

Determinants influencing customers' acceptance of smart restaurants in Penang, Malaysia

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Abstract

Purpose – This study investigated the linkage between customers' acceptance (CA) level and smart service competencies in the food sector across Penang, Malaysia. This research aims to develop a vision of how smart technology may transform the business model in hospitality industry to create value.

Design/methodology/approach – In this study, the level of CA of the smart restaurant is proposed as the dependent variable, while the perceived security (PS), perceived ease of use (PEOU) and perceived enjoyment (PE) are proposed as independent variables (IVs). The quantitative approach and simple random sampling method were adopted in this study. Data were collected from 150 respondents by distributing 225 survey questionnaires to restaurant customers across Penang, Malaysia. The data were analysed by the reliability test, factor analysis and multiple regression analysis using SPSS 23.0 software

Findings – The study outcomes indicated that PE and PEOU emerged as the most significant predictors for CA of smart services in restaurants in Penang. The smart services provide customers to experience enjoyable dining services with accurate and user-friendly service delivery.

Originality/value – This study may serve as a guideline for food and beverage (F&B) business owners and restaurant operators with an industrial standard to adopt smart services in restaurants and their progression to develop the intention to use such a novel technology. This research is one of the few attempts that have looked into the influences of hedonic, comfortable and security value on customers' acceptance level of smart restaurant services.

Keywords Perceived ease of use, Perceived enjoyment, Perceived security, Smart restaurant services, Technology acceptance model (TAM)

Paper type Research paper

1. Introduction

In today's digital age, various business models have pursued information and communication technology (ICT) to facilitate a more convenient operation that serves customers' changing needs and desires. ICT is an essential instrument, which is used for enabling valuable experiences.



Customers are nowadays moving towards a smarter world, which is characterized by huge, innovative capabilities of interaction in a global village. Boundaries, as well as restrictions, no more exist in establishing communication and relationships with each other (Kulkarni, Kangane, & Kumawat, 2018). Moreover, ICTs have empowered consumers to create a more personalized experience by adopting the latest technology trends. Over the past decade, smart services and smart home technology were entirely highlighted because of their wide-scale adoption in many industries. According to Marquardt (2017), a smart service refers to using a clever pattern, which is skilled and efficient by consumers and reflects service quality. The rapid advancement of smart technology has allowed business owners to integrate innovative technology and smart devices into their services, such enhanced dining services can ultimately encourage, nurture and attract more customers (Khatri, 2019). For instance, smart services, which were implemented in the hospitality and tourism industry, have greatly enabled a smooth exchange of transactions between customers, travellers and the environment, which is completely managed by ICT applications (Kabadayi, Ali, Choi, Joosten, & Lu, 2019; Koo, Ricci, Cobanoglu, & Okumus, 2017; Langley *et al.*, 2021).

Smart technologies can provide a vast range of opportunities and great potential, particularly for the tourism and hospitality industry. In addition to reducing costs, the wide-ranging potentials of smart systems accelerate transaction and distribution time (Neuhofer, Buhalis, & Ladkin, 2015). Many business operators in various sectors, particularly the food and beverage (F&B) and restaurant industry, have taken more efficient and productive insights with innovative business models. For instance, F&B business operators tend to adopt mobile devices along with cloud computing and data analytics as an innovative payment and ordering system, whereby a virtual cashier system is highly traceable. The application of a virtual payment system is capable of recording every customer's data, such as his/her spending and ordering pattern (Lundin, 2016). Among the previous research findings in the Malaysian context, in particular, the majority of industries and businesses would eventually demand these essential ICT skills in the foreseeable future so that the country embraces the digitized modernization trend and achieves progress effectively and comprehensively. For Malaysia, access to global infrastructure and world-class technologies is, therefore, inevitable so that the country transforms into a modern, digitized nation.

Malaysia, as a developing country in the Asian region, has the potential to employ universal, innovative technologies and high-tech services by updating the experience within the F&B industry (Abhari, Jalali, Jaafar, & Lim, 2020; Lai & Yap, 2004). Managing customer experience in the use of smart services is not only strategic but also creates value for both service providers and customers (Aguilar, Remeseiro, Bolaños, & Radeva, 2018). Kabadayi *et al.* (2019) pointed out that smart services are proactive and personalized services that can fulfil customers' needs through effective integration of technology. The key characteristics of smart services are as follows: the intelligent adoption of data, integrated technology, adaptability and the ability to anticipate customers' ever-changing needs. Simply put, smart services based on situational input can be adopted by many customers, who not only purchase products but also look for unique experiences by utilizing innovative services (Neuhofer *et al.*, 2015).

The specific features of smart services were outlined in some previous studies (Ivkov, Blešić, Simat, Demirović, & Božić, 2018; Lai, 2018; Lundin, 2016; Marquardt, 2017; Okumus & Bilgihan, 2014; Oliveira, Thomas, Baptista, & Campos, 2016). In the context of this study, customers' acceptance (CA) level of smart restaurant services is described as the customer's willingness to try and intend to use smart services in the dining experience per se. In other words, while there is an increment in using smart technology, the execution of suitable new technology in a restaurant would help grow business revenues. According to Wellsandt, Anke and Thoben (2017), it is essential for F&B operators to better understand the customers' preferences before designing and building smart services for their businesses. As such, it is

imperative to implement an ideal and efficient smart platform to process data, improve the existing business model and identify the factors, which affect the CA.

The extended technology acceptance model (TAM) in this study served as the theoretical basis for analysing the factors, which might affect the level of acceptance of smart restaurant services in Penang, Malaysia. Many previous studies extended the TAM model by assessing comfortable values, such as perceived enjoyment (PE), perceived ease of use (PEOU) and the perceived security/risk (PS) factors, which influence the CA (Davis, 1989; Lai, 2018; Li & Huang, 2009; Nguyen, 2015; Rind *et al.*, 2017; Venkatesh, Thong, & Xu, 2012).

Theoretical and practical implications are provided in this study, involving a more comprehensive understanding of the impact of selected determinants on CA of advanced technology in smart restaurants. Upon comprehending the elements of the CA towards smart restaurant services, F&B business owners and operators are, therefore, required to implement new strategies to raise their customers' turnover and further outline the unique features of smart dining services. Services become smarter when new technology is increasingly adopted within the system, and the implementation reward of the smart services is inevitable (Lim & Maglio, 2018). A better understanding of smart services across the hospitality and F&B industry may further facilitate the development and innovation in the future restaurant business.

The use of smart technology has been increasingly growing, especially in restaurant services. However, the differences between several influential components in the smart and regular dining experience have not been addressed. The contribution of this study to the available literature is three-fold, combined with a comprehensive conceptualization of smart restaurant services. Based on the definition of smart service in the F&B and hospitality industry, this study provides a theoretical justification and empirical evidence on the negative impact of PS on the CA of smart restaurants in Penang, Malaysia. Also a theoretical model, which links PEOU with the examined CA level of smart restaurants, is proposed in this study. Moreover, this study aims to bridge the existing knowledge gap by investigating the positive correlation between PE and CA levels of smart restaurant services. The next section presents the literature review and provides adequate justification for the hypotheses formulated in this study. In this paper, the proposed framework extends the hospitality and service literature by combining the existing findings on the role of new technology in the F&B experience. A research agenda has been also provided to assist researchers in exploring CA of the smart service experience and value for both F&B business operators and customers.

2. Literature review

2.1 Definition of smart restaurant services

Interest in smart home services has grown considerably in both academic and commercial domains since the 1980s, specifically when it was pointed out how people control and self-monitor their routines in life (Eggert, 2019; Yang, Lee, & Zo, 2017). Following the existing definition of smart technology based on a previous study, smart service is a term that has been used in different industries with multiple meanings (Park, Kim, Kim, & Kwon, 2018). For instance, the concept of a smart home in the healthcare industry is used to enhance the function of preventing diseases by monitoring patients' life patterns, routines and health habits. To better understand smart services, it is important to identify the differences between regular and smart services. However, some studies described that the functions of smart services are similar to regular existing services with additional features (Wunderlich *et al.*, 2015). Growing evidence of smart technology, which achieved progress in the hospitality and tourism industry, assisted tourists and customers in making hotel bookings and reservations, as well as navigating and finding locations (Foris, Crihălmean, & Pănoiu, 2020; Neuhofer *et al.*, 2015). Mani and Chouk (2017) asserted that some features of smart

services, including intelligence, connectivity and ubiquity can be sources of CA. Smart technology in F&B businesses aims at providing services and opportunities to differentiate and customize unique products to meet their customers' demands and preferences (Kabadayi *et al.*, 2019). To put it into perspective, in a smart restaurant, customers enjoy a unique dining experience through fully automated services with high-tech equipment. Moreover, improving hygiene and service quality and healthy diet control with the smart menu provides some features to control the dining environment, such as music, temperature, lighting and even gaming on the table-top, which will be ended by a secure payment method.

2.2 Underpinning the customer's acceptance (CA) level of smart restaurants and adopted theory

Smart technology can provide smart services by connecting customers, collecting information via customers' orders, environment and computation for customers' diet awareness tracking system in technology-equipped dining services (Lim & Maglio, 2018). In a previous study, Umap, Surode, Kshirsagar, Binekar, and Nagpal (2018) evaluated the difference between the conventional system with smart services, which revealed a higher level of time consumption and more human errors in the latter. According to Davis (1993), customers do not perceive smart technology as a specific feature with a single dimension; however, it is a multidimensional approach. The CA of smart services can exert a huge impact on the successful and favoured smart system adoption. In other words, technological innovations in restaurant services have mirrored higher levels of customer satisfaction, loyalty and intention to return as customers experience more convenient services at these smart restaurants (Mozeik, Beldona, Cobanoglu, & Poorani, 2009).

Several studies (Davis, 1986; Kimes, 2008; Venkatesh *et al.*, 2012; Yang *et al.*, 2017) have adopted TAM as the underpinning theory in different contexts. Recent studies, however, have expanded the focus area by embedding the postadoption of technology and individual acceptance behaviour. To analyse the components that may affect CA towards using smart restaurant services in Penang, Malaysia, the extended TAM has, therefore, been employed as the underpinning theory of this study. A major component, which is the most underlined by the TAM model, is the PEOU component. Upon applying the extended TAM model, many studies (Bailey, Pentina, & Mishra, 2017; Chang, Sun, Pan, & Wang, 2015; Hossain, Bao, Hasan, & Islam, 2020; Hung, Le Hoang, Do Thi Thu, & Hang, 2022; Nguyen, 2014; Park *et al.*, 2018) had expanded the original TAM model by integrating additional constructs to assess other possible components, for instance, perceived security and enjoyment, which might influence consumers' behavioural intention to accept new technology and smart services in restaurants. Accordingly, the extended TAM model has been applied as the conceptual framework of the study to assess the determinants, which affect CA of smart restaurants in Penang, Malaysia.

2.3 Perceived security (PS)

Despite the positive impact of smart services, quick adoption of this technology is still in its infancy phase with some diffusion (Mashal & Shuhaiber, 2018). With the rapidly increasing levels of internet usage, ICTs have exerted a significant impact on the interaction of users and technology with devices (Mani & Chouk, 2017). Aside from the vivid advantage of using smart service and the comfort it has to offer, there are some serious risks, including fraud, data hacking and phishing compared to conventional services (Eggert, 2019), because customers allow the service provider to access their personal information. Besides, smart services seem risky in some aspects when the customer allows controlling the service, which might be triggering the customer's discomfort and worry about the service operator accessing their data (Kabadayi *et al.*, 2019).

Many previous studies confirmed the security barriers that may disappoint the customers' adoption of new technology. A few studies, however, discussed the role of functional barriers that may influence consumers' intention to adopt smart services. According to [Kabadayi et al. \(2019\)](#), security is a primary issue for customers who are unwilling to share their personal information with service providers. [Kalakota and Whinston \(1997\)](#) described PS as the customer's perception of the protection levels against any disclosure, fraud and data abuse or modification. However, due to the rapid growth in demand for smart technology, the new services should consider and eliminate several major risks like security threats and system hacking. Such risks mainly occur because customers are often allowed to connect via multiple sources of network connections. According to [Park et al. \(2018\)](#), PS is defined as the customer's perspective of the protection level against potential risks when using smart services. Many previous studies have shown that customers' PS has negatively affected the CA of smart services in restaurants. Hence, it is hypothesized that PS has a negative impact on CA of smart services in restaurants ([Femenia-Serra, Neuhofer, & Ivars-Baidal, 2019](#); [Hosseini, Delaviz, Derakhshide, & Delaviz, 2016](#); [Kalakota & Whinston, 1997](#); [Li & Huang, 2009](#); [Yousafzai, Foxall, & Pallister, 2010](#)). The discussion above supports the following hypothesis:

H1. PS significantly influences CA level of smart restaurant services.

2.4 Perceived ease of use (PEOU)

It is essential to evaluate the main requirements of smart technology towards a better understanding of how smart services can contribute to facilitating personalized experiences. PEOU, as a comfortable value component, is defined as the users' perceptions about their ability and how easy to administrate the systems and services. Information technology (IT) programmers and software developers have designed many well-designed smart models for users that demand the basic skills to control or employ the new technology. According to several empirical studies regarding TAM, PEOU is positively associated with the CA level ([Li & Huang, 2009](#)). Hence, an improved PEOU can enhance productivity with a notable level of customer satisfaction. [Bai \(2015\)](#) has clarified that PEOU is a convenient and user friendly service interface of a particular technology. PEOU is considered an indicator of perceptive eagerness. On the contrary, [Koenig-Lewis, Marquet, Palmer, and Zhao \(2015\)](#) found that PEOU does not exert a huge impact on CA in adopting only one part of such smart services, such as payment services. Nevertheless, [Park et al. \(2018\)](#) demonstrated that smart services can offer a range of functions, in which customers and end users may easily apply the services. They added that customers' intention to use smart services may affect perceived usefulness and attitude, while PEOU influences attitude. Hence, there is a significant interconnection between usefulness and PEOU in the original TAM. With the extended TAM, and in accordance with previous findings, the following hypothesis states that PEOU has a significantly positive relationship with the CA of smart restaurant services ([Bai, 2015](#); [Park et al., 2018](#); [Rind et al., 2017](#); [Yang et al., 2017](#)). Eventually, PEOU as a comfortable value component can be described as the users' perceptions of their ability to control systems and services. The above discussion supports the following hypothesis:

H2. PEOU as a comfortable value significantly influences CA level of smart restaurant services.

2.5 Perceived enjoyment (PE)

The hedonic value, such as delightfulness, pleasantness and enjoyment, is defined as the imperative reasons to attract customers. For particular customers, enjoyment is the key component of a satisfying experience and trying something different from others, as an

alternative to an ordinary dining experience (Kabadayi *et al.*, 2019). Besides, hedonic motivation plays an essential role in evaluating technology acceptance and is generally defined as enjoyment and excitement, derived from embracing new technology (Venkatesh *et al.*, 2012). Using innovative technology and Internet-based systems promotes the feeling of joy and satisfaction, apart from providing self-fulfilling value to the user (Ramayah & Ignatius, 2005; Sun & Zhang, 2006). According to Davis, Bagozzi, and Warshaw (1992), PE is an intrinsic motivation to adopt innovative technology, while PEOU and perceived usefulness serve as extrinsic motivation. Several studies have extended the TAM with PE, along with two factors of trust and innovation (Alalwan, Baabdullah, Rana, Tamilmani, & Dwivedi, 2018; Lee, Kim, & Choi, 2019). Mashal and Shuhaiber (2018) asserted that PE significantly influences customers' intention to use smart technology. Lee *et al.* (2019) defined PE as a core factor that directly and indirectly affects the user's intention to use and accept new technology. The majority of previous studies emphasized the significant, positive impact of PE on CA and the intention to use smart services (Dickinger, Arami, & Meyer, 2008; Igarria, Schiffman, & Wieckowski, 1994; Kabadayi *et al.*, 2019; Park *et al.*, 2018; Ramayah & Ignatius, 2005; Yang *et al.*, 2017).

New smart dining encounters may be interesting to customers. This means that the impact of restaurants' atmosphere and environment can be quite substantial on the CA level of smart restaurant services (Yang *et al.*, 2017). Smart services in smart restaurants are equipped with advanced technology for a variety of operations and programmed tasks. Such an innovative service environment is adaptive and sensitive to both social and human needs with benefits to motivate and increase enjoyment during the dining experience (Hlee, Lee, Yang, & Koo, 2019; Nguyen, 2014; Yim & Yoo, 2020). Subsequently, the above discussion supports the following hypothesis:

H3. PE as a hedonic value significantly influences CA level of smart restaurant services.

Figure 1 shows the conceptual framework of this study, which is conceptualized based on the postulated hypotheses regarding the relationships between PS, PEOU, PE and the CA level of smart services.

3. Methodology

3.1 Sampling and data collection

As this study follows the quantitative research method, the questionnaire has been randomly administrated to mid and high-range restaurant customers to evaluate the research model. Data were collected via an online self-administered survey or scanning QR code using the

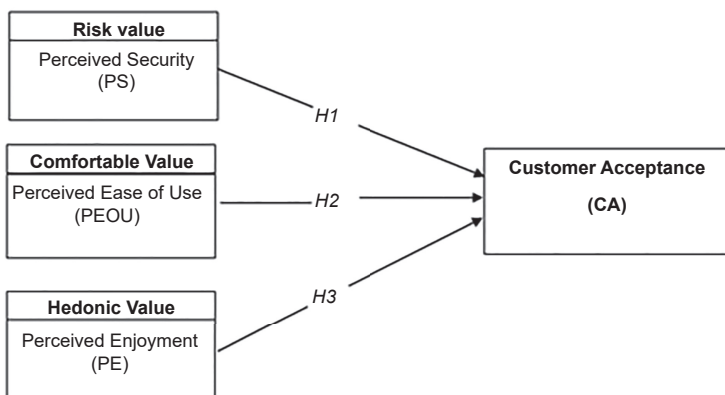


Figure 1.
Conceptual framework

probability simple random sampling approach. This means that respondents were all considered restaurant customers, who have had different dining experiences across Penang, Malaysia. They were invited to participate in the study via emails and other digital social media platforms, such as Facebook, LinkedIn and WhatsApp. The questionnaires were administered to these participants via various restaurant links, including Facebook, Instagram and food blog reviewers. Green (1991) prescribed that sufficient sample size to be generated for testing multiple correlations can be calculated based on the following formula: $N \geq 50 + 8m$ (3 independent variables [IVs] means $m = 3$). According to the mentioned formula, the minimum sample in this study must be more than 74. The strategy to evaluate sample size based on Cochran (1963) sampling technique is to determine the sampling error and the amount of accuracy of the margin error. The acceptable margin of error for this population size is 5%. Therefore, a total of 400 questionnaires were sent to the customers. A reminder e-mail was sent to those who did not answer within two weeks. A total of 225 responses were received; however, 150 responses were complete for analysis, which yielded a satisfactory response rate of 37.5%.

3.2 Questionnaire design and measurement

A total of four variables (i.e. three IVs and one dependent variable) were identified in the research framework. The first section of the survey gathered demographic information, followed by four main groups of constructs, namely (1) PS, (2) PEOU, (3) PE and (4) CA level of smart restaurant services. The participants were asked to rate the extent to which they agreed with each of the three items. A five-point Likert scale ranging from “strongly disagree” to “strongly agree”, and neutral with a score of = 3 was applied to evaluate customers’ perceptions of a single latent variable. The survey questions were adapted and refined based on previous relevant studies, which obtained a high Cronbach’s alpha (α) coefficient in the reliability assessment (Kazi & Khalid, 2012). To evaluate the level of customers’ opinions toward using smart services, the respondents were given numerical and coding scores to reflect their acceptance level. The items were based on a comprehensive review of existing research findings in relation to PS (Mani & Chouk, 2017; Yang *et al.*, 2017), PEOU and PE (Park *et al.*, 2018; Yang *et al.*, 2017). The items of the CA were also adopted and adapted from the study of Yang *et al.* (2017) and Park *et al.* (2018). Therefore, to confirm the reliability of this study, the designed questionnaire was adopted from the above-mentioned studies.

3.3 Data analysis

The data in this study were analysed by using the reliability test, factor analysis and multiple regression analysis using SPSS 23.0 software. The measurement model was verified by using a pretest and a pilot test. During the pretest, the scale was tested by asking five technology experts to check professional tech-related terms besides 30 respondents to pilot face validity and content reliability. According to the provided descriptive statistics in Table 1, including standard deviation and mean for the variable interest, the collected sample size (N) was 150 and, thus, valid for further multiple regression analysis, which fulfilled the assumptions. Also, the collinearity of the variables was tested as presented in Table 4.

3.3.1 Demographic profile of respondents. The collected data from respondents showed that 45.3% of the respondents were male participants, while 54.7% were female participants and displayed fair distribution for both genders. Most respondents (60%) were between 20–29 years old, 40% were bachelor’s degree holders, 38.0% were master’s degree holders and 12.0% were Ph.D. holders. The respondents’ demographic data are presented in Table 2, whereby most respondents were highly educated and provided valid, as well as solid support for data reliability upon completing the questionnaires. The majority of the survey respondents (32.0%) earned an average monthly income of RM3000–RM4500. The results

Table 1.
Summary of descriptive analysis

Factors	Mean	Std. deviation	Analysis <i>N</i>
PS1	3.29	0.885	150
PS2	3.19	0.946	150
PS3	3.06	0.985	150
PEOU1	3.88	0.843	150
PEOU2	3.78	0.826	150
PEOU3	3.62	0.864	150
PEOU4	3.75	0.851	150
PE1	3.95	0.794	150
PE2	3.97	0.958	150
PE3	3.97	0.908	150
PE4	3.81	0.806	150

revealed that the average level of food price and outside meals are affordable for two-thirds of the respondents, who earn a decent monthly income. It was found that almost 80% of the respondents have regularly dined out (more than thrice a month). Besides, 70% of this population have ordered food for RM30 more than thrice per month.

4. Results

Based on Table 3, the reliability test result with 150 respondents indicated that the Cronbach's alpha (α) values are all good and valid, ranging from 0.70–0.95, which is

Demographic variables	Frequency	Percentage
<i>Gender</i>		
Male	68	45.3
Female	82	54.7
<i>Age</i>		
19 years old and below	7	4.7
20–29 years old	83	55.3
30–39 years old	35	23.3
40–49 years old	20	13.4
50 and above	5	3.3
<i>Education status</i>		
High school and below	0	0
Certificate/Diploma	14	9.3
University bachelor degree	60	40.0
Master degree	57	38.0
Ph.D/Doctorate degree	18	12.0
Other	1	0.7
<i>Monthly income</i>		
RM1500 and below	17	11.3
RM1501–RM3000	30	20.0
RM3001–RM4500	48	32.0
RM4501–RM6000	18	12.1
RM6001–RM7500	13	8.6
RM7501 and above	18	12.0
Not preferred to revert	6	4.0

Table 2.
Summary of demographic profile of respondents (*N* = 150)

acceptable in accordance with [Sekaran & Bougie's \(2016\)](#) criteria and [Shea et al. \(2009\)](#). The PS as the first independent variable has three items with a Cronbach's alpha coefficient of 0.820, then PEOU with four items of measurement with a Cronbach's alpha coefficient of 0.822 and PE also has four items with a Cronbach's alpha coefficient of 0.828. The CA (dependent variable) has three factors of measurement and a Cronbach's alpha coefficient of 0.766. All factor loadings were above 0.5, which signified that they are particularly significant. As the minimum requirements were fulfilled by the variables, all measures were ideal to proceed for further analysis. No variable was discarded as a result of the assumption test. The summary of factor loadings analysis for the final test was based on the high Measurement Statistical Analysis (MSA) values to determines the amount of errors that derived from the measurement process itself, and have verified all the variables of the study.

The correlation analysis was employed to describe the degree of linear relationship between one variable and another ([Pallant, 2020](#)). The correlation between the dependent variable (CA) and the IVs (PS, PEOU and PE) is presented in [Table 4](#).

According to [Table 6](#), the results of the variance inflation factor (VIF) showed that the tolerance value of all the IVs of the study was above 1.0 (below 2.0), which indicated that IVs were not affected by the multicollinearity issue. According to [Pallant \(2013\)](#) and [Piaw \(2013\)](#), the correlation expresses the strength of the relationship and the co-occurrence between two variables in a single value, which is represented by the *r*-value. A positive *r*-value reflects a positive relationship, while a negative *r*-value indicates a negative correlation, and zero expresses no relationship between the variables. The computed results in the present study showed that all the IVs were correlated with the dependent variable. The CA exerted a positive and moderately strong correlation with PE (*r* = +0.708). However, CA was weakly

Factors	Rotated factor loadings	Eigenvalues	% of variance	Cronbach's alpha
<i>Factor 1: Perceived security (PS)</i> <i>I think smart restaurant services</i> <i>[. . .]</i>	-	3.582	41.965	0.820
Q1: Not safe for my personal information	0.796	-	-	-
Q2: Will be manipulated	0.830	-	-	-
Q3: Can misuse my stored information	0.833	-	-	-
<i>Factor 2: Perceived ease of use (PEOU)</i>	-	1.333	15.620	0.822
Q4: Are not difficult to use	0.731	-	-	-
Q5: Is understandable for me	0.711	-	-	-
Q6: Does not require my mental effort	0.720	-	-	-
Q7: Easy and simple to learn	0.791	-	-	-
<i>Factor 3: Perceived enjoyment (PE)</i>	-	1.088	12.745	0.828
Q8: Is fun	0.849	-	-	-
Q9: Is so interesting to me	0.770	-	-	-
Q10: Is pleasant and existing	0.771	-	-	-
Q11: Is enjoyable for me	0.871	-	-	-
<i>Dependent variable</i> <i>Customer acceptance (CA)</i>	-	1.079	5.995	0.766
Q12: Try to use smart services	0.786	-	-	-
Q13: Overall satisfied	0.811	-	-	-
Q14: Is worthwhile	0.820	-	-	-

Table 3.
Summary of factor
loading
analysis (N = 150)

correlated with PS ($r = +0.282$), PEOU (+0.515), and significant at 0.000 ($p < 0.001$) (Table 4). Besides, the proposed multiple regression analysis shows that the R -value was 0.732, which displayed strong correlations between the dependent variable and IVs (refer to Table 5). R square showed the amount of variance in CA, which is accounted for or explained by PS, PEOU and PE. The computed R square in Table 4 indicated that 53.6% of changes in the CA variable can be explained by all the IVs. The remaining 46.4% of changes, however, can be attributed to the variation of other factors. The analysis of variance (ANOVA) test demonstrated significant relationships between each of the IVs and the dependent variable at a p -value of 0.000.

The significant and direct relationship should score a p -value of 0.000 or below 0.05 for the hypotheses to be accepted. As a result, the relationships of CA with PE and PEOU were significant with $p = 0.000$ and $p = 0.010$ ($p < 0.05$), respectively. The Pearson correlation coefficient showed a positive and strong relationship between the PEOU and the CA of smart restaurant services. The relationship between PS and CA was insignificant with an exceeded value and $p = 0.666$ ($p > 0.05$). The standardized coefficients (β) are presented in Table 6, which shows the negative results for PS with -0.27 . Therefore, a larger, positive Beta (β) is associated with a larger t -value, as shown in Table 6.

The regression model is quite significant to explain the present research model. Based on these results, Hypothesis 2 was rejected, and Hypotheses 1 and 3 were accepted.

5. Discussion

The postulated hypotheses were examined in this study, and the results were consistent with the findings of previous studies (Bai, 2015; Hlee *et al.*, 2019; Lee *et al.*, 2019; Mashal & Shuhaiber, 2018; Nguyen, 2015; Park *et al.*, 2018; Ramayah & Ignatius, 2005; Yang *et al.*, 2017; Yim & Yoo, 2020), which confirmed the significant and positive effect of PE and PEOU on CA.

	CA	PE	PS	PEOU
Customers' acceptance	1.000 150			
Perceived enjoyment	0.708** 0.000 150	1.000 150		
Perceived security	0.282** 0.000 150	0.389** 0.000 150	1.000 150	
Perceived ease of use	0.515** 0.000 150	0.502** 0.000 150	0.373** 0.000 150	1.000 150

Note(s): ** indicate correlation is significant at the 0.01 level (two-tailed)

Table 4.
Pearson correlation matrix of all variables

Model	R	R square	Adjusted R square	Std. error of the estimate
1	0.732 ^a	0.536	0.527	0.48131

Note(s): Predictors: (Constant), perceived enjoyment, perceived security and perceived ease of use

Table 5.
Relationship between dependent variable and the model

Moreover, the findings regarding the relationship between PS and CA were consistent with several previous results (Eggert, 2019; Femenia-Serra *et al.*, 2019; Hosseininia & Ramezani, 2016; Kabadayi *et al.*, 2019; Park *et al.*, 2018). As illustrated in Table 6, the results of the standardized coefficient, which was retested only with significant predictors, showed that PE is the most significant factor that affects the customers' decision-making and acceptance of smart restaurant services in Penang, Malaysia.

The data analysis results showed that the F&B industry can enhance their customers' dining experience, guaranteeing comfort and enjoyment with new modern services by employing smart dining services. It was found that creating customer confidence besides CA is crucial for further implementation and development of any new technology adoption in F&B sectors. Hence, the CA has an undeniable key role in any technology implementation in the future. The results of this study are in line with previous studies in this regard. In this study, PE is a significant factor that affects the customers' intention to accept smart services in restaurants. This result is consistent with prior scholars within the same context and findings, such as Igbaria *et al.* (1994), Dickinger *et al.* (2008), Yang *et al.* (2017), Park *et al.* (2018), Shuhaiber and Mashal (2019) and Leung and Loo (2022) that confirmed the significant positive role of the hedonic value in achieving the CA of smart restaurants. However, the weakness in controlling the customer's connection over information privacy may influence their intention to accept and use different types of services and technologies like mobile or e-wallet payment methods. Moreover, PS was found to be significant to reject the null hypothesis in this study. Similarly, Yousafzai *et al.* (2010), Hosseini *et al.* (2016), Park *et al.* (2018) and Femenia-Serra *et al.* (2019) explained that personal security and privacy concerns have been proved as one of the noticeable issues in smart and digital systems, especially for fresh users. The results indicated that most of the customers were aware of several risks while using the new technology, such as the payment system that is linked to smart services. Based on the findings reported by Li and Huang (2009) and Hosseini *et al.* (2016), PS can be a prior measurement of customers' PEOU toward using smart services.

In this study, PEOU exhibited a significantly positive relationship with CA (p -value at 0.010 ($p < 0.05$)). According to Bai (2015), Nguyen (2015), Yang *et al.* (2017), Park *et al.* (2018) and Leung and Loo (2022), the findings demonstrated that smart services can provide a broad range of features that offer users more convenience and confidence when using smart services.

More significantly, the respondents' socio-demographic characteristics portrayed that most of the respondents were from Gen Y and Gen Z. These are closely associated with various new technologies, especially relevant mobile applications. These new generations would prefer employing new technologies, such as mobile payment and smart ordering despite the lurking risks. The younger respondents typically have a better relationship with new devices, and they are more comfortable when they use smart technology.

The findings substantiated that Malaysians from Penang are very interested in the new dining experience and are quite familiar with technological advancements. Most respondents

Table 6.
Standardized and
unstandardized
coefficients

Model	Unstandardized coefficients		Standardized coefficients		Sig.	Collinearity statistics	
	B	Std. error	Beta	t-value		Tolerance	VIF
(Constant)	2.513	0.805		3.123	0.002		
PE	0.452	0.050	0.608	9.039	0.000	0.701	1.427
PS	-0.020	0.047	-0.027	-0.432	0.666	0.807	1.240
PEOU	0.169	0.051	0.220	3.293	0.001	0.710	1.407

Note(s): Dependent variable: customers' acceptance

agreed that employing smart services may potentially provide a competitive advantage and believed that doing so did not require any training or much of an effort.

6. Practical implications

The findings of this study and the literature review emphasized that F&B service operators and related industries can implement ideas towards improving their current services by embracing smart services. It was revealed that technology innovation and creativity in restaurant services help in upgrading and developing the business concepts and improving both cooking and dining processes. In this study, the research model provided an awareness of the CA pattern of the technology-oriented and popularized smart services within the restaurant context. The smart service can be considered a user friendly service to adopt convenient systems to learn without exerting much effort, especially in unprecedented situations, such as the latest COVID-19 pandemic. Due to the lack of manpower and large-scale digital adoption, there is a growing demand to level up the dining experience with co-creation and smart technologies. With the implementation of smart technology in F&B sectors, restaurant productivity and overall operations should consider the frequency of errors even though the application of smart services enables restaurants to attain a higher level of reliability of service delivery. To put it simply, the more convenient and easy use of a system guarantees a more potential adoption of that system. Meanwhile, personalizing services is an inevitable key factor for interactions between customers and the level of their acceptance of smart technology. However, customers still preferred using the fast and convenient payment method and smart ordering platform despite being unsafe and unreliable to them since they enjoy using smart technology. Besides, during the COVID-19 pandemic restrictions, smart services helped reduce the waiting time in restaurants for ordering, finding a seat and waiting long for meals to be served. Smart services also decreased the number of complaints. Both practitioners and academia expect smart services to revolutionize the tourism and hospitality industry. Therefore, the findings of this study contribute to supporting business operators to employ technology wisely to enhance customers' experiences and to handle unpredictable situations and crises like a pandemic situation.

7. Limitations and avenues for further studies

In this study, the results provided meaningful cognitive representations into implementing smart services in the F&B businesses and hospitality industry. However, some limitations can be drawn to be discussed and addressed in further studies. The sample size has only covered a group of restaurant customers in Penang, Malaysia. Therefore, the results may not be accurate enough to generalize to users across all the Malaysian states. Also, the strength between variables may be altered if expanded to a larger group of users. Additionally, several unpredictable factors, such as cultural differences and psychological barriers may affect customers' decision-making and the pattern of CA level of smart restaurant services.

Studies can employ the findings to further explore other influential components, which were not included in this study. The correlation among other factors, such as novelty and uniqueness, can be assessed as a baseline to better understand technology innovation in the F&B industry. Researchers can conceptualize the variables, such as perceived cost or human touch and interaction components. The examination of such variables could be important for food operators, who wish to understand more about customers' preferences for experiencing smart services. Incorporating a range of different variables may also provide further validation to the proposed model, apart from enabling a possible comparison with the findings in this study. These limitations can pave the way for further endeavors. Regarding the values of smart service for both customers and business operators, smart service providers can offer valuable insights to enhance their customers' experience. Further studies

are recommended to thoroughly evaluate the marketing and customer satisfaction components by adopting and combining TAM with other existing theories, such as the theory of planned behaviour (TPB).

8. Conclusion

The postmodern hospitality and tourism industry has witnessed a great revolution by adopting novel technology, especially in the domain of smart restaurant services to remain competitive. ICTs play a significant role in creating value with F&B business design and management. This study examined the determinants that influenced the CA level of smart services at restaurants in Penang, Malaysia by providing a new conceptualization of several factors, which affected the customer's dining experience. The extended TAM was employed in this study to demonstrate the factors that may significantly influence the customers' intention to accept smart technology in restaurant services. The results of the study showed the effect of the examined factors on the CA level. For some restaurant customers, uniqueness and doing something different is a component of an accepting and satisfying experience. This study identified three components of smart services in the F&B sectors and explained how each of them significantly contributed to the CA level in smart restaurants. Overall, CA is associated with a pleasant and comfortable feeling for the customer, thereby advocating convenient and user-friendly services. The major challenges to using smart services in competitive markets for F&B businesses are the lack of interoperability between devices and the information system standards in restaurants, as well as the lack of courage to change habits or routines. However, in smart services, sometimes the device or connection delivery may fail, and data may be lost at some point. Therefore, service failure is inevitable whether services are regular or smart. This study addressed the determinants of the CA of smart restaurants in Penang, Malaysia and provided useful insights for academic and business operators. Although some limitations were raised during the study, it is essential to consider various factors that may affect customers' decision-making, such as psychological barriers or cultural differences, which are unpredictable at times.

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Further reading

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