The Effect of Self-Checkout on Customer Satisfaction and Repatronage in a Retail Context

Abstract
Self-checkout is being tested by retailers across the world. However, limited research focused on factors that influence the use of this technology in supermarket customers and its consequences. Our study investigates the reasons why consumers use automatic cash registers (i.e. self-checkout) in a retail outlet, and the influence that self-checkout attributes have on satisfaction and repurchase intention.
A large Portuguese supermarket chain offering self-checkout was chosen for this study. A causal model was developed in order to determine the relationship between self-service attributes, satisfaction and repatronage. The empirical results support our conceptual framework and findings of previous literature.
Keywords: self-service technologies, self-checkout, retailing, satisfaction, repatronage
Track: Service Business

Introduction

During the last decade, the way customers interact with firms has changed, mainly due to self-service technologies. The term self-service technology (SST) was first introduced by Dabholkar (1994) and refers to activities or benefits based on technology and carried out by the consumers themselves. Given increasing technology development, it's important to understand the potential impact of SSTs on consumers' assessments and intentions towards the firm. Speed, control, reliability, ease of use and enjoyment are viewed as important attributes to consumers in evaluating SSTs (Dabholkar 1996; Zhu et al. 2007).
However, SST is a relatively recent service delivery method, resulting in comparatively little research on it (Beatson et al. 2008). Namely, its success from the customers perspective is not yet clear (Marzocchi and Zammit 2006) and is raising significant research issues (Dabholkar et al. 2003). In the particular case of self-checkout, specific literature (e.g. Anselmsson 2001; Dabholkar et al. 2003, Weijters et al. 2007) is difficult to find due to its recent introduction (Marzocchi and Zammit 2006). Moreover, while most studies focus on reasons for adoption and intention to use SSTs, limited research exists on its impact on customer satisfaction and retention (Weijters et al. 2007; Beatson et al. 2008).
Our study contributes to bridge this literature gap, focusing not only on understanding SSTs, namely, self check-out systems, in the service encounter but also on its impact on customer satisfaction and repurchase intention. Moreover, most empirical research has focused on experimental conditions using student samples or critical events analysis (Meuter et al. 2000) as primary sources of data (Dabholkar and Bagozzi 2002), but studies on SST usage in a real life scenario are still lacking. The next two sections will focus on the literature relevant to this study and the development of the hypotheses which drive the study. The investigation undertaken to test the conceptual framework is then described. A discussion of the results then follows, along with the contributions managerial relevance of this research. Finally, the study's limitations and suggestions for future research conclude the paper.

Self-service technologies and self-checkout

The large shift of GDP from products to services in many economies, the increasing use and importance of the Internet and other technological advances is significantly impacting marketing strategies. Self-service technologies (SSTs) are defined as technological interfaces that enable customers to produce a service independent of direct service employee involvement (Meuter et al. 2000) and without assistance from service employees (Meuter et al. 2005). SSTs lead to active customer participation in the co-production of service (Lusch

and Vargo 2009; Vargo and Lusch 2008; Hilton and Hughes 2013), which is a component of value co-creation (Lusch and Vargo 2006). This participation is critical for providers, with consumers making an important contribution to service productivity. According to 'Service-Dominant Logic' customers are vital 'operant' resources, co-creators of value and potentially, a major source of competitive advantage (Lusch and Vargo 2006).

The wide range of SSTs available include automatic teller machines (ATMs), pay-at-the pump automated machines, internet banking, automated airline ticketing, in-store kiosks and, the main subject of this study, supermarket self-checkout systems (Cunningham et al. 2008; Yang and Klassen 2008). In fact, supermarkets are viewing self-scanners as an alternative to hiring and training, as a source of potential savings (Walker et al. 2002; Dabholkar et al. 2003) and increased productivity (Curran et al. 2003) and as a way to reach new customer segments (Bitner et al. 2002). The use of self-service technology also limits problems usually associated with heterogeneity and perishability (Beatson et al. 2007). However, since provider-client interaction is an essential feature of service delivery, implementing technology-based self-service can be challenging (Hilton et al. 2013). Customers are invited to play an active role in service co-creation through self-service, but this may only be achieved if consumers are willing to participate (Rodie and Kleine 2000; Anitsal and Schumann 2007). Hence, understanding the underlying motives that trigger usage and satisfaction with SSTs has important implications for customer-firm relationships (Meuter et al. 2000), since willingness to co-produce is influenced by benefits a customer may expect to receive. Key drivers of customer satisfaction with self-service have been identified in previous research (Bateson 1985; Dabholkar 1996; Meuter et al. 2000; Walker et al. 2002; Zhu et al. 2007; Shamdasani et al. 2008). Speed, control, reliability, ease of use and enjoyment are viewed as important attributes to consumers in evaluating SSTs.

Speed of service delivery

The most obvious advantage offered by self-checkout systems is that it reduces the amount of time spent at the check-out (Marzocchi and Zammit 2006). Customers commonly strive to make the most efficient use of their time (Rodie and Kleine 2000) and may prefer not to interact with employees in a full service encounter. The speed of service delivery provided by this technology results in time savings (Ding et al., 2007) and reduced waiting time for consumers (Walker et al. 2002; Beatson et al. 2007). Dabholkar (1996) defines expected speed of delivery as the customers' expectation of the time it would take to actively perform the service. The longer consumers have to wait for a service, the less satisfied they will be with the service itself. Conversely, if customers expect that a service will be delivered speedily, they are likely to valuate the service more highly (Dabholkar 1996) which may affect overall satisfaction.

Perceived control

Perceived control can be viewed as the amount of control that a customer feels he/she has over the process/outcome of a service encounter (Bateson and Hui 1987). Some customers tend to feel more in control when they perform the service for themselves (Dabholkar 2000) and customer participation may lead to an increased feeling of self-control (Bateson 2000; Rodie and Kleine 2000). According to Bateson (1985) and Anselmsson (2001), the higher the level of perceived control by consumers while experiencing a service, the higher their degree of satisfaction. Consumers use self-service not for monetary savings, but to feel in control (Bateson 1985). Dabholkar (1996) showed that perceived control had a positive impact on the intention to use SSTs (namely, touch screens) and on service quality evaluation. Conversely, a reduced sense of control may reduce customer satisfaction (Bateson and Hui 1987).

Reliability

Reliability is an important dimension of service quality (Parasuraman et al. 1988), including technology-based services (Davis 1989). Reliability involves consistency of performance and dependability (Parasuraman et al. 1985) or the ability to perform the promised service dependably and accurately (Parasuraman et al. 1988). Evans and Brown (1988) suggest that reliability plays a critical role in customer technology acceptance and Davis (1989) found dependability to be an important dimension to the use of computer technology. Also Dabholkar (1996) found in its qualitative study that reliability and accuracy are relevant for evaluating technology-based self-service options.

Ease of use

Ease of use has been defined as the degree to which a person believes that using a particular system is free of effort (Davis 1989). Ease of use thus relates to the efforts a customer needs to make in order to effectively use the new service process and enjoy its expected advantage (Timmor and Rymon 2008). Customers may associate ease of use with less effort spent, on one hand, and reduced social risk, on the other (Dabholkar 1996). Ease of use reflects the extent to which customers expect SSTs to be easy to learn and use, and is positively linked to customers' willingness to reuse SSTs (Davis and Wiedenbeck 2001). Ease of use is a critical factor in explaining consumer perceptions and behaviors regarding SSTs (Zhao et al. 2008). Studies in several domains – i.e. online shopping, online banking, financial services, health services – have shown positive relationships between ease of use and adoption of and satisfaction with the new service (Shim et al. 2001; DeJong et al. 2003; Lim and Dubinsky 2004).

Enjoyment

Hirschman and Holbrook (1982) first defined hedonic consumption as reflecting the potential entertainment associated with shopping experience, besides more utilitarian motivations. The use of SSTs may be considered as a source of fun by some consumers, who derive pleasure from interacting with machines (Childers et al. 2001). Novelty (Rodie and Kleine 2000; Hilton and Hughes 2013) or the mere fascination with SSTs capabilities (Meuter et al. 2000) may also motivate customers to participate. Curran and Meuter (2007) and Davis et al. (1989) concluded that enjoyment influences the use of technological devices. Also Dabholkar (1996), Dabholkar and Bagozzi (2002) and Anselmsson (2001) consider that enjoyment with the use of technology-based self-service systems is one of the main attributes determining evaluations of service quality.

As self-service technologies increasingly replace service employees, customers are increasingly performing the service task, or producing the service all by themselves (Hilton and Hughes 2013). Though this participation is critical for providers, the loss of the interpersonal aspect of service encounters may have an impact on consumer satisfaction and retention (Beatson et al. 2007). Thus, it is important to understand not only the motives that drive consumers to use SSTs in general, and supermarket self-service check-out in particular, but also its potential impact on consumers' assessments of their experience with the organization and consumers' future intentions (Beatson et al. 2006). Namely, it is well established that customer satisfaction can affect customer retention (Meuter et al. 2000). If the use of self-service check-out generates customer satisfaction - i.e. if consumers are pleased with the performance of the SST based on attributes they consider important - this may have an impact on consumers' intention to repatronise the store, thus representing a feature differentiating the retailer from its competitors (Marzocchi and Zammit 2006).

Research Framework and Methodology

Our research focus on the self-checkout attributes as drivers of customer overall service evaluation and measures outcomes through quality, satisfaction and repatronage. According to literature review, we propose the following research framework and hypothesis (Fig. 1):

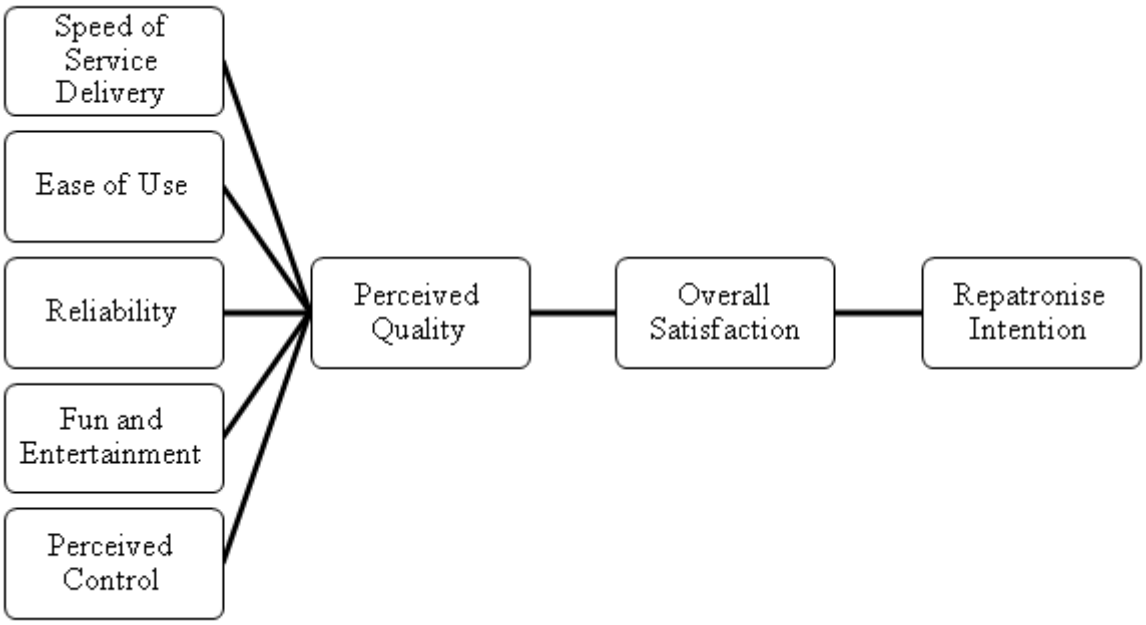

Figure 1: Research model

Attention is focused on testing the following hypothesis:

Hypothesis 1 (H1): Self-checkout attributes [speed, ease of use, reliability, enjoyment and control] will have a positive effect on the service perceived quality.

The importance of self-service attributes has been identified by literature, namely its impact on overall satisfaction: if a consumer is satisfied with a SST based on attributes they consider important, they are likely to be satisfied with the overall experience (Meuter et al. 2000). Thus we propose that:

Hypothesis 2 (H2): Self-checkout perceived quality will have a positive effect on customer overall satisfaction.

Likewise, if a consumer as a satisfying overall experience with the organization, it is likely that he will want to return to the organization in the future (Beatson et al. 2007). Thus, we expect self-checkout satisfaction to have a positive impact on the intention to repatronise the store in the future (Marzocchi and Zammit 2006):

Hypothesis 3 (H3): Customer overall satisfaction will have a positive effect on repatronise intention.

A representative store of a large Portuguese supermarket chain offering self-checkout was chosen for this study. Supermarket self-checkout machines have only recently been introduced in some selected supermarkets and this offline retailing context has been rarely

examined in the literature, providing an additional benefit of this setting (Wang et al. 2012). Data was collected through a self-administered cross-sectional survey. Each question was created on the existing literature and, with the exception of the initial questions regarding consumer characteristics and frequencies of use, respondents were asked to express their opinion using a seven-point Likert scale. Data collection was similar to a mall-intercept method, with randomly chosen respondents filling out the questionnaire on site during self-checkout, resulting into 294 usable responses.

The questionnaire comprised 20 questions and was divided into four sections, including (i) attributes related to self-checkout usage (assessed through a two-item measure for each attribute, adapted from Dabholkar 1996 and Dabholkar et al. 2003) as well as (ii) consumer characteristics and (iii) frequency of use. Respondents were also asked about (iv) their level of overall satisfaction (defined as an evaluation based on the consumer's overall experience with the supermarket and assessed through a single-item measure) and repatronise intention (defined as whether the availability of self-checkout will increase store patronage and assessed through a single-item measure). A causal model was developed in order to determine the relationship between service attributes, satisfaction and repatronage.

Findings

The majority of the respondents (54.1%) were female, with an average age of approximately 40 years, who concluded high school (33.3%) or had a bachelor degree (32.6%) and currently employed on a full time job (54.1%). In terms of age, we can observe from Table 1 that the different percentages are very close to each other, showing somehow the use of self-checkout is a transversal phenomenon.

The frequency of usage of self-checkout systems shows that 38.4% of those surveyed uses this technology frequently, 34.7% always, 20.4% occasionally and finally 6.5% rarely uses it. Thus, overall more than 70% of respondents use self-checkout regularly.

Table 1 – Descriptive Statistics for respondents age

Age	Frequency	Percent	Valid Percent	Cumulative Percent
< 23 years	50	17	17,1	17,1
24 to 30	39	13,3	13,4	30,5
31 to 35	39	13,3	13,4	43,8
36 to 40	46	15,6	15,8	59,6
41 to 47	38	12,9	13,0	72,6
48 to 57	39	13,3	13,4	86,0
≥ 58	41	13,9	14,0	100
Missing	2	0,7	100	
Total	294	100		

Exploratory factor analysis (EFA) and reliability tests were performed on the items used to measure self-checkout attributes. Regression Analysis was performed between self-checkout attributes and perceived quality, between perceived quality and overall satisfaction, and between overall satisfaction and repatronage.

We conducted an EFA by the method of Principal Component Analysis using Varimax rotation for self-checkout attributes. A value of Kaiser-Meyer-Olkin (KMO) equal to 0.816, and Bartlett's test with a p-value <0.001 indicated that there was a significant correlation between the variables and the data is appropriate for a factorial analysis. The results strongly support the five factor structure (Table 2), with a total variance explained of 85.9%. The

scales demonstrated good reliability according to accepted standards (Nunnaly 1978). Internal reliability tests of the identified factors showed strong Cronbach's alpha (ranging from .75 to .89) and average variances extracted (ranging from 63.7% to 79%). In addition, evidence of the measures' validity is provided by the fact that all factor loadings are significant and that the scales exhibit high levels of internal consistency. The scales are reported in Table 2 along with reliability, validity and dimensionality statistics.

Hypothesis 1 aims to determine to what extent perceived quality of self checkout (dependent variable) is explained by its attributes, namely speed, ease of use, reliability, enjoyment and control (independent variables). Thereby we proceed to Multiple Linear Regression Analysis, a statistical technique used to analyse the relationship between a single dependent variable and several independent variables (Hair et al. 1998).

Table 2 – Measurement scales, reliability, validity and dimensionality statistics for self- checkout attributes

Measures	PCA loadings	α (AVE)
SPEED	Mean 5,732	.85 (.680)
The self-scan saves me time	.849	
The self-scan lets me check-out quickly	.800	
EASE OF USE	Mean 6,109	.75 (.637)
The self-scan is easy to use	.872	
The self-scan does not take much effort	.716	
RELIABILITY	Mean 5,933	.76 (.697)
The self-scan is accurate	.865	
The self-scan is reliable	.804	
ENTERTAINMENT	Mean 5,677	.89 (.703)
I enjoy using the self-scan	.796	
It is fun to scan the items yourself	.879	
PERCEIVED CONTROL	Mean 5,680	.86 (.790)
The self-scan gives me control	.897	
The self-scan lets the customer be in charge	.880	

Multiple regression analysis showed all factors (attributes) to be significant. Speed of using the service, ease of use and reliability control emerged as important determinants customers' evaluation of self-checkout quality. Perceived control and fun/enjoyment were viewed as less important factors. The coefficient of determination ($R^2 = 0.518$) tends to be influenced by the sample size and it is considered an optimistic measure of the quality (Hair et al., 1998). Thereby, alternatively it is possible to use the R^2 Adjusted (adjusted $R^2 = 0.510$). 51% of the variability of the perceived quality of self check-out is explained by its attributes. The analysis of the simple correlation coefficient (R=0.72) suggests that there is a high positive correlation (R> 0.6) between the variables (Table 3).

Hypothesis 2 was also supported (Table 4). By analyzing the simple correlation coefficient (R = 0.698) we verified that there is a good positive correlation (R> 0.6) between the variables. The adjusted coefficient of determination (adjusted $R^2 = 0.486$) suggests that 48.6% of the variability of overall satisfaction is explained by perceived quality with self check-out.

Table 3 – H1 Testing Results: Regression Analyses between self-scan attributes and perceived quality

		R	R Square	Adjusted R Square	Durbin-Watson	
		0,720	0,518	0,510	1,994	
ANOVA		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
	Regression	271,184	5	54,237	60,936	0,000
	Residual	251,889	283	0,890		
	Total	523,073	288			
Coefficients		**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)		5,322	0,055		95,895	0,000
Speed		0,484	0,056	0,173	4.203	0,000
Ease of Use		0,487	0,056	0,361	8,753	0,000
Reliability		0,586	0,056	0,435	10,537	0,000
Entertainment		0,234	0,056	0,173	4,203	0,000
Perceived Control		0,270	0,056	0,201	4,865	0,000

Table 4 – H2 Testing Results: Regression analysis between perceived quality and satisfaction

		R	R Square	Adjusted R Square	Durbin-Watson	
		0,698	0,488	0,486	1,827	
ANOVA		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
	Regression	285,894	1	285,894	278,156	0,000
	Residual	300,123	292	1,028		
	Total	586,017	293			
Coefficients		**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)		1,687	0,242		6,956	0,000
Quality		0,737	0,044	0,698	16,678	0,000

Similar to Hypothesis 1 and 2, Hypothesis 3 was also supported. By analysing the simple correlation coefficient (R = 0.622) we verified that there is a good positive correlation (R> 0.6) between the variables. The adjusted coefficient of determination (adjusted $R^2 = 0.385$)

suggests that 38.5% of the variability of the intention to repatronise the store is (in part) explained by overall satisfaction with the service experience (Table 5).

Table 5 – H3 Testing Results: Regression analysis between satisfaction and repatronise intention

		R	R Square	Adjusted R Square	Durbin-Watson	
		0,622	0,387	0,385	1,960	
ANOVA		**Sum of Squares**	**Df**	**Mean Square**	**F**	**Sig.**
	Regression	274,932	1	274,932	184,102	0,000
	Residual	436,065	292	1,493		
	Total	710,997	293			
Coefficients		**B**	**Std. Error**	**Beta**	**T**	**Sig.**
(Constant)		2,162	0,292		7,404	0,000
Quality		0,685	0,050	0,622	13,568	0,000

Conclusion

The study of self-service technology (SST) has gained wide spread interest in recent years. In particular, the proliferation of new SSTs in the retail setting, namely self check-out, suggests a need to better understand factors that may affect consumers' evaluation of this technology, which requires customers to play an active role. The purpose of this paper is to extend recent research that has investigated factors driving consumers' usage of self-checkout technology. Specifically, this study assesses the impact of SST attributes on consumers' evaluations of self-checkout technology when completing a retail transaction, overall satisfaction with service experience and intention to repatronise the store.

The empirical results support the conceptual framework proposed in this study and findings of previous literature (e.g. Dabholkar et al. 2003; Beatson et al. 2006). There is evidence that self-checkout attributes positively impact user perceptions of service quality. Speed of using the service and ease of use emerged as important determinants customers' evaluation of self-checkout quality. Interestingly, reliability was considered the most important determinant of service quality. According to Meuter et al. (2000) this could be explained by the novelty of the technology, which turns its ability to perform ("do its job") and accuracy as satisfying. Perceived control and fun/enjoyment were viewed as less important factors, in spite of the results obtained by e.g. Marzocchi and Zammit (2006). Moreover, perceptions of service quality determine overall satisfaction which, in turn, has a positive impact on the intention to repatronise the store. This would suggest that successful use of SST may 'tie' consumers into a service provider.

Our study contributes to bridge the literature gap on SST, namely the relatively new self check-out technology, focusing on a retail real-life scenario and analyzing both actual usage and outcomes, namely satisfaction and repurchase intention. Results also provide strategic implications not only for retailers but also for other service industries where technology based self-service options may be considered. By understanding what factors affect a customer's

choice, better strategies can be developed to manage and coordinate multiple service delivery options. Service firms can design and promote attributes of self-service check-out which will lead to better evaluations of service quality and, thus, to higher overall satisfaction and intention to return to the store. The attributes of SST that service managers should focus on, include: how much time savings are provided by the SST systems; the ease of use of SSTs; and whether the SST is perceived as reliable and accurate. This may have consequences in terms of the importance given by providers to e.g. service promptness and convenience, customer education and service recovery.

While this research was successful at increasing our understanding of the relationship between SST and consumer satisfaction and repatronage, it is important to acknowledge some possible limitations. In particular, future research might expand beyond the single context of the current research to multiple contexts. Moreover, though we focus outputs such as satisfaction and repatronage, future studies could focus on other behaviors such as e.g. word-of-mouth (Meuter at al. 2000). The moderating impact of variables such as usage frequency (Dabholkar et al. 2003) and customer demographics (Simon and Usunier 2007; Dean 2008) could also be studied. Also, our study focused solely on self-checkout. However, today in a retailing context SST is just one of multiple channels available to customers. Thus, future studies should examine the multi-channel context instead of SST in isolation, so that other relevant factors that may influence people's actual choice could be investigated.

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