

The adoption of self-service kiosks in quick-service restaurants

Nazi Rastegar¹, Joan Flaherty², Lena Jingen Liang^{3*} and Hwan-suk Chris Choi⁴

¹ School of Hospitality, Food, and Tourism Management, University of Guelph, Guelph, Canada

² School of Hospitality, Food, and Tourism Management, University of Guelph, Guelph, Canada

³ School of Hospitality, Food, and Tourism Management, University of Guelph, Guelph, Canada. E-mail: jliang@uoguelph.ca

⁴ School of Hospitality, Food, and Tourism Management, University of Guelph, Guelph, Canada

* Corresponding author

Abstract

This study investigates factors influencing the customers' decision to use self-service kiosks in quick service restaurants. A model incorporating Technology Acceptance Model and Satisfaction Model was developed to examine the relationships among trust, self-efficacy, perceived ease of use, perceived usefulness, perceived enjoyment, perceived value, satisfaction and behavioural intention toward using these kiosks. The moderating impact of age, gender and past self-service kiosks experience was also examined. An online survey that measured customer perceptions and evaluations of self-service kiosks in McDonald's garnered 415 responses. Data were analysed using structural equation modelling and multiple regression analyses. Recommendations address the importance of clear, accessible information about kiosk operation; visible security measures; and enhanced features such as menu item nutrient profiles and promotions. These findings and recommendations can be used to promote self-service kiosk usage, thereby addressing the COVID-19 induced prohibitions against direct service in restaurants.

Keywords: self-service technology; kiosk; adoption; quick-service restaurant; customer satisfaction, technology acceptance model

Citation: Rastegar, N., Flaherty, J., Liang, L.L. and Choi, H. C. (2021). The adoption of self-service kiosks in quick-service restaurants. *European Journal of Tourism Research* 27, 2709.



© 2021 The Author(s)

This work is licensed under the Creative Commons Attribution 4.0 International (CC BY 4.0). To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>

Introduction

Over the last two decades, hospitality operations have increasingly turned to technology to facilitate and enhance customer service (Dabholkar & Bagozzi, 2012; Ivanov, Webster, & Berezina, 2017; Buhalis, Harwood, Bogicevic, Viglia, Beldona, & Hofacker, 2019). Self-service technology (SST), particularly the kiosk, is one example. Self-service kiosks (SSKs), which enable customers to serve themselves with little to no help from the service provider, have long been a common feature in certain segments of the hospitality industry. Airports offer self-service check in and information kiosks; hotels use SSK that allow their guests to check in/out and access hotel or area information; and some restaurants use SSKs that enable patrons to customize, place and pay for their orders.

In particular, quick service restaurants (QSRs) have aggressively adopted the SSK in an effort to reduce labour costs (Beatson, Lee, & Coote, 2007; Wei, Torres, & Hua, 2017); improve service speed and order accuracy (Kincaid & Baloglu, 2005); and increase sales. This is supported by a recent study, which found that almost 80% of consumers associate restaurant technology with increased convenience and 70% with faster, more accurate service (National Restaurant Association, 2017a). Indeed, the promise of a shorter waiting time (i.e., faster service) appears to influence customers' decisions to use SSKs (Kokkinou & Cranage, 2015). In fact, one study found that customers were willing to accept higher prices by paying, on average, \$2.47 USD more at QSRs if it meant faster service (Perutkova, 2009). These factors suggest the trend toward SSKs is likely to become increasingly important in the hospitality industry generally, but particularly in the QSR segment – a fact that reinforces the importance of the current study.

Not all customers, however, share the enthusiasm. Factors which inhibit the use of SSK include concerns about design and security flaws, whereby a customer may lack confidence in the kiosk instructions being clear and easy to follow or in the kiosk's ability to protect sensitive information, such as debit card passwords (Curran & Meuter, 2005). Consequently, in spite of the fact that 36% of consumers are more likely to adopt tech options in the restaurant industry than they were two years earlier, almost half (49%) prefer to interact with employees rather than with an SSK (National Restaurant Association, 2017b). At least one research team, however, suggests that time will render this finding inaccurate. In their work on future industry trends, Webster and Ivanov (2020) characterize technology-averse consumers as a relatively small group, confined to the high end of the market. The vast majority of future consumers, they speculate, will enjoy an automated experience.

In the end, the customers' decision to embrace or reject an SST depends on their evaluation and perception of it (Mozeik, Beldona, Cobanoglu, & Poorani, 2009). Understanding the factors that shape these views holds obvious benefits for the industry, particularly the QSR segment, guiding its consideration of SSK adoption. It also holds significant benefits in terms of furthering research on technology in the hospitality industry. Right now, most SST studies in a hospitality context have been conducted in hotels and airport settings (Kim, Lee, & Law, 2008). Relatively few have been conducted in QSR settings (Kim, Christodoulidou, & Choo, 2013). Even fewer have studied customer satisfaction with technology acceptance (Kim *et al.*, 2008). Moreover, most technology adoption studies have focused on initial adoption rather than repeat use (Fernandes & Pedroso, 2017). In Europe, SSKs were first introduced by McDonald's to reduce queues and provide more personalized service to their customers in 2011 and today almost every McDonald's offers SSKs. Even though most independent restaurants in Europe prefer to provide face-to-face service, COVID-19 will speed up the undeniable rise of contactless usage across Europe. However, no known study has been conducted to examine the customers' SSK use experience.

To address these gaps, this study develops a conceptual model that investigates the customer's perception and evaluation of self-service kiosks in quick service restaurants; identifies factors that influence the customer's decision to continue using these kiosks; and explains the relationships among those factors.

Literature Review

The hospitality and tourism industry has long used technology to revolutionize its services: starting in the mid-1800s with the advent of train travel to transport tourists, to the current ubiquity of automated self-service in restaurants, and to a future where robots routinely greet guests, serve food and clean rooms (Ivanov, 2019). The train's dominance was subsequently usurped by car and air travel, both of which have been curtailed by COVID-19. Advances in robotics have the potential to transform industry customer service, but the routine use of robots is still a vision. In contrast, automated self-service technologies appear to be experiencing a steep trajectory, particularly in casual dining (Hanks, Line & Mattila, 2016) and in quick service restaurants (Kim, Christodoulidou, & Choo, 2013).

Self-service technologies in QSRs

Self-service technology in quick service restaurants allows customers more control over their dining experience and, ideally, more satisfaction. They also offer potential benefits to the operator in terms of reduced labour costs and increased sales. Some of these recent technologies include mobile ordering, online coupons, digital menu boards, smartphone apps, and self-service kiosks. These kiosks typically feature a large touch screen that enables customers to order, customize and pay for menu items, with little to no employee interaction. Their increasing adoption by Canadian quick service restaurants represents a movement away from the restaurant industry's traditional 'high touch and low tech' ethos toward a 'low touch and high tech' approach.

Many studies have contributed to the understanding of why customers use SSTs. For instance, Lin and Hsieh (2006) focused on initial adoption of SST in shopping malls, train/ subway stations. They found that technology readiness influences users' perceptions of SST service quality and behavioural intentions. Liu, Hung, Wang and Wang (2019) also shed lights on consumers' initial adoption of SST in the hotel setting. They found that consumers' travel purposes and unique needs influence their adoption decisions.

Another trend of SST studies in the hospitality context is that of conducting research in the context of hotels and airports rather than restaurants (Kim, Lee, & Law, 2008). This is supported by a systematic literature review conducted by Vakulenko, Hellström and Oghazi (2018), in which within 76 articles analysed, only 6 were related to food, while 17 were related to hotels or airports (p.512).

Further evidence suggests a relationship between increased sales and non-face-to-face orders with self-service technology, such as an SSK (Allon, Federgruen, & Pierson, 2011). The kiosk enables customers to order freely, without the potential embarrassment caused by mispronouncing menu items or the fear of being judged for their menu choices (Goldfarb, McDevitt, Samila, & Silverman, 2015). At least one study shows that customers avoid purchasing more complex items, higher calorie items, and items with difficult-to-pronounce names in front of others (Goldfarb et al., 2015). The option to use an SSK eliminates these obstacles, encouraging the customer to spend more freely.

Children, adolescents and young adults are among the highest consumers of fast food in Canada (Black & Billette, 2015). Having grown up with digital technology, these customers tend to be more comfortable than their older counterparts with self-service – even to the point of actively seeking it out because they

see it as convenient and efficient (Sweeney, Danaher, & McColl-Kennedy, 2015). Other segments of the market that may prefer SSKs are customers with accessibility issues: the hearing impaired; and those who do not speak the language fluently. For some individuals within these groups, the prospect of a face-to-face interaction might dissuade them from patronizing the restaurant for fear that they will not understand the employee or the employee will not understand them.

Labour costs prompt service providers to consider options that allow customers to provide services for themselves, without the need of paid employees (Shamdasani, Mukherjee, & Malhotra, 2008). While legislation to raise the minimum wage in Ontario by approximately 30%, from \$11.40 in 2017 to \$15.00 in 2019 did not pass, the issue of increasing the minimum wage continues to be under public scrutiny. The potential for an increase is particularly concerning for Canadian QSR employers, since the majority of minimum wage workers are in the food sector. Therefore, QSR employers are prompted to look even more closely at SSKs to reduce labour costs.

These factors justify pursuing more knowledge in this area, particularly on what influences QSR customer adoption of, and satisfaction with, new technology. To that end, this study presents a conceptual model that combines Davis's Technology Acceptance Model (1986) with a satisfaction model (Cronin, Brady, & Hult, 2000). The reasoning behind the development of this conceptual model is explained below.

Technology Acceptance Model

In order to understand consumers' acceptance of a new technology, many theoretical approaches (e.g. theory of reasoned action; theory of planned behaviour; unified theory of acceptance and use of technology; motivational model) have been proposed. Of these, the technology acceptance model (TAM) has become the most accepted approach to explain intention to use a certain technology. Introduced by Davis (1986), TAM predicts whether or not consumers will use a system based on their motivation, which is influenced by external stimuli, such as the system's features and capabilities.

Davis hypothesized that one's attitude toward a technology can be predicted by two factors: perceived ease of use (PEOU) and perceived usefulness (PU). PEOU refers to "the degree to which an individual believes that using a particular system would be free of physical and mental effort" (Davis, 1986, p.26). PU refers to "the degree to which an individual believes that using a particular system would enhance his or her job performance" (Davis, 1986, p.26). However, although PEOU and PU are the most powerful predictors of whether one accepts or rejects a system, TAM does not explain the reasons a system is found useful and easy to use (Venkatesh, 2000). While it identifies PEOU and PU as extrinsic sources of motivation, it does not consider intrinsic motivation.

Since Davis's (1986) work, researchers have developed TAM by incorporating additional external and internal variables. SST characteristics and individual user differences are two main categories of antecedents that impact the customer's intention to use SSTs. Of these, trust and self-efficacy have been cited in many SST studies as critical determinants of user intention (Compeau & Higgins, 1995; Gefen, Karahanna, & Straub, 2003). However, most of these studies have investigated trust in the online setting in the hospitality context rather than offline setting, while self-efficacy has been tested as an antecedent of PEOU in TAM studies. No research to date has tested the role of self-efficacy as an antecedent of both intrinsic and extrinsic motivations in TAM studies in the restaurant industry.

Satisfaction Model

To date, studies have mainly concentrated on identifying factors affecting the customer’s intention to use SST or not. Few studies have investigated the customer’s evaluation of SSKs in restaurants (Kim et al., 2013). However, understanding how the customer evaluates these kiosks can help restaurants enhance customer satisfaction and increase revenue. To clarify the relationship between value, satisfaction and behavioural intention (BI), Cronin et al. (2000) identified three competing evaluation models that explain how a customer evaluates the service encounter: value model; satisfaction model; and indirect model.

In the value model, value is a key construct to understand repeat purchase (Gallarza, Gil-Saura, & Arteaga-Moreno, 2017). Based on this model (Cronin et al., 2000), there is no direct relationship between satisfaction and BI. Satisfaction indirectly, through value, affects BI. Customers intend to purchase if they perceive the product or service as valuable for them. The satisfaction model has been extensively studied (Angelova, & Zekiri, 2011). According to the satisfaction model (and in direct opposition to the value model), customer satisfaction is a major determinant that directly affects a customer’s BI. The indirect model was derived from literature that investigates the relationship between satisfaction and intention. This model proposed that perceived value has both direct and indirect effect on BI through satisfaction (Chen, 2008; Liang, Choi, & Joppe, 2018b).

To develop our understanding of customers’ evaluation of SSKs in QSRs, this study borrows from the indirect model (satisfaction, perceived value, and behavioural intention) (Cronin et al., 2000). It is the most comprehensive model because it looks at both the direct and indirect impacts, integrating them into the TAM model. Furthermore, few studies have investigated multiple direct effects between value, satisfaction, and BI and even fewer have studied these variables simultaneously in the technology acceptance field to understand whether or not any or both variables (value and satisfaction) directly influence behavioural intention.

Proposed model and hypotheses development

By combining elements of the TAM and the satisfaction model, the proposed model attempts to better understand customers’ behavioural intention to adopt a new technology and its antecedents in the restaurant industry, specifically in the QSR segment. See Figure 1 for details.

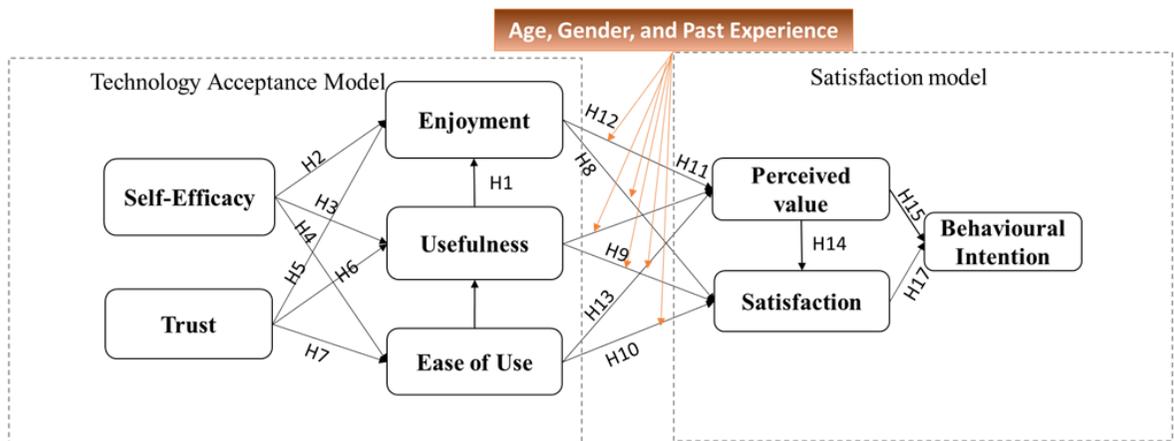


Figure 1. Proposed model

Perceived enjoyment

Perceived enjoyment (PE) is defined as “the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use” (Venkatesh, 2000, p.351). This variable has been widely applied and validated as a key determinant in customer use of SSTs (Lewis & Loker, 2014; Moon & Kim, 2001; Alalwan, Baabdullah, Rana, Tamilmani, & Dwivedi, 2018). Therefore, this study examines the role of PE in SSK usage. For the purpose of this study, perceived enjoyment is defined as the degree to which a person believes that adoption of an SSK in a QSR is enjoyable. The hypothesis is as follows:

H1: *PU has a positive influence on perceived enjoyment.*

Self-efficacy as an antecedent in TAM

Maddux and Kleiman (2018) defined self-efficacy as people’s judgment of their ability to perform a particular behaviour that results in desired outcomes. In a technology context, self-efficacy is defined as the user’s confidence in their ability to use a technology and achieve favourable outcomes. Studies have concluded that the more confident consumers feel with their ability to use a technology (i.e., the greater their self-efficacy), the more likely they are to perceive benefits from that technology (Hartzel, 2003; Compeau & Higgins, 1995). Based on these findings, the hypotheses are as follows:

H2: *Self-efficacy has a positive influence on PE.*

H3: *Self-efficacy has a positive influence on PU.*

H4: *Self-efficacy has a positive influence on PEOU.*

Trust as an antecedent in TAM

Trust is also considered a significant external factor of TAM (Gefen *et al.*, 2003; Kim *et al.*, 2008). According to Kramer (1999), “trust entails a state of perceived vulnerability or risk that is derived from an individual’s uncertainty regarding ... others on whom they depend” (p. 571). In this study’s context, “others” refers to the SSKs, whereby QSR customers might question the security of conducting financial transactions via the kiosk as opposed to face-to-face (Kaushik, Agrawal, & Rahman, 2015).

Many studies have investigated the importance of trust in online shopping settings (Corritore, Kracher, & Wiedenbeck, 2003; Elbeltagi & Agag, 2016; Koufaris & Hampton-Sosa, 2004). This study examines the effect of trust in the restaurant industry, an offline setting. A review of the literature uncovered no other studies that examined the effect of trust on consumer’s PEOU, PU, and PE in using SSKs in QSRs. The hypotheses are as follows:

H5: *Trust positively influences the PE of customers using restaurant kiosks.*

H6: *Trust positively influences the PU of customers using restaurant kiosks.*

H7: *Trust positively influences the PEOU of customers using restaurant kiosks.*

Perceived value

Perceived value (PV) is one of the most important contributors to customer satisfaction (Prebensen, Woo, & Uysal, 2014). According to Woodruff (1997), PV is a trade-off between the benefits received and sacrifices given to obtain the service. Sacrifices include monetary (price) and non-monetary elements (time and effort) (Cronin *et al.*, 2000). In this study, perceived value results from the QSR customer’s evaluation of benefits received by using an SSK versus non-monetary “sacrifices” made by using an SSK. Several studies have demonstrated a significant relationship between PV and PU, PEOU, and PE. Setterstrom, Pearson and Orwig (2013), found PU and enjoyment to be predictors of PV in web-enabled

wireless technology. Wang and Wu (2014) investigated the PV of the iPad menu and its relationship to the BI to patronize a restaurant, concluding that both functional factors (i.e. PEOU and PU) and emotional factors (PE) significantly influence PV. Therefore, the hypotheses are as follows:

H8: PE increases a customer's perceived value towards SSK in QSRs.

H9: PU increases a customer's perceived value towards SSK in QSRs.

H10: PEOU increases a customer's perceived value towards SSK in QSRs.

In addition, a number of hospitality studies have shown that PV has a strong and significant effect on customer satisfaction (CS) (Chen, Chen, & Chen, 2009; Sweeney & Soutar, 2001). That is, if a customer perceives and places a high value on a product or service, then their level of satisfaction increases. Therefore, the hypothesis is as follows:

H11: PV has a direct and positive impact on customer satisfaction.

However, the direct linkage between PV and BI is not clear. Several studies conclude that PV directly influences BI (Liang, Choi, & Joppe, 2018a; Sweeney, Soutar, & Johnson, 1999), while at least one other finds that PV indirectly affects BI through CS (Patterson & Spreng, 1997). Shang and Wu (2017) asserted that PV is an important factor in using SST which positively influences customer's intention indirectly through CS. In accordance with these findings, this study suggests the following hypotheses:

H12: PV directly and positively influences customer's BI towards SSK.

H13: PV indirectly through satisfaction influences customer's BI towards SSK.

Customer satisfaction

Zeithaml (1988) defined CS as the customer's evaluation of a product or service in terms of whether it meets their needs and expectations. Understanding CS is important because it is a fundamental predictor of the intention to continue information technology (IT) use (Limayem, Hirt, & Cheung, 2007); key indicator of IT success (Bhattacharjee, 2001); and an important IT-dependent variable, representing the user's overall feeling about the system (Bhattacharjee & Premkumar, 2004). Research has shown that if users perceive that a system has improved their productivity and enhanced their job performance, they tend to have a positive emotional response to that system. That is, a positive relationship exists between PU and CS (Gelderman, 1998; Hsu & Chiu, 2004; Rai, Lang, & Welker, 2002). Studies have also confirmed a positive relationship between PEOU and CS (Lin, 2008; Stoel & Lee, 2003). In addition, a consumer's positive experience in an enjoyable environment is likely to increase their level of satisfaction and repurchase intention (Hirschman & Holbrook, 1982). In the hospitality context, studies have shown that entertainment and perceived enjoyment (PE) has a positive effect on CS and repurchase intention (Chiu, Fang, & Tseng, 2010). In view of these findings, the hypotheses are as follows:

H14: PE positively influences customer satisfaction.

H15: PU positively influences customer satisfaction.

H16: PEOU positively influences customer satisfaction.

The positive and strong relationship between CS and BI has been addressed in several studies (Cronin et al., 2000; Oliver & Swan, 1989). Most of these studies have reported CS as a main determinant of repurchase intention, which, in turn, affects the company's revenue. A high level of CS results in a high

level of BI and a high level of repurchase and recommendation to others (Anderson & Sullivan, 1993; Liang, *et al.*, 2018b). Therefore, the hypothesis is as follows:

H17: *Customer satisfaction positively and directly influences behavioural intention toward using SSK in QSR.*

Moderating effect of age and gender

To better understand the characteristics of technology users, the roles of age and gender have been tested in many technology adoption studies (Darian, 1987; Kim, 2016; Kim, Christodoulidou, & Brewer, 2011; Wong, Yap, Turner, & Rexha, 2011). However, the results have been inconsistent. For example, some studies identified men as more likely than women to use SSTs (Darian, 1987; Sim & Koi, 2002), while others showed no significant differences between men and women in technology adoption in the hospitality setting (Kim *et al.*, 2011; Wong *et al.*, 2011). One study concluded that younger customers were more likely to use SSTs (Kim *et al.*, 2011); another found insufficient evidence to support that finding (Sim & Koi, 2002). This study attempts to add some clarity to these ambiguous findings by examining the moderating effect of age and gender on technology adoption in QSRs. The hypotheses are as follows:

H18: *Gender moderates the relationship between the three factors of TAM (PE, PEOU and PU) and the two factors of the satisfaction model (PV and satisfaction).*

H19: *Age moderates the relationship between the three factors of TAM (PE, PEOU and PU) and the two factors of the satisfaction model (PV and satisfaction).*

Moderating effect of past experience

Previous studies have found that having experience with SSKs positively influences the customers' intention to use SSKs at airports, car-rental kiosks, ATMs, and QSRs (Kim *et al.*, 2013). Kim *et al.* (2013) concluded that past experience with SSKs positively influences customers' perceptions of their ability and their extrinsic motivation to use SSKs. Therefore, this study expects that customers who have experience with kiosks are more likely to use the SSK at QSRs than those without experience. Our hypothesis is as follows:

H20: *Past experience moderates the relationship between the three factors of TAM (PE, PEOU and PU) and the two factors of the satisfaction model (PV and satisfaction).*

Methodology

Study context and sampling

The target population for this study, confirmed through two screening questions, was McDonald's customers over the age of 18 who had used its SSK at least once in the last six months. McDonald's was chosen because it is one of the biggest chains of QSRs and most of its locations in Canada have adopted SSKs. According to Henderson (2015), SSKs have been introduced in 70% of McDonald's restaurants in Canada, with more expected over the next few years. To examine the model, this study used a quantitative research approach and developed an online survey to measure participants' perceptions and evaluations of SSK in McDonald's. A pre-test was conducted with 10 graduate students who had used McDonald's SSK before the final distribution. This survey was distributed in Winter 2018 through Amazon Mechanical Turk (M-Turk) online panel, with respondents being given a small monetary incentive in North America. The decision to use M-Turk was made based on previous studies' support, whereby researchers successfully reached a designated population in a relatively short time through using M-Turk (Hung & Law, 2011).

Excluding demographic and past experience questions, this survey consisted of 32 questions and was assessed on a five-point Likert scale from 1 (strongly agree) to 5 (strongly disagree). Among 619 returned questionnaires, 415 were usable for data analysis.

Measurement developments

This study explores the main determinants that influence the customer's decision to use SSKs in the QSR industry. The measurement items of each construct were chosen because they had shown promise as being potential determinants based on the findings of previous studies. Specifically, the measurement items for PU were adopted from Wang and Wu (2014) where PU was tested using five items with composite reliability 0.86. This scale for PU was selected because it was measured for technology adoption in the restaurant industry, which fits this study's context. Measurement items for PEOU and PE were adopted from Davis *et al.* (1989) and Davis *et al.* (1992), respectively. As for trust, four items were adopted from Kaushik *et al.* (2015) as they showed a strong composite reliability of 0.92. The measurement items of self-efficacy were adopted from two studies: Van Beuningen, De Ruyter, Wetzels and Streukens (2009) and Compeau and Higgins (1995). The former study measured self-efficacy with five items, with Cronbach alpha ranging from 0.92 to 0.94. Additionally, two items were adopted from Compeau and Higgins (1995), which are widely used in hospitality studies. Perceived value (PV) is the result of customer's evaluation of what benefits they would receive by using SSKs in QSRs against what they would have to sacrifice. Based on this definition, this study investigates non-monetary PV and focuses more on the behavioural price dimension, which is adopted from Petrick (2002).

As for the outcome variables, four items from Cronin *et al.* (2000) were adopted to measure satisfaction, while three items from the same study were adopted to measure behavioural intention to use SSK.

In summary, the survey questionnaire consisted of three parts: (i) respondent's past experience with the SSK; (ii) measurement items for the key study variables (i.e., PU, PEOU, PE, trust, self-efficacy, PV, satisfaction, and behavioural intention); and (iii) respondent's socio-demographic characteristics, such as age, gender and education level. This information allowed us to explore the potential moderating factors affecting customer adoption of SSKs in QSRs.

Results

Demographics of the respondents

Multiple statistical methods, including both descriptive and inferential statistics, were used to examine the relationships among the proposed constructs. First, to identify a demographic profile, frequency analysis was conducted via SPSS 25.0. Among the qualified respondents, 51% of participants were female. Expectedly, 56% were between the ages of 26-35, indicating a relatively young age group of participants. The majority (56%) were highly educated, holding a university or higher degree. A dominance of middle (\$36,000 - \$61,000) and low (\$18,000 - \$36,000) participant income was observed, accounting for 32% and 24% respectively of our respondents (Table 1).

Confirmatory factor analysis

Second, Anderson and Gerbing's (1988) two-step approach was used to analyse the proposed model: (i) Confirmatory factor analysis (CFA) for measurement model; and (ii) Structural Equation Model (SEM) for the structural model. CFA is conducted to test the validity of measurements and to remove unnecessary items via AMOS 25.0. After running CFA, items with factor loading lower than 0.50 were eliminated to achieve higher reliability. Twenty-nine items were retained in the model (Table 2).

The CFA results demonstrate satisfactory indices based on Hair, Anderson, Tatham and Black's (1998) criteria, which the normed chi-square statistics (χ^2 / df) is 2.709, less than the cut-off point of 3. The

Root Mean Square Error of Approximation (RMSEA) is 0.064, less than the recommended cut off point of 0.08. Normed Fit Index (NFI) is 0.90 and Confirmatory Fit Index (CFI) is 0.94. Both are higher than Hair *et al.*'s (1998) recommendation of 0.90, indicating that the measurement model achieves satisfactory fitness.

Table 1. *Sociodemographic Profile of Respondents (N=415)*

Characteristics	Variable	n	Percentage
Gender	Male	210	51%
	Female	204	49%
Age	18-25	35	8%
	26-35	200	48%
	36-45	101	24%
	46-55	48	12%
	56+	29	7%
Education	High school or less	38	9%
	College	143	34%
	University	153	37%
	Graduate	66	16%
	Higher than graduate	13	3%
Household Income	Less than \$18,000	29	7%
	\$18,000 – \$36,000	100	24%
	\$36,001 – \$61,000	133	32%
	\$61,001 – \$72,000	57	14%
	\$72,001 – \$90,000	42	10%
	More than \$90,000	50	12%

To assess the reliability and convergent validity of the measurement model, standardized factor loading, composite reliability (CR) and average variance extracted (AVE) were calculated. As shown in Table 2, the standardized factor loading of all the items ranges was above the threshold limit of 0.6, ranging from 0.65 to 0.95 except for the first item of trust (0.57). Nonetheless, this item is appropriate to be kept in the analysis based on Chen and Tsai's (2007) suggestion that factor loadings greater than 0.5 are acceptable for CFA. Moreover, the mean of this item is 4.05 with a standard deviation of 0.35 and therefore it was not removed. Composite reliability was calculated to assess the reliability of the latent constructs. CR of the all constructs were higher than the recommended threshold value of 0.70. Also, as recommended by Fornell and Larcker (1981), AVEs were calculated to evaluate the convergent validity. As shown in Table 2, all the AVE values exceed the cut-off value of 0.50 (Hair *et al.*, 1998), indicating a good convergent validity. Furthermore, discriminant validity is evidence if the square root of AVE for each construct is higher than its correlation with another construct (Fornell & Larcker, 1981). For example, as shown in Table 3, PEOU and SAT are two constructs with a correlation of 0.543. The square root of SAT and PEOU is higher than this correlation (0.778, 0.817 respectively), indicating good discriminant validity. Therefore, most of the constructs achieve discriminant validity except for PV. Nevertheless, this concern is resolved by a variance inflation factors test, which is discussed further in the next section.

Table 2. *The Factor Loading, Reliability, and Validity of Measurement Model*

Items	Std. Factor Loading	CR	AVE
Trust		0.710	0.562
The security policy for credit card information on this system is clear.	0.570		
I feel that it is safe for me to provide my credit card information when I use the kiosk.	0.894		
Ease of Use		0.889	0.667
Learning to use the McDonald's kiosk is easy.	0.847		
I find it easy to use the McDonald's self-service kiosk.	0.842		
The instruction on the kiosk are clear and understandable.	0.797		
I could easily become skillful at using the kiosk.	0.778		
Usefulness		0.852	0.657
The kiosk provides complete information, such as meal choices and prices.	0.852		
The kiosk provides clear images of the different menu items.	0.827		
The kiosk allows me to browse the menu conveniently.	0.750		
Perceived Enjoyment		0.930	0.815
The self-service kiosk is fun to use.	0.866		
Using the kiosk is an enjoyable experience.	0.955		
Using the kiosk is a pleasant experience.	0.885		
Self-Efficacy		0.912	0.721
Ordering food via kiosk is a task which I can perform well.	0.841		
I have all technical knowledge I need to use a kiosk.	0.843		
I am certain I can use the kiosk well.	0.901		
I feel confident that my skill at using the kiosk is just as good or even better than others who use the kiosk.	0.810		
Perceived Value		0.845	0.523
Using the kiosk makes my purchase easier.	0.800		
Using the self-service kiosk requires little energy to purchase.	0.647		
Using the kiosk requires little effort.	0.684		
Using the kiosk was a good value for money spent.	0.764		
The kiosk lets me get my food in a timely manner.	0.709		
Satisfaction		0.860	0.606
I think I did the right thing when I used the kiosk.	0.766		
My choice to use the kiosk was a wise one.	0.853		
The kiosk offered by McDonald's exceeds my expectations.	0.699		
Overall, I am satisfied with the kiosk at McDonald's.	0.788		
Behavioural Intention		0.890	0.669
I would like to use the kiosk whenever it is available.	0.855		
I will recommend the kiosk to my colleagues, friends and/or family.	0.824		
I plan to use the McDonald's kiosk more in the future.	0.858		
I am more likely to return to McDonald's because of the kiosk.	0.729		

Note: AVE = Average Variance Extracted; CR = Composite Reliability. Model fit: Chi-square = 937.400, DF = 346, $p < 0.01$, NFI = 0.90, CFI = 0.94, RMSEA = 0.064.

Table 3. Results for Correlation matrix and AVEs

Variable	AVE	SAT	PEOU	BI	PV	SE	TRU	PE	PU
SAT	0.606	0.778							
PEOU	0.667	0.543	0.817						
BI	0.669	0.851	0.430	0.818					
PV	0.523	0.783	0.552	0.755	0.723				
SE	0.721	0.507	0.841	0.382	0.488	0.849			
TRU	0.562	0.473	0.519	0.397	0.440	0.543	0.750		
PE	0.815	0.692	0.594	0.668	0.603	0.545	0.495	0.903	
PU	0.657	0.506	0.784	0.376	0.498	0.775	0.537	0.560	0.811

Note: square root of AVE for each construct is shown in bold. PE=Perceived Enjoyment, PU=Perceived Usefulness, PEOU=Perceived Ease of Use, TRU=Trust, SE= Self-Efficacy, PV=Perceived Value, SAT=Satisfaction, BI= Behavioural Intention

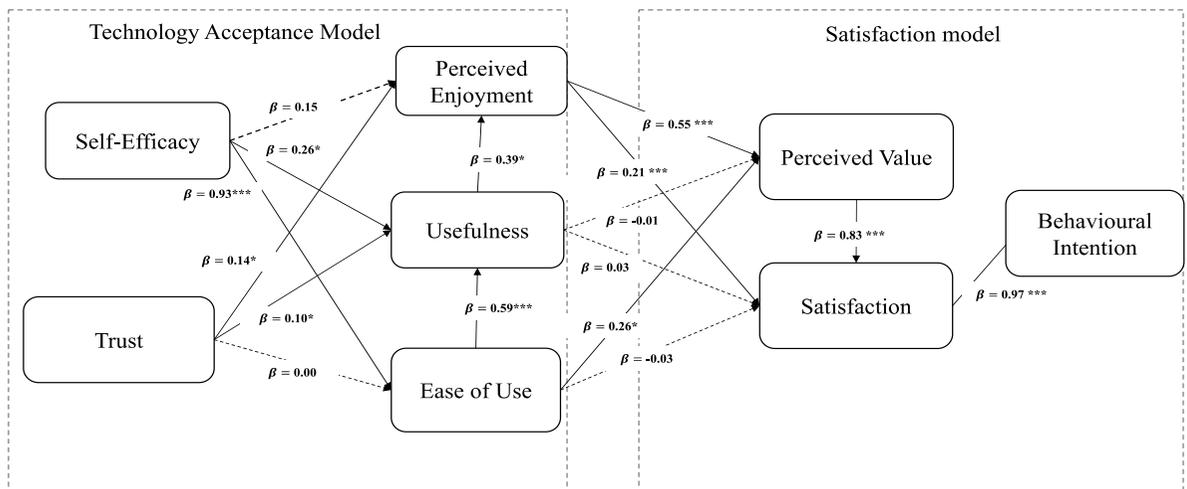
Structural model analysis

To evaluate the structural model, SEM is used to evaluate the relationships among variables, to test hypotheses, and to assess the model fit. All the model fit indices indicated the structural model fit with the data at the acceptable level: $\chi^2/df=2.748$, $GFI=0.856$, $NFI=0.90$, $IFI=0.94$, $CFI=0.94$, and $RMSEA=0.065$. As shown in Figure 2, perceived usefulness was found to significantly and positively influence enjoyment ($\beta=0.402$, $t=3.32$, $p<0.001$), supporting H1. Hypothesis 2 was not supported because self-efficacy is not significantly related to enjoyment. However, the results show that self-efficacy is a predictor of perceived usefulness ($\beta=0.260$, $t=1.900$, $p<0.05$) and perceived ease of use ($\beta=0.933$, $t=15.129$, $p<0.001$), supporting H3 and H4. Hypotheses 5 and 6 were supported that trust significantly impacts enjoyment ($\beta=0.128$, $t=1.96$, $p<0.05$) and usefulness ($\beta=0.099$, $t=2.010$, $p<0.05$). However, there is a lack of significant support between trust and usefulness, resulting in a not-supported H7. H8 was supported because enjoyment significantly and positively influences satisfaction ($\beta=0.203$, $t=3.92$, $p<0.001$). In addition, the hypotheses on the relationship between TAM constructs (PU and PEOU) and satisfaction (H9 and H10) were not supported. Hypothesis 11 was found to display a positive and significant effect on perceived value ($\beta=0.553$, $t=8.59$, $p<0.001$). The hypothesis on the relationship between usefulness and value was not supported (H12). However, the hypothesis on the relationship between ease of use and value (H13) was supported ($\beta=0.26$, $t=1.954$, $p<0.05$). Perceived value was shown to have a positive and significant impact on satisfaction ($\beta=0.968$, $t=15.750$, $p<0.001$); therefore, H14 was supported. In terms of Hypothesis 15, because there was no direct relationship between value and intention, all proposed Cronin *et al.*'s models (value, satisfaction and indirect model) were tested to determine which model could be supported and related to this study context. Based on the analysis result, satisfaction model was supported. In other words, perceived value is confirmed to influence behavioural intention indirectly through satisfaction. Thus, Hypothesis 16 was supported. It is interesting to note that the largest path coefficient was between satisfaction and behavioural intention ($\beta=0.968$, $t=15.750$, $p<0.001$). Among the 17 proposed causal hypotheses, 11 hypotheses were statistically significant (Table 4).

Table 4. Results for the Structural Model and Hypothesis Tests

Hypothesis	Standardized coefficient	t-value	Support
H1: PU → PE	0.402	3.326***	YES
H2: SE → PE	0.154	1.287	NO
H3: SE → PU	0.259	1.893*	YES
H4: SE → PEOU	0.933	15.129***	YES
H5: TRU → PE	0.128	1.957*	YES
H6: TRU → PU	0.099	2.010*	YES
H7: TRU → PEOU	-0.008	-0.188	NO
H8: PE → SAT	0.203	3.925***	YES
H9: PU → SAT	-0.088	-0.898	NO
H10: PEOU → SAT	-0.226	-0.396	NO
H11: PE → PV	0.553	8.595***	YES
H12: PU → PV	-0.008	-0.054	NO
H13: PEOU → PV	0.258	1.954*	YES
H14: PV → SAT	0.826	10.824***	YES
H15: PV → BI	0.148	-0.848	NO
H16: PV → SAT → BI	0.881	1.997*	YES
H17: SAT → BI	0.968	15.750***	YES

Note: PE=Perceived Enjoyment, PU=Perceived Usefulness, PEOU=Perceived Ease of Use, TRU=Trust, SE= Self-Efficacy, PV=Perceived Value, SAT=Satisfaction, BI= Behavioural Intention; ***p<0.001; **p<0.01; *p<0.05.



Note: ***=p<0.001; **=p<0.01; *=p<0.05
 $\chi^2/df=2.748$, GFI=0.856, NFI=0.90, IFI=0.94, CFI=0.94, RMSEA=0.065.

Figure 2. Structural Path Coefficients

R² indicates the significant amount of variance for dependent variables that could be explained by the independent variables. The results showed the following dependent variables with satisfactory R squares: behavioural intention (94%), satisfaction (90%), perceived ease of use (87%), perceived usefulness (81%), perceived value (53%), and perceived enjoyment (40%). As inter-correlations have been observed among more than two predictor variables (i.e. self-efficacy, trust and perceived

usefulness), multicollinearity issues might exist. Therefore, Variance Inflation Factors (VIF) were adopted to verify the multicollinearity issues. According to Baguley (2012), when all VIF values ranged less than the proposed cut off threshold of 5 (Hair, Ringle, & Sarstedt, 2011), the conclusion of no obvious multicollinearity issue can be made. In this study, the VIF tests suggest all values between 1.418 to 2.960, demonstrating that no obvious multicollinearity issues exist.

Moderating effect

According to Steinmetz, Davidov and Schmidt (2011), using regression analysis techniques to determine the interaction effects between variables has low power due to a lack of control of measurement errors. Therefore, to test the moderating effects, this study uses the latent interaction modelling 'constrained' SEM approaches through Amos 25.0. Three moderators were proposed, including gender, age and past experience in using SSKs. The following paragraphs describe the detailed analysis for each moderator, and Table 5 demonstrates an overview for each moderator testing.

To begin, Hypothesis 18 - gender moderates the relationship between the three beliefs in the TAM (PE, PEOU and PU) and the satisfaction model (PV and satisfaction) - was tested. First, structural parameters were constrained in each gender group (male, N=217 and female, N=155). Then the moderating effect was tested by the comparison between constrained model and unconstrained model and the difference in the two chi-squares was calculated. As shown in Table 5, there are only two significant $\Delta\chi^2$ between unconstrained model and the proposed constraint paths. Therefore, H18 was only partially supported and gender only moderated the relationships between PE and PV ($\Delta\chi^2=5.334$, $p=0.05$) but not the other proposed relationships.

Next, the moderating effect of age was tested. The sample was divided into two groups [the younger groups including age range 18-45 (N=319) and older group including 46-90 (N=54)] based on the medium split method. Similarly, the moderating effect of this hypotheses was examined using chi-square differences test between constrained model and unconstrained model. Table 5 shows that there was no significant difference between the constraint paths and the unconstrained model. Therefore, H19 was not supported and age did not moderate this relationship.

Finally, Hypothesis 20 - past experience moderates the relationship between the three beliefs in TAM and satisfaction model - was tested. To do so, median split method was used to divide the sample into the low-level experience (N=240, used SSKs less than 12 times) and high level experience (N=175, used SSKs more than 12 times). The result, following the similar analysing procedure, indicates that moderating effect of past experience on the relationship between the three beliefs in TAM and satisfaction model was only significant for the path from PE to SAT ($\Delta\chi^2=3.645$, $p=0.051$) but not the others.

Discussion

Earlier research (Davis, 1989) suggests the need to consider the role of external variables in the TAM. Therefore, this study examined the external variables of enjoyment, trust, and self-efficacy in an offline hospitality context: SSK adoption in QSRs. The extended TAM model was tested using a two a step approach: confirmatory factor analysis (CFA) and structural equation modelling (SEM).

Overall, the findings show that customer satisfaction is the most powerful factor influencing the customer's decision to continue using SSKs. The more the customers are satisfied with the kiosk use, the more likely they are to use kiosk service whenever it is available; and the more likely they are to recommend their friends and families to use it. This result supports previous studies which have

identified satisfaction as the salient factor impacting behavioural intention (Cronin et al., 2000; Oliver & Swan, 1989).

Table 5. Results for the Moderating Effects for gender, age and past experience

Constrained paths	Moderator	χ^2	df	$\Delta\chi^2/\Delta df$	p	Results
Unconstrained model for gender		881.543	224	N/A	N/A	
PE→PV	Female				0.05	YES
	Male	886.877	225	5.334**		
PE→SAT	Female				0.12	NO
	Male	882.445	225	0.902		
PEOU→PV	Female				0.35	NO
	Male	881.748	225	0.205		
Unconstrained model for age		870.346	224	N/A	N/A	
PE→PV	Young				0.235	NO
	Old	871.705	225	1.359		
PE→SAT	Young				0.201	NO
	Old	871.817	225	1.471		
PEOU→PV	Young				0.673	NO
	Old	870.389	225	0.043		
Unconstrained model for past experience		861.884	224	N/A	N/A	
PE→PV	High				0.25	NO
	Low	862.075	225	0.191		
PEOU→PV	High				0.18	NO
	Low	862.308	225	0.424		
PE→SAT	High				0.051	YES
	Low	865.529	225	3.645*		

Note: PE=Perceived Enjoyment, PV=Perceived Value, SAT=Satisfaction, PEOU=Perceived Ease of Use, ***p<0.001; **p<0.01, *p<0.05

The study findings indicate that self-efficacy has a positive and significant effect on PE and PU. In other words, if people perceive that they have sufficient knowledge, ability, and skills to use SSKs in QSRs, they are more likely consider them to be useful and easy to use. These results are congruent with previous studies and extend the previous TAMs by adding self-efficacy as an effective predictor in the hospitality setting (Compeau & Higgins, 1995; Kulviwat, Bruner, & Neelankavil, 2015).

From a practical perspective, the results underscore the importance of clear and accessible instruction on how to use the SSK. Some measures that might achieve these goals include sufficient written instruction and videos and/or knowledgeable staff who can assist customers in using the SSK.

Unexpectedly, self-efficacy had insignificant effects on perceived enjoyment, suggesting that one's confidence level in their ability to use an SSK does not drive feelings of enjoyment. Since most of the survey participants were relatively young, they were likely comfortable with technology. For them, the process of ordering food through a kiosk is not complex, and their confidence in handling it does not influence their intrinsic motivation.

The second antecedent of PEOU and PU is trust. Trust was positively related to PU and PEOU. That is, if the customers clearly understand and trust the kiosk, they are very likely to perceive that the SSK as

enjoyable and useful. These perceptions strengthen their satisfaction and increase the likelihood of their recommending the SSK to others.

Previous related studies on trust in the hospitality context were mostly conducted in an online setting (Corritore *et al.*, 2003; Elbeltagi & Agag, 2016; Koufaris & Hampton-Sosa, 2004). This study confirmed their results in an offline setting, thereby enriching the research literature on trust and TAM.

This result also provides practical implications. Forty-four percent of the survey participants answered “disagree” or “neither agree nor disagree” in response to questions about whether they perceived the system as having strong security safeguards. Therefore, to increase customers’ trust, a clear description about the SSK’s security safeguards should be visible, and cash payments possible (in addition to credit and debit card payment options). While trust positively and directly influenced PE and PU, trust had no significant effect on PEOU. This finding makes sense because customer’s perception of ease of use was strongly influenced by their confidence level in using the kiosk rather than by their trust.

Notably, the result demonstrated that self-efficacy had a much stronger impact on TAM than trust. This result suggests that customers are more concerned with their knowledge and ability to use the SSK than with their trust of the SSK’s security features. One possible explanation may lie in the offline setting of the SSK. Customers are physically visiting the kiosk in a busy QSR staffed with employees. If a mistake happens or if they sense a security error, the customer can immediately call for help. This kind of physical transaction contrasts sharply with the offline setting, where transactions are made in somewhat of a void, where help is not close at hand. Also, in the offline setting, the process of ordering from the SSK is public – which may prompt concerns about how others are judging their competence at operating the SSK. Confidence to complete the task, therefore, plays an important role.

This study result supported the relationship between perceived enjoyment and perceived usefulness. The result shows that perceived usefulness positively and significantly impacts perceived enjoyment. This finding is consistent with existing studies that found usefulness to positively influence enjoyment (Kang & Lee, 2014). However, this relationship has not been explored in the previous TAM studies in the restaurant setting. This result also suggests the kiosk designer should focus more on enhancing SSKs’ practical performance features since these lead to enjoyment, which ultimately leads to continued retention. Furthermore, consistent with previous studies (Davis, 1986), perceived ease of use positively affects perceived usefulness. Perceived usefulness can be viewed as a mediating factor between perceived ease of use and enjoyment.

Implications and limitations

Two important contributions of this study are its integration of TAM and the satisfaction model to better understand users’ continued use of SSKs at QSRs; and its examination of the relationship between intrinsic and extrinsic motivations in the TAM and customer satisfaction components (PV, satisfaction, and behavioural intention). Previous TAM studies investigated only the direct effect of PU and PEOU on attitude or behavioural intention (Beatson, Lee, & Coote, 2007; Wei, Torres, & Hua, 2017). In contrast, this study tested the mediating role of perceived value and satisfaction between PU, PEOU and behavioural intention. Thus, our model enriches the research literature on TAM, continued intention, and satisfaction. The findings indicate that the satisfaction model explains the largest proportion of variance. Intrinsic motivation has a stronger effect on value and satisfaction than extrinsic motivation. Satisfaction and value both mediate the relationship between enjoyment and behavioural intention. In other words, customers are more satisfied with an SSK at a QSR if they perceive using a kiosk as fun and enjoyable. This result is consistent with previous studies. It also extends previous study findings on

intrinsic motivation in TAM, especially those that show enjoyment as a salient factor of satisfaction (Chiu *et al.*, 2010; Hirschman & Holbrook, 1982; Setterstrom *et al.*, 2013). Customers are more likely to continue using SSKs in QSRs and recommend them to their friends and family if they have enjoyed using the kiosk. Some ways to help the customer enjoy more fully the kiosk experience include offering a variety of menu items, enabling customized ordering and providing detailed nutritional profiles about the menu items (e.g., identifying gluten-free products).

An important and surprising finding of this study is the insignificant relationship between PU-SAT and PU-PV. This result contradicts that of previous studies which have identified PU as a main antecedent of user satisfaction when using technology (Gelderman, 1998; Hsu & Chiu, 2004; Rai *et al.*, 2002). One possible explanation for this result is that most survey participants were relatively young (25-36 years old). For them, technology is so embedded within their lives that the question of its usefulness never arises. They may simply accept, without consideration, that technology is necessary and useful. In other words, the question of whether a McDonald's SSK is useful may not even be a consideration for a younger age group.

Another result of this study is that perceived ease of use did not have a significant effect on customer satisfaction. This result is not aligned with the previous studies which indicate PEOU is highly related to satisfaction. However, this result supports Bruner and Kumar's (2005) study that found TAM models that include intrinsic motivation such as perceived enjoyment result in PEOU not having a direct effect on satisfaction and repurchase intention. Although the customers perceive that the SSK is easy to use and fast and accurate, this perception does not influence their satisfaction and repurchase intention.

One explanation is that PEOU and PU are now widely perceived as the basic requirements for any new technology. We expect our technology to be useful and easy to use. Therefore, the fact that a technology, such as an SSK in a QSR, meets those criteria is not enough for customers to register satisfaction with that technology. In earlier studies, PU and PEOU could have been relevant factors to consider when studying technology adoption decision making, but perhaps their relevance is of less importance in a newer, technology-ubiquitous world.

Additionally, results reveal that perceived ease of use had small but significant positive effects on perceived value. When customers feel the instructions at an SSK in a QSR are clear and easy to follow, they are more likely to perceive its value as high. It explains that the number of respondents were slightly greater for women (51%) than for men. Previous research shows that when it comes to technology adoption, perceived ease of use is a more salient factor for women than for men (Venkatesh & Morris, 2000).

Perceived value is strongly and positively related to satisfaction. This result is in line with prior studies (Anderson *et al.*, 1994; Sweeny & Soutar, 2001). Moreover, while value is significantly related to satisfaction, the results indicate no significant relationship between perceived value and behavioural intention. Therefore, the results support that value indirectly, through satisfaction, affects behavioural intention; and satisfaction strongly and positively affects repurchase intention. A reason could be the way it was operationalized. Perceived value was operationalized as a unidimensional (behavioural) value. It is possible that five items of behavioural value inadequately explained a customer's perception of value. A user-friendly restaurant kiosk could reduce user effort and enhance perceived value. Offering different promotions is the other way to encourage repeat kiosk use and therefore enhance customer's perceived value.

This study found that gender only moderates the relationship from PE to PV and past experience only moderates the path from PE to SAT. Age has no moderating effect on the model. In other words, there are no significant differences between young and old age groups in SSK adoption in QSRs. Enjoyment has a significant impact on value for different genders and also affects customers differently, depending on their level of SSK experience.

Finally, this study provides an important implication for the European restaurant industry. Compared to the rest of the developed world, cash has been the most popular payment form in 22 out of 38 European countries (de Best, 2020). Since the COVID-19 pandemic crisis, more and more people worry about touching cash during the transaction. Also, many essential businesses have installed hygiene shields to maintain social distancing between frontline staff and their customers. Thus, it is reasonable to predict the continued rise of self-order kiosks as a way to improve customer service and operating efficiencies around the globe, including Europe. This study findings show that ease of use has a direct effect on perceived value and perceived enjoyment significantly influences both value and satisfaction. It is important to note that the SSK should be easy to use for a complex order (e.g., order customization; special request) and make nutritional content of food and ingredient information available... Perceived enjoyment should be considered as an important ingredient for providing a high quality SSK experience. For example, visual cues (e.g., photos of food and ingredients) help customers place accurate orders while also promoting upsells. Additional information about the menu items (e.g., home styled, authentic, locally sourced) and ingredients will also provide customers with a more fun and enjoyable experience.

Since the COVID-19 pandemic, service technology has become increasingly important. In Europe, consumers used to have the mentality that SSKs do not belong to casual dining restaurant and bistro settings but may be useful for quick service restaurants. COVID-19 has clearly exposed the need for more service automation and accelerated the adoption of SSKs in the restaurant industry. It has also pressured suppliers to develop SSKs with new functions (e.g., temperature check, touchless and antiviral film-like shield on touch screen). For these reasons, SSKs may replace human service delivery and traditional paper menus.

Although this study contributes to the existing TAM literature, there remain some limitations, and some opportunities for future research. First, the participants were asked to recall their kiosk use in the past six months, which could have challenged their long-term memory. Future studies should investigate more recent kiosk use to reduce recall limitation. Second, data were collected from an online panel and the majority of respondents (81%) were under 45 years old. Therefore, this study may have limited applicability to older customers (above 45 years old) and to customers with limited computer skills. Third, the sample of this study was limited to McDonald's customers in Canada and the United States. Consequently, caution must be exhibited when generalizing the study results. Fourth, at least one previous study (Liang *et al.*, 2018b) has suggested trust should be measured from two different perspectives, while this study measured it from only one perspective. Therefore, future studies might consider measuring trust in the platform (kiosk) and in users (skills). Finally, considering the importance of perceived enjoyment, future studies are needed to investigate the concept of fun and enjoyment through open-ended questions to better understand which aspect of fun affects customer repurchase intention.

References

- Alalwan, A. A., Baabdullah, A. M., Rana, N. P., Tamilmani, K., & Dwivedi, Y. K. (2018). Examining adoption of mobile internet in Saudi Arabia: Extending TAM with perceived enjoyment, innovativeness and trust. *Technology in Society*, 55, 100-110.
- Allon, G., Federgruen, A., & Pierson, M. (2011). How much is a reduction of your customers' wait worth? An empirical study of the fast-food drive-thru industry based on structural estimation methods. *Manufacturing & Service Operations Management*, 13(4), 489-507.
- Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin*, 103(3), 411-423.
- Anderson, E. W., & Sullivan, M. W. (1993). The antecedents and consequences of customer satisfaction for firms. *Marketing Science*, 12(2), 125-143.
- Angelova, B., & Zekiri, J. (2011). Measuring customer satisfaction with service quality using American Customer Satisfaction Model (ACSI Model). *International Journal of Academic Research in Business and Social Sciences*, 1(3), 232-258.
- Baguley, T. (2012), *Serious Stats: A Guide to Advanced Statistics for the Behavioral Sciences*. Macmillan International Higher Education, London.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191-215.
- Beatson, A., Lee, N., & Coote, L. V. (2007). Self-service technology and the service encounter. *The Service Industries Journal*, 27(1), 75-89.
- Bhattacharjee, A. (2001). Understanding information systems continuance: An expectation-confirmation model. *MIS Quarterly*, 351-370.
- Bhattacharjee, A., & Premkumar, G. (2004). Understanding changes in belief and attitude toward information technology usage: A theoretical model and longitudinal test. *MIS Quarterly*, 28(2), 229-254.
- Black, J., & Billette, J. (2015), "Fast food intake in Canada: Differences among Canadians with diverse demographic, socio-economic and lifestyle characteristics", *Canadian Journal of Public Health*, 106(2), 52-58.
- Bruner II, G. C., & Kumar, A. (2005). Explaining consumer acceptance of handheld Internet devices", *Journal of Business Research*, 58(5), 553-558.
- Buhalis, D., Harwood, T., Bogicevic, V., Viglia, G., Beldona, S., & Hofacker, C. (2019). Technological disruptions in services: Lessons from tourism and hospitality. *Journal of Service Management*. 30(4), 484-506.
- Chen, C. F. (2008). Investigating structural relationships between service quality, perceived value, satisfaction, and behavioral intentions for air passengers: Evidence from Taiwan. *Transportation Research Part A: Policy and Practice*, 42(4), 709-717.
- Chen, S., Chen, H., & Chen, M. (2009). Determinants of satisfaction and continuance intention towards self-service technologies. *Industrial Management & Data Systems*, 109(9), 1248-1263.
- Chen, C. F., & Tsai, D. (2007). How destination image and evaluative factors affect behavioral intentions? *Tourism Management*, 28(4), 1115-1122.
- Chiu, Y. T., Fang, S. C., & Tseng, C. C. (2010). Early versus potential adopters: Exploring the antecedents of use intention in the context of retail service innovations. *International Journal of Retail & Distribution Management*, 38(6), 443-459.
- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19(2), 189-211.
- Corritore, C. L., Kracher, B., & Wiedenbeck, S. (2003). On-line trust: Concepts, evolving themes, a model. *International Journal of Human-Computer Studies*, 58(6), 737-758.

- Cronin, J. J., Brady, M. K., & Hult, G. T. M. (2000). Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments. *Journal of Retailing*, 76(2), 193–218.
- Curran, J. M., & Meuter, M. L. (2005). Self-service technology adoption: Comparing three technologies. *Journal of Services Marketing*, 19(2), 103–113.
- Dabholkar, P. A., & Bagozzi, R. P. (2002). An attitudinal model of technology-based self-service: Moderating effects of consumer traits and situational factors. *Journal of the Academy of Marketing Science*, 30(3), 184–201.
- Darian, J. C. (1987). In-home shopping: are there consumer segments? *Journal of Retailing*, 63(2), 163–186.
- Davis, F. D. (1986). *A technology acceptance model for empirically testing new end-user information systems: Theory and results* (Doctoral dissertation, Massachusetts Institute of Technology).
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1992). Extrinsic and intrinsic motivation to use computers in the workplace. *Journal of Applied Social Psychology*, 22(14), 1111–1132.
- De Best, R. (2020). Estimate of cash money use at POS (points of sale) in Europe in 2018, by country access from <https://www.statista.com/statistics/1112656/cash-use-in-europe-by-country/>
- Elbeltagi, I., & Agag, G. (2016). E-retailing ethics and its impact on customer satisfaction and repurchase intention: A cultural and commitment-trust theory perspective. *Internet Research*, 26(1), 288–310.
- Fernandes, T., & Pedroso, R. (2017). The effect of self-checkout quality on customer satisfaction and repatronage in a retail context. *Service Business*, 11(1), 69–92.
- Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error: Algebra and statistics. *Journal of Marketing Research*, 18(3), 382–388.
- Gallarza, M., Gil-Saura, I., & Arteaga-Moreno, F. (2017). Exploring competing models on sacrifices, quality, value, satisfaction and loyalty with PLS and partial correlations. *European Journal of Tourism Research*, 17(17), 116–135.
- Gefen, D., Karahanna, E., & Straub, D. W. (2003). Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, 27(1), 51–90.
- Gelderman, M. (1998). The relation between user satisfaction, usage of information systems and performance. *Information & Management*, 34(1), 11–18.
- Goldfarb, A., McDevitt, R. C., Samila, S., & Silverman, B. S. (2015). The Effect of Social Interaction on Economic Transactions: Evidence from Changes in Two Retail Formats. *Management Science* (61). <https://doi.org/10.1287/mnsc.2014.2030>
- Hair, J. F., Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis*. Prentice-Hall: Englewood Cliffs, NJ.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19, 139–151.
- Hanks, L., Line, N.D., & Mattila, A.S. (2016). The impact of self-service technology and the presence of others on cause-related marketing programs in restaurants. *Journal of Hospitality Marketing & Management*, 25(5), 547–562, DOI:10.1080/19368623.2015.1046536
- Hartzel, K. (2003). How self-efficacy and gender issues affect software adoption and use. *Communications of the ACM*, 46(9), 167–171.
- Henderson, P. (2015). *McDonald's Canada introducing new self-serve options, table service*. CTV News. Retrieved on July 31, 2019 from www.ctvnews.ca.
- Hirschman, E. C., & Holbrook, M. B. (1982). Hedonic consumption: Emerging concepts, methods and propositions. *Journal of Marketing*, 46(3), 92–101.
- Hsu, M. H., & Chiu, C. M. (2004). Internet self-efficacy and electronic service acceptance. *Decision Support Systems*, 38(3), 369–381.

- Hung, K., & Law, R. (2011). An overview of Internet-based surveys in hospitality and tourism journals. *Tourism Management*, 32(4), 717-724.
- Ivanov, S. (2019). Ultimate transformation: How will automation technologies disrupt the travel, tourism and hospitality industries? *Zeitschrift für Tourismuswissenschaft*, 11(1). <https://doi.org/10.1515/tw-2019-0003>
- Ivanov, S., Webster, C., & Berezina, K. (2017). Adoption of robots and service automation by tourism and hospitality companies. *Revista Turismo & Desenvolvimento* 27(28), 1501-1517.
- Kang, Y. J., & Lee, W. J. (2014). Self-customization of online service environments by users and its effect on their continuance intention. *Service Business*, 9(2), 321-342.
- Kaushik, A. K., Agrawal, A. K., & Rahman, Z. (2015). Tourist behaviour towards self-service hotel technology adoption: Trust and subjective norm as key antecedents. *Tourism Management Perspectives*, 16, 278-289.
- Kim, J. (2016). An extended technology acceptance model in behavioral intention toward hotel tablet apps with moderating effects of gender and age. *International Journal of Contemporary Hospitality Management*, 28(8), 1535-1553.
- Kim, J., Christodoulidou, N., & Brewer, P. (2011). Impact of individual differences and consumers' readiness on likelihood of using self-service technologies at hospitality settings. *Journal of Hospitality & Tourism Research*, 36(1), 85-114.
- Kim, J. (Sunny), Christodoulidou, N., & Choo, Y. (Clara). (2013). Factors influencing customer acceptance of kiosks at quick service restaurants. *Journal of Hospitality and Tourism Technology*, 4(1), 40-63.
- Kim, T. G., Lee, J. H., & Law, R. (2008). An empirical examination of the acceptance behaviour of hotel front office systems: An extended technology acceptance model. *Tourism Management*, 29(3), 500-513.
- Kincaid, S., & Baloglu, S. (2005). An exploratory study on the impact of self-service technology. *Journal of Foodservice Business Research*, 8(3), 35-54.
- Kokkinou, A., & Cranage, D. A. (2015). Why wait? Impact of waiting lines on self-service technology use. *International Journal of Contemporary Hospitality Management*, 27(6), 1181-1197.
- Koufaris, M., & Hampton-Sosa, W. (2004). The development of initial trust in an online company by new customers. *Information & Management*, 41(3), 377-397.
- Kramer, R. M. (1999). Trust and distrust in organizations: Emerging perspectives, enduring questions. *Annual Rev. Psychology*, 50, 569-598.
- Kulviwat, S., Bruner, G. C., & Neelankavil, J. P. (2015). The role of self-efficacy in predicting technology acceptance. In *Marketing, Technology and Customer Commitment in the New Economy* (pp. 176-176). Springer, Cham.
- Lewis, T., & Loker, S. (2014). Technology usage intent among apparel retail employees. *International Journal of Retail & Distribution Management*, 42(5), 422-440.
- Liang, L. J., Choi, H. C., & Joppe, M. (2018a). Understanding repurchase intention of Airbnb consumers: Perceived authenticity, electronic word-of-mouth, and price sensitivity. *Journal of Travel & Tourism Marketing*, 35(1), 73-89.
- Liang, L. J., Choi, H. C., & Joppe, M. (2018b). Exploring the relationship between satisfaction, trust and switching intention, repurchase intention in the context of Airbnb. *International Journal of Hospitality Management*, 69, 41-48.
- Limayem, M., Hirt, S. G., & Cheung, C. M. (2007). How habit limits the predictive power of intention: The case of information systems continuance. *MIS Quarterly*, 31(4), 705-737.
- Lin, H. F. (2008). Antecedents of virtual community satisfaction and loyalty: An empirical test of competing theories. *Cyber Psychology & Behavior*, 11(2), 138-144.

- Liu, C., Hung, K., Wang, D., & Wang, S. (2019). Determinants of self-service technology adoption and implementation in hotels: The case of China. *Journal of Hospitality Marketing & Management*, 29(6), 636-661.
- Maddux, J. E., & Kleiman, E. M. (2018). *Self-efficacy*. Guilford Press.
- Moon, J. W., & Kim, Y. G. (2001). Extending the TAM for a World-Wide-Web context. *Information & Management*, 38(4), 217-230.
- Mozeik, C. K., Beldona, S., Cobanoglu, C., & Poorani, A. (2009). The adoption of restaurant-based e-service. *Journal of Foodservice Business Research*, 12(3), 247-265.
- National Restaurant Association. (2017a). *New research shows restaurant technology plays part in dining decisions*. Retrieved on Aug 17, 2017, from <http://www.restaurant.org/News-Research/News/New-research-shows-restaurant-technology-plays-par>
- National Restaurant Association. (2017b). *Technology that puts the 'fast' into fast casual*. Retrieved on Aug 17, 2017, from <http://www.restaurant.org/Manage-My-Restaurant/Operations/Front-of-House/Technology-that-puts-the-fast-into-fast-casual>
- Oliver, R. L., & Swan, J. E. (1989). Consumer perceptions of interpersonal equity and satisfaction in transactions: A field survey approach. *Journal of Marketing*, 53(2), 21-35.
- Patterson, P. G., & Spreng, R. A. (1997). Modelling the relationship between perceived value, satisfaction and repurchase intentions in a business-to-business, services context: an empirical examination. *International Journal of Service Industry Management*, 8(5), 414-434.
- Perutkova, J. (2009). Consumers' willingness to pay and to patronize according to major restaurant attributes. *The Pegasus Review: UCF Undergraduate Research Journal (URJ)*, 4(2), 4-10.
- Petrick, J. F. (2002). Development of a multi-dimensional scale for measuring the perceived value of a service. *Journal of Leisure Research*, 34(2), 119-134.
- Prebensen, N. K., Woo, E., & Uysal, M. S. (2014). Experience value: Antecedents and consequences. *Current Issues in Tourism*, 17(10), 910-928.
- Rai, A., Lang, S. S., & Welker, R. B. (2002). Assessing the validity of IS success models: An empirical test and theoretical analysis. *Information Systems Research*, 13(1), 50-69.
- Setterstrom, A. J., Pearson, J. M., & Orwig, R. A. (2013). Web-enabled wireless technology: An exploratory study of adoption and continued use intentions. *Behaviour & Information Technology*, 32(11), 1139-1154.
- Shang, D., & Wu, W. (2017). Understanding mobile shopping consumers' continuance intention. *Industrial Management & Data Systems*, 117(1), 213-227.
- Shamdasani, P., Mukherjee, A., & Malhotra, N. (2008). Antecedents and consequences of service quality in consumer evaluation of self-service internet technologies. *The Service Industries Journal*, 28(1), 117-138.
- Sim, L. L., & Koi, S. M. (2002). Singapore's Internet shoppers and their impact on traditional shopping patterns. *Journal of Retailing and Consumer Services*, 9(2), 115-124.
- Steinmetz, H., Davidov, E., & Schmidt, P. (2011). Three approaches to estimate latent interaction effects: Intention and perceived behavioral control in the theory of planned behavior. *Methodological Innovation Online*, 6(1), 95-110.
- Stoel, L., & Lee, H. K. (2003). Modeling the effect of experience on student acceptance of Web-based courseware. *Internet Research*, 13(5), 364-374.
- Strauss, M. (2015). *McDonalds' rolls out upsclae options*. Retrieved on Aug 14, 2017, from <https://www.theglobeandmail.com/report-on-business/mcdonalds-rolls-out-table-service-customized-burgers-in-upscale-shift/article26601464/>
- Sweeney, J. C., Danaher, T. S., & McColl-Kennedy, J. R. (2015). Customer effort in value cocreation activities: Improving quality of life and behavioral intentions of health care customers. *Journal of Service Research*, 18(3), 318-335.

- Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, 77(2), 203-220.
- Sweeney, J. C., Soutar, G. N., & Johnson, L. W. (1999). The role of perceived risk in the quality-value relationship: A study in a retail environment. *Journal of Retailing*, 75(1), 77-105.
- Vakulenko, Y., Hellström, D., & Oghazi, P. (2018). Customer value in self-service kiosks: a systematic literature review. *International Journal of Retail & Distribution Management*, 46(5), 507-527.
- Van Beuningen, J., De Ruyter, K., Wetzels, M., & Streukens, S. (2009). Customer self-efficacy in technology-based self-service: Assessing between-and within-person differences. *Journal of Service Research*, 11(4), 407-428.
- Venkatesh, V. (2000). Determinants of perceived ease of use: Integrating control, intrinsic motivation, and emotion into the technology acceptance model. *Information Systems Research*, 11(4), 342-365.
- Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 24(1), 115-139.
- Wang, H.-Y., & Wu, S.-Y. (2014). Factors influencing behavioural intention to patronise restaurants using iPad as a menu card. *Behaviour & Information Technology*, 33(4), 395-409.
- Webster, C., & Ivanov, S. (2020). Future tourism in a robot-based economy: A perspective article. *Tourism Review*, 75(1), 329-332. <https://doi.org/10.1108/TR-05-2019-0172>
- Wei, W., Torres, E. N., & Hua, N. (2017). The power of self-service technologies in creating transcendent service experiences. *International Journal of Contemporary Hospitality Management*. 29(6), 1599-1618.
- Wong, D. H., Yap, K. B., Turner, B., & Rexha, N. (2011). Predicting the diffusion pattern of internet-based communication applications using bass model parameter estimates for email. *Journal of Internet Business*, 9(2011), 26-50.
- Woodruff, R. B. (1997). Customer value: The next source for competitive advantage. *Journal of the Academy of Marketing Science*, 25(2), 139-153.
- Zeithaml, V. A. (1988). Consumer perceptions of price, quality, and value: A means-end model and synthesis of evidence. *Journal of Marketing*, 52(3), 2-22.

Received: 09/05/2020

Accepted: 14/08/2020

Coordinating editor: Estela Mariné Roig