). The coefficient of determination R^2 represents the measure of the forecasting performance of

Table 2. Estimation results and significant differences between user types.

	Full model		Experienced		Inexperienced		Differences in PC
	PC	f ²	PC	f ²	PC	f ²	
H ₁ Perc. Usefulness → Int.	0.295***	0.090	0.361***	0.152	0.190*	0.032	0.171***
H ₂ Fun → Int.	0.310***	0.094	0.253*	0.075	0.376***	0.119	-0.123***
H ₃ Trust → Int.	0.241***	0.067	0.262***	0.095	0.245*	0.054	0.017 ^{ns}
Perc. Usefulness. →	0.818***	2.017					
Perc. Usefulness. (R)							

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$;
 ns : not significant

the models. Intention to use (0.555) reach a moderate R^2 value (Hair, Ringle, and Sarstedt 2011; Henseler, Ringle, and Sinkovics 2009). The effect size f^2 provides information on the influence of an exogenous construct on the R^2 value of an associated endogenous construct and is divided into small (0.02), medium (0.15) and large (0.35) effects (Cohen 1988). Hypotheses H₁ (f^2 : 0.090), H₂ (f^2 : 0.094), and H₃ (f^2 : 0.067), possess small effect sizes. We employ the PLSpredict procedure and utilize the cross-validated predictive ability test (CVPAT) to obtain the necessary results for assessing out-of-sample predictive power (P. N. Sharma et al. 2023). Based on the Q^2 predict, we checked the predictive relevance of the model. Intention to use had a measured Q^2 value of 0.534.

Finally, we divided the sample into experienced and inexperienced users. To distinguish the data groups (between experienced and inexperienced users), the questionnaire inquired about participants' previous experience with an SST. This approach aligns with existing studies (e.g. Eastlick et al. 2012; Leng and Wee 2016). Furthermore, we used a t-test to identify significant differences between the path coefficients (PC) of both groups (Leng and Wee 2016; Oyedele and Simpson 2007). First, the influence of perceived usefulness on intention to use is significant for experienced and for prospective adopters. However, the influence of perceived usefulness was significantly stronger for experienced users. The results for usefulness thus confirm the H_{1a} and H_{1b} hypotheses. Secondly, the fun factor was also significant for inexperienced prospective adopters and experienced users' (H_{1b}) intention to use. But fun was significantly stronger for the inexperienced users, thus confirming the hypothesis H_{2a}. Thirdly, we were also able to show that trust was significantly relevant for both groups. Furthermore, using the t-test, we could not determine any significant difference between the two PC for the two groups and can confirm our hypothesis H₃ (see Table 2).

Discussion

Results

This paper aimed at explaining how trust and fun influence the intention to use a holistic self-checkout and self-scan system (RQ1), differentiated by experienced and inexperienced prospective adopters (RQ2).

In general, our study confirmed the importance of perceived usefulness found in prior studies for the technology's intention to use, in this case of a holistic SST system (e.g. Inman and Nikolova 2017; Jia et al. 2012; Mukerjee, Deshmukh, and Prasad 2019). In line with studies that solely focused on self-checkout (Fernandes and Pedroso 2017; Leng and Wee 2016) or self-scan systems (Elliott, Meng, and Hall 2012, 2013; Weijters

et al. 2007), fun is also a decisive factor for a holistic SST system that incorporates the task of self-scanning and self-checkout. This demonstrates that customers' consumption behavior is not exclusively benefit-driven but is also influenced by numerous intangibles and emotional aspects related to the shopping journey (B. J. Babin, Darden, and Griffin 1994). Fun is one of the key drivers for using innovation and for perceived service quality (Fernandes and Pedroso 2017; Marzocchi and Zammit 2006). To a much lesser extent, the users' intention to use is influenced by trust. This result nevertheless shows the importance of trust in SST for users' intention to use it and confirm study results from various IS adoption areas (Dahlberg, Guo, and Ondrus 2015; Gefen, Karahanna, and Detmar 2003).

Considering the different user groups (RQ2), experienced and prospective users, the result is even clearer. Although all three factors analyzed have a significant influence, the importance or strength of the intention to use differs between the user groups. As expected, but in contrast to Leng and Wee (2016), the fun aspect plays a (much) stronger role for potential adopters than for experienced users. Despite this, fun still influences the usage intentions of experienced users. However, there are other more important factors besides this, like usefulness and trust.

Regarding the usefulness, experienced users value utilitarian benefits more than potential users in terms of their intention to use (Karahanna, Straub, and Chervany 1999; Leng and Wee 2016). Compared to fun and trust, usefulness is the most essential factor for experienced users' intention to use. Based on their experience with SST, experienced users are better able to appreciate the utility of SST, while inexperienced users do not seem to have a clear picture of the utility of SST. Therefore, inexperienced users are more likely to focus on fun instead of the benefits before using the system (e.g. Fernandes and Pedroso 2017; Gefen, Karahanna, and Detmar 2003; Weijters et al. 2007).

Usually, trust evolves over time with the accumulation of trust-related knowledge (e.g. Lewicki and Bunker 1995). It is therefore unsurprising that trust significantly influences the intention of experienced users. Furthermore, trust is the second most important factor after usefulness for the usage intention of experienced users. The trust result also shows that prior experience with SSTs can positively shape experienced users' intention to use. Of course, whether the influence is positive or negative depends on the actual experience, like whether the systems work as expected or have many failures (Gefen, Karahanna, and Detmar 2003). However, this does not mean that trust is irrelevant for prospective adopters. The result shows a significant influence of trust on the intention to use for prospective adopters and confirms the high (initial) trust levels of prospective adopters for the SST intention to use (e.g. McKnight, Cummings, and Chervany 1998).

The results for the second hypothesis show that the factors analyzed are of different importance for inexperienced prospective adopters and experienced users for the intention to use SST. For inexperienced users, fun is the main priority. In addition to fun, trust in the technology is also an important influencing factor. Usefulness only plays a minor role. For experienced users, the importance of the factors is reversed. Usefulness plays a major role, followed by trust. With regard to fun, the fun aspect of an SST is essential, but it tends to be less recognized with increasing user experience. Therefore, the results confirm the assumption that users tend to overlook the pleasure or fun in an activity and focus on its practical value when assessing the time spent (Agarwal and Karahanna 2000).

Managerial implications

First and foremost, fun is the most influencing driver for the intention to use SSTs. This holds particularly for prospective adopters. As a consequence, practitioners should advertise the fun aspect of SSTs to convince prospective adopters. A suitable approach can be gamification elements, like leaderboards, for collected loyalty points or virtual scavenger hunts in the shop. Secondly, for experienced users, benefits and trust become more important for long-term usage. Hence, practitioners have to tailor their marketing measures accordingly. For instance, non-gamification elements can enhance the system's usefulness, like, for example, in-store maps with a product finder, personalized or historical shopping lists. The fun aspect of SST should be foregrounded to attract new users and make them experience the technology by trying it out. This turns first-time SST users into a stage between prospective adopters and experienced users and lets them perceive the advantages. Otherwise, inexperienced SST users could use second-hand information and underestimate the benefits of SST. Once users have experienced SST and the associated benefits like time-saving, the fun aspect becomes less important, although remaining influential. Hence, by providing a system that is fun, practitioners can address customers' high initial trust level by lowering the entry barriers. In parallel, they optimize the benefits of the SST to turn the customers into long-time users. For instance, retailers can adjust the layout of store entrances and checkout so that customers can directly access the SST devices without waiting in a registration queue. This even reinforces the main benefit of SST, the time-saving aspect.

Thirdly, trust is an essential aspect for both user types. Although the initial trust is high, practitioners need to ensure and invest in the trustworthiness of the technology and make it as reliable as possible in order to confirm the initial trust and make it grow. A well-functioning technology creates fertile ground for growing the customer's trust in SST over time. In contrast, a negative performance experience creates a negative stimulus that negatively affects the trust in the technology, which in turn deters users from using SST. Apart from the reliability aspect, retailers should refrain from using a mandatory registration before using SST. Sooner or later, customers will realize the benefits of a registration like time saving or convenience. But as no personal data is collected, reasons for skepticism are eliminated. In addition, the entrance barrier will be lower initially so that less customers are deterred from using SST. As no personal data is collected in advance but access to SST is granted to customers without premises, retailers demonstrate that they trust their customers. This in turn will increase the customers' trust level in the sense of 'tit for tat'.

Limitation and future research

First, the data sample is relatively small and suffers from many incomplete responses. However, the sample size is still big enough so that inexperienced and experienced users can be investigated with regard to the SST characteristics and trust. Secondly, the study investigated solely the intention to use of inexperienced and experienced users. This is a common approach in IS research (e.g. Karahanna, Straub, and Chervany 1999; Weijters et al. 2007), but future research should also incorporate continuance intention for a better understanding of long-term usage. Thirdly, although this is the first study that incorporated trust into its research model when investigating SST, a more comprehensive approach considering the different trust aspects could provide more detailed information about what type of trust (e.g.

institution-based trust) is vital for the intention to use SST. Fourthly, this study analysed SST based on devices and not mobile apps. However, with the emergence of more mobile apps as SST, data security also plays a more significant role. Therefore, future studies should consider this aspect when analyzing intention to use, as providers could now also create customer profiles with the mobile app compared to anonymously usable SST devices. Lastly, we used a formative construct for the perceived usefulness that performed as well as a well-established reflective construct. While formative constructs are problematic with regard to completeness, the advantage is that the influence of single benefits could be measured with one construct. Hence, future research should consider more formative constructs to better measure different aspects in more detail than with only one single reflective construct.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendices

Appendix A

Table A1 contains an overview of the 26 relevant publications that were also discussed in the subchapter literature review.

Table A1. Overview of the 26 reviewed paper.

Paper	Objective/ Technology	Basic Theory	Sample/ Country	Findings
Bulmer, Elms, and Moore (2018)	Adoption of self-checkout	Paradoxes of Technology	20/New Zealand	Self-checkout fulfils needs (e.g. speed up) and create inefficiency (e.g. Technology failure). Shoppers can very quickly move from feeling competent to inept.
Collier et al. (2015)	Attitude toward using self-checkout	Resource Matching Theory	1154/USA	Shopping effectiveness has a significant strong positive impact and time pressure a significant negative impact on the attitude.
Dabholkar, Michelle Bobbitt, and Lee (2003)	Intention to use and avoid self-checkout	Own Model	150/USA	Ease of use and enjoyment were important to customers in using self-checkouts.
Demoulin and Djelassi (2016)	Customers' intention to use and actual use of SST	Extended TAM 3	293/France	Situational factors (e.g. basket size, coupons and queue length at the SSTs and staffed checkouts) influence customers' decisions to use SSTs.
Djelassi, Diallo, and Zielke (2018)	Satisfaction with self-scan or self-checkout	Own Model	714/France	SST experience evaluation and customer satisfaction toward the store is stronger for self-checkout than for self-scanning.
Eastlick et al. (2012)	Future Intention to use self-scan	Own Model	228/USA	Attitude toward co-producing the scanning service is a central construct leading to future intent to use.
Elliott, Meng, and Hall (2012)	Attitude toward using self-scan	TAM & TRI	1079/USA	Perceived Usefulness and perceived fun have the most significant impact on the attitude.
Elliott et al. (2013)	Intention to use self-scan	TRI	1079/USA	Perceived fun appears to be an important driver of intention to use self-scanning.
Fernandes and Pedroso (2017)	Intention to repatronage the Store (self-checkout)	Extended TAM	294/Portugal	Self-checkout attributes fun and ease of use have a significant impact on the perceived quality of self-checkout.
Inman and Nikolova (2017)	Adoption of self-checkout	Shopper-focused Decision Framework & TAM	306/USA	Perceived Usefulness has the highest impact on the adoption for scan & go and self-checkout.
Jia et al. (2012)	Trial intention of self-checkout	Regulatory Focus Theory	359/China	Functional and Experiential Value has the most significant impact on the trial intention.
Lee et al. (2010)	Intention to use self-checkout	Own Model	285/USA	Demographic factors (Gender, Age) only indirectly influence intention to use retail self-checkouts.

(Continued)



Table A1. (Continued).

Paper	Objective/ Technology	Basic Theory	Sample/ Country	Findings
Lee, Faithurst and Cho (2013)	Effect of consumer characteristics on service quality for self-checkout	Own Model	300/USA	Consumers evaluated service quality based on time convenience, ease of use, control for service use, and enjoyment
Lee (2017)	Intention to use self-checkout	LOC	823/Korea	The need for interaction with a retail employee is inversely associated with the intentions to use SSTs.
Leng and Wee (2016)	Comparison of users and non-users of self-checkout	Own Model	778/ Singapore	In contrast to non-users, self-checkout users consider self-checkout as more fun and also see the relative advantage.
Leung and Matanda (2013)	Intention to use self-checkout	Self-Determination Theory	361/ Australia	Self-determined motivation and autonomy has the highest impact on the intention to use self-checkout.
Marzocchi and Zammit (2006)	Intention to repurchase (self-scan)	Own Model	353/Italy	Enjoyment seemed to be the factor having the largest impact on satisfaction with self-scanning.
Mukerjee, Deshmukh, and Prasad (2019)	Likelihood to use self-checkout	TRI & TAM	152/India	Perceived Usefulness and perceived ease of use has the highest impact on the likelihood to use self-checkout.
Orel and Kara (2014)	Customer Satisfaction and Loyalty (self-checkout)	SSTQUAL	275/Turkey	Service quality and satisfaction of self-checkout have a significant impact on customer loyalty.
Oyedele and Simpson (2007)	Intention to use self-checkout in different context	LOC	186/USA	Non-users of SSTs are more technologically anxious and more disposed to prefer check-out service personnel rather than self-service check out than users.
Sharma, Jeno and Kingshott (2021)	Comparison of the staff checkout with the self-checkout	Construal Level Theory	787/UK & Australia	Staff-checkout has a stronger positive effect on store satisfaction and loyalty, than the satisfaction with self-checkout.
Schweitzer and Simon (2021)	Consumer empowerment for self-checkout and self-scanning	Spreitzer four-dimension model	201/-	The study provide extensive description of the positive and negative manifestations of SSRT-based customer empowerment
Vučkovic et al. (2017)	Mobile Scan & Go Usage	Own model	Transaction data/Swiss	Half of all users regularly fail to make purchases because of time pressure and long queues. App users on average save 60 seconds during peak hours.
Wang, Harris, and Patterson (2012)	Actual choice between self-checkout and personal service	Own Model	47 Interviews Australia	Perceived waiting time, perceived task complexity, and companion influence are the three situational factors that impact on a customer's actual choice between self-service and personal service.
Wang, Harris, and Patterson (2013)	Intention and continued intention to use self-checkout	Own Model	115/-	Habit, self-efficacy, and satisfaction affect SST usage over time in a retailing context.
Weijters et al. (2007)	Attitude towards self-scan	TAM	497/-	Perceived usefulness has the most significant impact on attitude, whereas perceived fun also has an effect on customer attitude towards self-scan.

Appendix B

Table B2 contains an overview of the measurement items were used in the survey.

Table B2. Overview measurement items.

Usefulness (formative)	
U1	I save time by doing my own scanning.
U2	I have a better overview of my shopping basket.
U3	I have a better overview of my expenses.
Usefulness (reflective)	
U4	Shopping with this system is advantageous.
U5	I imagine shopping with this system to be useful.
U6	Using this system makes my shopping easier.
U7	Shopping with this purchase is efficient for me.
Fun	
F1	I think I would have fun shopping with this system
F2	I imagine shopping with this system to be interesting.
F3	Shopping with a scanner would be varied (gets me away from it all).
Trust	
T1	I generally trust the technology of this system.
T2	I am not afraid that the system is not secure.
T3	I generally have the feeling that I can trust this system.
Intention to Use	
IN1	I would like to use this system whenever possible.
IN2	I would not want to do without such a system.
IN3	I plan to replace "normal" purchasing with the system.
