Examining Attributes Affecting Fast-Food Restaurants' Self-Service Ordering Kiosk Continuous Usage Intention

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ABSTRACT

Self-service ordering kiosks are gaining popularity among fast-food operators to reduce operational costs. Although there is an abundance of study on the subject, limited studies have investigated the antecedents of self-service ordering continuous usage intention from the perspective of the information system success model. Understanding what continuously influences customers to use self-service ordering kiosks is essential to justifying the enormous technological investments. Thus, the study investigates attributes influencing customers' continuous usage of automated self-service technology in fast-food restaurants, explicitly focusing on Penang, Malaysia. Unlike the existing studies, the study employed Delone and Mclean's information success model as the underpinning theory that can contribute to a new perspective in the current literature. The statistical analyses found that system quality, innovativeness, safety, and security significantly influence continuous usage intention. The study's findings suggest that fast-food restaurant operators should focus on enhancing the quality, safety, and security of their self-service ordering kiosks. The study also highlighted the importance of innovativeness as an attribute of customers' intention to use self-service ordering kiosks. Customers are more likely to continuously operate a self-service ordering kiosk if they think it is more advanced than traditional ordering methods. Several study limitations were discussed, which serve as signposts for future research endeavors.

1. INTRODUCTION

Self-service ordering kiosks in fast-food restaurants have gained attention in recent years. They are a type of self-service technology designed to improve service quality and customer experience by replacing traditional interactions between service providers and customers (Yaacob, 2021). These kiosks are the latest innovative technology offered by restaurants, particularly in quick-service restaurants, to enhance customer experiences (Noradzhar, 2020). The introduction of self-ordering kiosks in the restaurant industry aims to meet customers' needs for a self-ordering process and improve ordering efficiency (Lee et al., 2023). The application of technology in businesses, such as self-service kiosks, offers greater convenience and efficiency to customers, attracting technology-oriented customers (Shahril et al., 2021). These kiosks allow customers to facilitate the ordering process without or with minimal help from service providers (Kim & Qu, 2014). The self-service ordering kiosks comprise electronic ordering units and point-of-sale machine payment units, which simplify the operation of customers and enhance their user experience. They often have features such as display screens, ticket outlets, loudspeakers, and support frames, which contribute to a user-friendly design and enhance the ordering experience. This allows customers to place orders automatically without waiting for service staff, leading to improved efficiency in business processes.

A recent report by Grand View Research (2020) stated that the global self-order technology segment is predicted to gradually rise to 12.4% from 2022 to 2028. International fast-food businesses like McDonald's and Kentucky Fried Chicken are increasingly adopting self-service technology kiosks to automate order production and delivery operations (Shahril et al., 2021). This is due to the potential benefits self-service ordering kiosks provide to fast-food restaurants, such as improved customer satisfaction, increased efficiency, and a sense of empowerment and control for customers (Lee et al., 2023). They eliminate the need to queue, provide more time for menu selection, and offer clear and detailed information about menus, ingredients, discounts, and promotions (Yang et al., 2019). Customers also feel a sense of safety and privacy when using kiosks, especially when facing language barriers or personal insecurities (Yaacob et al., 2021). Gamifying self-service technologies can lead to higher behavioral outcomes and impulsive menu ordering, especially when participants win and receive monetary rewards (Lee & Lu, 2023). Comparisons between self-service kiosks and cashiers show that customers report a better experience with kiosks, with external responses varying based on crowdedness (Leung et al., 2021). Most importantly, using self-service technology enables businesses to provide services with fewer employees (Lin et al., 2011), which consequently can result in cost savings for the businesses (Law et al., 2020). Still, as with other similar technologies, there are issues linked with self-service ordering kiosks.

The utilization rate of self-service ordering kiosks has been rather low, and there are challenges in terms of interface design and usability (Lee et al., 2023). Because of a lack of technological knowledge, some customers are hesitant to use self-service kiosks and prefer to engage with human service personnel (Rastegar, 2018). They also might be concerned about giving personal information or data, such as their debit card password, to complete the purchase using the self-service ordering kiosks (Kaushik et al., 2015). Moreover, issues of unclear operation processes, ineffective prompts, and interface design can lead to longer ordering times (El-Said & Al Tall, 2020; Arsat et al., 2023). The degree of customization in current kiosks is relatively subdued, and there is a need for more customizable options (Han et al., 2019). These issues signify that self-ordering kiosks may not yet reach their full potential, indicating room for improvement in their design and functionality. Therefore, while self-service ordering kiosks offer numerous benefits, there are areas of concern that need attention to enhance the customer experience.

Although the literature on self-service ordering kiosks in fast-food restaurants is abundant, several significant gaps still exist. The existing studies have focused on factors such as customer experience, satisfaction, and acceptance of kiosks (Lee, 2023; Arsat, 2023; Lee et al., 2023). There is limited research specifically addressing the continuous usage intention of self-service ordering kiosks in Southeast Asian fast-food restaurants. Recent studies in Malaysia have focused on the influence of 4As marketing mix attributes, namely affordability, accessibility, awareness, and acceptability (Arsat et al., 2023), perceived ease of use, usefulness, need for interaction, and risk, on Malaysian consumers' intention to use self-service kiosks (Ketimin & Shami, 2021). This gap in the literature indicates a need for further investigation into other key factors that influence customers' intentions to continue using self-service ordering kiosks in this context. Research on the system quality, information quality, and service quality of self-service kiosks is urgently warranted to gain a better understanding of customers' continuous usage intentions of self-service ordering kiosks in Southeast Asian fast-food restaurants. Additionally, there is a need for more research to understand the willingness to continue using self-service kiosks beyond the two widely used theories of the technology acceptance model and the unified theory of acceptance and use of technology.

Drawing on the stated research gaps, the study intends to examine the factors that contribute to customers' continuing use of automated self-service technologies in fast-food establishments. With a particular focus on Penang, Malaysia, the study selects a popular international fast-food chain establishment in the country. In today's ever-changing restaurant industry, the study is quite pertinent. Within the fast-food business, it provides insights about changing consumer behavior, acceptance of new technologies, and operational efficiency. This study gives foodservice businesses an advantage in a highly competitive market by identifying characteristics that influence usage intention, hence improving customer experience through user-friendly kiosk interfaces. The study's findings can also help legislators comprehend how self-service technology will affect the food industry, in addition to fast food businesses.

2. LITERATURE REVIEW

2.1 Continuous Usage Intention

According to Li and Shang (2020), continuous-use intention, one of the key post-adoption behaviors, is a basic and crucial indicator of user loyalty. It is essential to the success of e-government programs because, while investments in e-government can provide significant returns, their full potential can only be realized if people use them regularly. According to user evaluation, continuous use intention refers to a user's willingness to keep using order and payment services through kiosks (Na et al., 2021). Lee et al. (2012) also found that attitudes toward kiosks, service providers, and the willingness to utilize them frequently are influenced by consumer technology preparedness. Yang et al. (2022) stated that the term continuous use of information systems refers to a user's ongoing use of a system both now and potentially in the future. But conferring to Masri et al. (2020), there is evidence that customer satisfaction affects consumers' retention intentions because it fosters cognitive, emotional, and conative loyalty. The continuous usage intention of self-service ordering kiosks is influenced by various factors such as convenience, controllability, and gamification (Kim & Lee, 2020). On the other hand, factors like human alienation and sociability negatively influence the continued use intention of self-service kiosks (Nie et al., 2023). Perceived usefulness, customer satisfaction, and subjective norms also play a significant role in influencing the continuous usage intention of self-service kiosks (Chen et al., 2009). There is a need to consider self-service ordering kiosk quality factors that can help service providers overcome consumer resistance and develop strategies to enhance the continuous usage intention of self-service ordering kiosks.

2.2 System Quality

System quality is defined by Al-Mamary et al. (2018) as the whole quality of information processing. It is distinguished by the use of state-of-the-art technology, a system with fundamental features and functions, and software that is simple to use, intuitive to learn, and easy to maintain. By doing this, the businesses' return on investment is increased, customer happiness and loyalty are raised, and service quality and customer experience are improved (Kelly et al., 2017). Masri et al. (2020) stated that the quality of an information system is defined as goods and services that satisfy consumers' needs and expectations in order for them to complete their transaction in an e-tourism setting. These goods and services also include itinerary services, accurate operation, fast information, dependable information, and particular information that the user can access from anywhere at any time. According to McKnight et al. (2017), a system's technical attributes, such as its usability and accessibility, are related to its quality. System, information, and service quality are factors that affect user satisfaction and the information system's ability to be successfully used (Li & Wang, 2021). These factors also serve as subsequent indicators that show the information system's success from a cause-and-effect standpoint.

H1: System quality has a significant positive influence on continuous usage intention.

2.3 Service Quality

The entire quality of the system is characterized as service quality (Fianu et al., 2020). Soleimani et al. (2018) said that service quality is described as the customer's overall view of the organization and its services' relative inadequacy and superiority. DeLone and McLean (2003) also assert that certainty, empathy, and responsiveness are all related to service excellence. Lai and Ivan (2014) argue that the impact of service quality on behavioral intentions is influenced indirectly by perceived value. Chatterjee et al. (2018) agreed that service quality is the user's total evaluation of the service provider and is an essential factor in their positive attitudes, perceptions, and attitudes. Zhou (2013) found that numerous studies have suggested that when users think that an information system provides an ideal service, they will feel satisfied and wish to reuse it in the future. Yang and Shao (2017) also discovered a link between service quality in self-service ordering kiosks and customers' continuous usage intentions.

H2: Service quality has a significant positive influence on continuous usage intention.

2.4 Information Quality

McKinney et al. (2002) define information quality as users' impressions of the quality of information supplied. Likewise, Chatterjee et al. (2018) refer to information quality as system properties such as relevance, sufficiency, accuracy, and timeliness. Chen and Cheng (2009) found that any content a company provides its customers is information. Liu et al. (2017) similarly stated that the disparity between users' expectations and perceptions of the information supplied is reflected in the information quality. Degirmenci (2020) stated that informational quality is vital in lowering user information and processing costs, benefiting service providers. Li et al. (2011) specified that information quality increases the behavioral intention to reuse the self-service ordering kiosk. Islam and Rahman (2017) also supported the idea that to inspire user participation, the information provided by self-service ordering kiosks should be relevant, tailored, and simple to grasp. Thus, it is conjectured the greater the level of information quality of a self-service ordering kiosk, the higher the continuous usage intention of such technology.

H3: Information quality has a significant positive influence on continuous usage intention.

2.5 Innovativeness

The definition of innovativeness includes the following: the prompt release of new goods and services onto the market (product-related), process efficiency and speed (process-related), new technology and marketing strategy (market-related), and general organizational members' support of fresh concepts and innovation (Munir & Beh, 2019). Ratten (2016) specified an organization is considered innovative if it supports and engages in novel procedures or offerings. Wooder and colleagues (2012) assert that technical innovation comprises a range of inventions associated with technological advancements, with the goal of gradually enhancing current products or services or creating entirely new ones. To make things easier for itself and to its advantage, the self-service ordering kiosk has added new features or services to its systems. Seo (2020) indicated that restaurant kiosks are expected to swiftly gain traction as a general and routine client service due to their unique technological infrastructure and ability to provide customers with fresh value. There is a hypothesis that suggests that customers are more inclined to repurpose self-service technology in the future if they believe it to be innovative.

H4: Innovativeness has a significant positive influence on continuous usage intention.

2.6 Technology Self-Efficacy

The capacity to identify and understand a person, place, or thing based on past knowledge is measured by familiarity (Lawry et al., 2019). Knowledge acquired via former experience that is applicable to future situations is referred to as prior knowledge. In addition, Arts and Veugelers (2015) noted that technology self-efficacy can be used to characterize recognition and comprehension by encouraging average usefulness. This is because it measures the extent to which recognition and comprehension are related to a particular situation due to prior knowledge. Error-free failure rates are reduced, and breakthrough probabilities are increased when new component combinations are developed. According to Bonnin's (2020), the relationship between customer responses and perceptions of a product or service is mediated by technology self-efficacy. Customers' decision-making processes, including their propensity to stick with a website, are greatly impacted by their level of technical self-efficacy (Oday et al., 2021). In other words, technology self-efficacy absorbs residual risk by assuming unequal interactions between a system and its surroundings, allowing for reasonably safe assumptions about the future (Mittendorf, 2018). A precise assessment of personal efficacy has great practical importance since it affects people's effort and perseverance in the face of obstacles (Shiau et al., 2020). Thus, self-efficacy is considered as a salient trait that encourages users to keep utilizing self-service ordering kiosks.

H5: Technology self-efficacy has a significant positive influence on continuous usage intention.

2.7 Safety and Security

Othman et al. (2017) described security as the perceived level of protection from security and privacy threats such as fraud, general safety, and data loss. Li et al. (2020) stated that security can be defined by how much a government website secures itself from unlawful invasion and attack. Security is the precaution and prevention of financial transactions in a technological setting (Kim et al., 2013). Hasan et al. (2021) supported the idea that technical security is an essential component of security control because it directs the production and protection of data and information through firewalls, cryptography, and software that protects users from cyberattacks and hackers via the internet. Safaeimanesh et al. (2021) stated that consumer transaction data benefits enterprises and customers. Shao et al. (2019) said that customers' trust in mobile payment platforms could be increased by improving the platform's reputation and

security design. Likewise, Ye et al. (2008) demonstrated that perceived security influences users' switching behaviors toward IT products, a critical post-adoption behavior.

H6: Safety and security have a significant positive influence on continuous usage intention.

2.8 Research Framework

This study employed DeLone and McLean's (2003) Information System Model as a foundation for the research framework. Celik and Ayaz (2022) stated that an information system is defined as a person or organization that collects, processes, and saves data and employs technology to use and distribute it. DeLone and McLean (2003) indicated that information, system, and service quality affect user satisfaction and usage intention. The model demonstrates the effectiveness of the information system by identifying, describing, and systematizing the links between the many quality characteristics (Abdulkareem & Mohd Ramli, 2022). Based on DeLone and McLean, this study proposes four variables influencing continuous usage intention using a self-service ordering kiosk. This study applies the Information System by DeLone and McLean but adds another dimension: technology self-efficacy, innovativeness, and safety and security toward continuous usage intention. Figure 1 shows the study's conceptual framework based on the DeLone and McLean models.
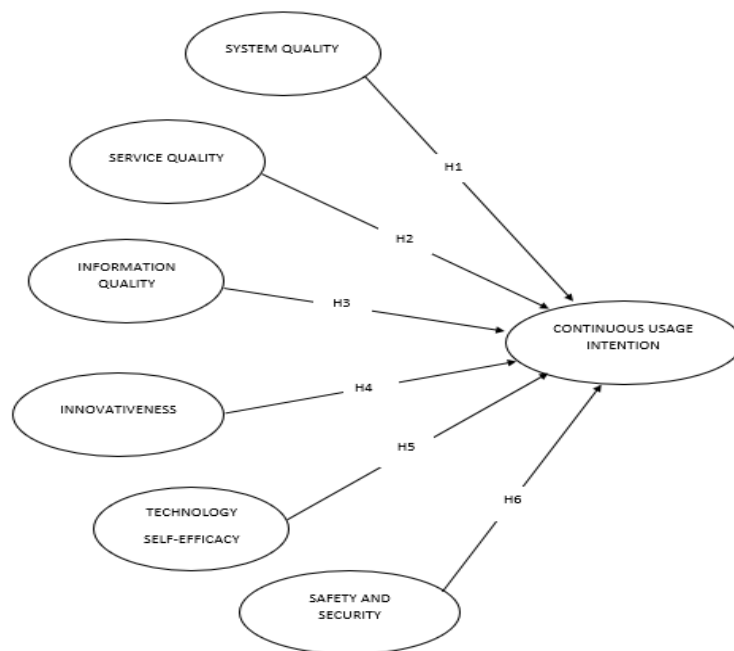

Figure 1: Research Conceptual Framework

3. RESEARCH METHODOLOGY

3.1 Research Approach

The research examines the effect of system quality, technology self-efficacy, innovativeness, service quality, information quality, safety, and security on customers' continuous intention toward self-service ordering kiosks at a fast-food restaurant. To achieve the stated objective, the study employed a quantitative research approach that focuses on scientific inquiry and depends on data observed or measured to answer questions about the sample population.

3.2 Population and Sampling

The study's target population is individuals with experience using self-service ordering kiosks in fast-food restaurants. Since the sampling frame was nonexistent for such a population, purposive sampling, a non-probability sampling type, was chosen for study. Based on G*Power software version 3, the minimum sample size required for the present study is 146 respondents, with 80% statistical power and a significant level set at 0.05. The final sample size for the study is determined to be 150 respondents.

3.3 Research Instrument

This study used validated measurement items adapted from previous studies. The first part of the survey concerns demographic characteristics, including gender, age, education level, and monthly income. The main section of the survey captures respondents' responses to the four attributes of interest selected for the study. System quality (five items) was developed by Hedin et al. (2020) and Ali et al. (2021). Technology self-efficacy (three items) was developed by Yang et al. (2020); innovativeness (three items) was developed by Ain et al. (2016). Service quality (four items) was developed by Ali et al. (2021), information quality (four items) was developed by Ali et al. (2021), safety and security (four items) were developed by Fu Tsang et al. (2010), and continuous usage intention (four items) was developed by Pai et al. (2022). All items were measured using a seven-point Likert scale, with 1 indicating "strongly disagree" and 7 indicating "strongly agree."

3.4 Data Collection Procedure

A total of 150 questionnaires were distributed to respondents who have used self-service ordering kiosks at a fast-food outlet in Penang, Malaysia. The questionnaires were distributed using a face-to-face survey approach to ensure respondents understood the questions asked in the survey. All distributed questionnaires were completed and returned on the same day for further data analysis. The study has received approval from the Research Ethics Committee, Universiti Teknologi MARA, with reference number BERC/09/2022 (UG/MR/116).

4. DATA ANALYSIS AND RESULTS

The data were analyzed using the statistical software IBM Statistical Package for Social Science (SPSS), version 26. The statistical analyses included normality tests, frequency tests, correlation, and multiple regression. The reliability assessment of the items representing each construct was assessed using Cronbach's alpha, widely used in many studies (Hair et al., 2006).

4.1 Common Method Variance

This study has a tendency to have statistical and methodological biases, also known as common method variance, because it relies on self-collected data from a single source. This study applied a post-hoc technique called Harman's one-factor test with unrotated factor solutions to assess whether common method bias was evident in the study. It is one of the most commonly used assessments to detect common method variance in a quantitative study (Kock, 2020). Based on Harman's one-factor test result, it was found that the total variance extracted by one factor is 42.42%. This reveals that common method bias is not a problem in the study because the total variance extracted by one factor (42.42%) is lower than the suggested threshold of 50% (Podsakoff et al., 2003).

4.2 Respondent Characteristics

Table I shows the demographic profiles of the respondents. Based on frequency analysis, it was found that most respondents are female, 83 (55.3%), as opposed to male, 67 (44.67%). Most of them are between the ages of 26 and 35 (64 (42.66%), representing the typical age of the continuing education and working adult population using self-service ordering kiosks. This was followed by 18–25 years, which accounted for 51 (34%), 36–45 years, which accounted for 18 (12%), and 46 years and older, which accounted for only 17 (11.33%). This is as expected since the target market for fast-food restaurants is generally young, working adults. In terms of race, most of the respondents are Malay (135%), followed by Chinese (5.33%), Indians (3.33%), and others (1.33%). For the respondent's monthly income, the highest is RM 1200–RM 1500 with 97 (64.66%), followed by RM 1600–RM 2000 with 25 (16.66%), and RM 2000 and above with 28 (18.66%). Finally, the highest education level attained by respondents is undergraduate, with 46 (56.66%), followed by secondary education with 85 (30.66%), postgraduate with 8 (5.33%), and others with 11 (7.33%).

Table 1: Respondent Scoio-Demographic Profiles

Socio Demographic	Options	Frequency	Percentage (%)
Gender	Male	67	44.67
	Female	83	55.33
Race	Malay	135	90
	Chinese	8	5.33
	Indian	5	3.33
	Others	2	1.33
Age Group	18-25 years	51	34
	26-35 years	64	42.66
	36-45 years	18	12
	46 years and above	17	11.33
Monthly Income	RM 1200 - RM1500	97	64.66
	RM 1600 - RM 2000	25	16.66
	RM 2000 and above	28	18.66
The Highest Education Level Attained	Secondary	46	30.66
	Undergraduate	85	56.66
	Postgraduate	8	5.33
	Others	11	7.33

4.3 Reliability Analysis

Reliability analysis was used to check the reliability of research variables. Cronbach's alpha coefficients were satisfactory, ranging from 0.825 to 0.927 for all the constructs, exceeding the 0.7 recommended by Nunnally (1978). This indicates that the research instrument is reliable in gauging the concept of the respective constructs employed in the study.

4.4 Exploratory Factor Analysis

An exploratory factor analysis was conducted to measure attributes of the self-service ordering kiosk and continuous usage intention. The factor analysis extracted six factors, and based on their core concepts, the factors were named "System Quality" for Component 1, "Information Quality" for Component 2, "Service Quality" for Component 3, "Technology Self-Efficacy" for Component 4, "Safety and Security" for Component 5, and "Continuous Usage Intention" for Component 6. Table 2 presents the results of the exploratory factor analysis.

Table 2: Factor Analysis of Variables

Rotated Component Matrix[a]

		Component					
		1	2	3	4	5	6
System Quality	I find the self-self-service ordering kiosk easy to use.	0.823					
	I find it easy to get the self-service ordering kiosk to do what I want.	0.804					
	The self-service ordering kiosk is interactive.	0.709					
	Learning to operate the self-service ordering kiosk was easy for me.	0.762					
	The self-service ordering kiosk apps quickly load all the text and graphics.	0.729					
Information Quality	The self-service ordering kiosk provide valuable information to me.		0.811				
	The self-service ordering kiosk provide necessary information to me.		0.830				
	The self-service ordering kiosk provide accurate information to me.		0.799				
	The self-service ordering kiosk provide relevant information to me.		0.769				
Service Quality	I can receive an immediate service if any problem occurs when I use self-service ordering kiosk.			0.738			
	The self-service ordering kiosk provides good service.			0.759			
	Self-service ordering kiosk provides services as promised.			0.775			
	Self-service ordering kiosk support staffs make continuous efforts to improve services.			0.841			
Technology Self-Efficacy	I feel confident that I can use self-service ordering kiosk.				0.676		
	I am proficient in using self-service ordering kiosk.				0.672		
Safety and Security	I trust self-service ordering kiosk payment system will not be misused to collect my personal information.					0.831	
	The self-service ordering kiosk payment system has adequate security features.					0.913	
	My transactions using the self-service ordering kiosk payment system are protected.					0.857	
	My transactions using the self-service ordering kiosk payment system are safe.					0.825	
Continuous Usage Intention	I intend to continue using the self-service ordering kiosk.						0.655
	I will regularly use the self-service ordering kiosk in the future.						0.735
	I will continue using the self-service ordering kiosk.						0.785
	I will recommend others to use the self-service ordering kiosk.						0.629

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

4.5 Multiple Regression Analysis

A multiple regression analysis was conducted to analyze the direct relationship between independent variables and continuous usage intention. To test H1, H2, H3, H4, H5, and H6, which propose a positive and significant influence relationship between attributes of self-service ordering kiosks and continuous usage intention, the regression equation would test the impact of the factors influencing self-service ordering kiosks (system quality, service quality, information quality, innovativeness, technology self-efficacy, and safety and security) on continuous usage intention. The statistical results suggest that only three out of six factors, namely, system quality ($\beta = 0.273$, $p < 0.005$, $t = 3.937$), innovativeness ($\beta = 0.167$, $p < 0.005$, $t = 2.954$), and safety and security ($\beta = 0.246$, $p < 0.005$, $t = 4.667$), had a positive and significant influence on customers' continuous usage intention. In contrast, the other attributes of self-service ordering kiosks' continuous usage intention were found to be positively insignificant, which are technology self-efficacy ($\beta = 0.061$, $p > 0.005$, $t = 0.768$), service quality ($\beta = 0.095$, $p > 0.005$, $t = 1.467$), and lastly, information quality ($\beta = 0.072$, $p > 0.005$, $t = 1.016$). Therefore, it can be concluded that hypotheses H1, H4, and H6 are supported. On the other hand, hypotheses H2, H3, and H5 are not supported. The coefficient of the determinant (R^2) of attributes of self-service ordering kiosks is 0.613, indicating that the attributes of the self-service ordering kiosk have significantly represented 61.3% of the variance in continuous usage intention. In addition, the result indicates that among the six factors, system quality ($\beta = 0.273$) is statistically the most significant attribute in explaining the variance in continuous usage intention, followed by safety and security ($\beta = 0.246$) and innovativeness ($\beta = 0.167$). Table 3 shows the multiple regression analysis results.

Table 3: Reliability and Multiple Regression Analyses

	No. of Items	Cronbach Alpha	Std. Error	Beta	t	Sig.	R^2
System Quality	5	0.914	.066	.273	3.937	.000	
Service Quality	4	0.886	.058	.095	1.467	.144	
Information Quality	4	0.927	.068	.072	1.016	.311	0.613
Innovativeness	3	0.825	.057	.167	2.954	.004	
Technology Self-Efficacy	3	0.849	.146	.064	0.162	2.288	
Safety and Security	4	0.895	.054	.246	4.667	.000	
Continuous Usage Intention	4	0.896					

a. Dependent Variable: Continuous Usage Intention

5. DISCUSSION AND IMPLICATIONS

The primary purpose of this research is to determine self-service ordering kiosk features that influence consumers' continuous usage intentions. Specifically, the study investigates the effects of a self-service ordering kiosk's system quality, service quality, information quality, innovativeness, technology self-efficacy, safety, and security on continuous usage intention. Based on the statistical analysis, three attributes have a substantial positive influence on consumer continuous usage intention: system quality, innovativeness, safety, and security. On the other hand, there is no statistical evidence to support the link between service quality, information quality, technological self-efficacy, and continuous usage intention. Arguably, there could be other predictors or intervening factors not considered in the study that are more influential in shaping continuous usage intention. For example, factors like convenience, pricing, or the availability of certain menu items could be more critical to customers' choices when using self-service kiosks in fast-food restaurants. Further research and a deeper exploration of these factors may provide more insights into customers' decision-making processes in the context of self-service ordering kiosk usage in Malaysia.

The findings of this study offer valuable insights into the practical implications of the supported hypotheses. Firstly, the result supporting H1 emphasizes the crucial role of system quality in driving continuous usage intention for self-service ordering kiosks. This is consistent with the finding by Li and Wang (2021), who stated that system quality is a critical attribute influencing user satisfaction and successful usage of the information system. This implies that fast-food restaurants can enhance the overall customer experience by investing in cutting-edge technology, user-friendly interfaces, and easy maintenance of their self-service systems. By doing so, they not only improve service quality but also foster customer satisfaction and loyalty. Additionally, the link between system quality and return on investment underscores the business advantages of prioritizing these attributes. In practical terms, this suggests that restaurants should consistently monitor and upgrade the technical features of their self-service kiosks to keep them user-friendly and up-to-date, ultimately encouraging customers to continue using this service.

Secondly, H4 underscores the significance of innovativeness in shaping consumers' intention to continuously use self-service ordering kiosks. Ratten (2016) argued that an organization's

participation in and support of innovative services is important in improving customers' experiences, which can influence their attitudes and behaviors. This highlights that fast-food establishments can enhance customer retention by continuously introducing novel products, services, and technology into their self-service systems. As the study suggests, customers are attracted to self-service kiosks not only because they are convenient but also because they offer an innovative and efficient way to place orders. This implies that restaurants should remain proactive in incorporating new features, technologies, and services into their self-service kiosks to cater to tech-savvy and innovation-seeking customers, ultimately bolstering their continuous usage intention.

Lastly, the support for H6 underscores the importance of security in the context of self-service ordering kiosks. The finding is in line with Ye et al. (2008), who found that perceived security significantly influences consumers' continuous usage intention toward self-service ordering kiosks, which is an essential post-adoption behavior. It is crucial for restaurants to prioritize the safety and privacy of customer data and transactions. By implementing robust security measures, such as encryption, firewalls, and user-friendly privacy settings, fast-food establishments can build trust among customers, reassuring them that their transactions are secure. This trust, in turn, contributes to customers' intentions to continue using self-service kiosks. To practically implement this finding, restaurants should regularly update and maintain their security features, communicate these measures to their customers, and educate them about the safety of their payment and personal information when using self-service kiosks.

All in all, the findings highlight the critical need for fast-food restaurant operators to come up with actionable strategies to improve customers' continuous usage intentions for self-service ordering kiosks. By focusing on system quality, innovativeness, and security, they can foster positive customer experiences, enhance customer loyalty, and ultimately boost their competitiveness in the fast-food industry.

6. CONCLUSION

The study attempted to investigate the attributes that influence customers to continuously use self-service ordering kiosks in fast-food restaurants. The findings suggest that attributes related to system quality, innovativeness, safety, and security have a significant positive effect on continuous usage intention. However, the study did not find any statistical support to validate the proposed significance of the positive effect of service quality, information quality, and self-efficacy on continuous usage intention. This calls for further investigations into any other intervening variables that might influence the relationships among the attributes.

The study makes both theoretical and practical contributions to the field of service innovation and customer behavior in fast-food restaurants. Theoretically, the study sheds light on the multifaceted nature of customer preferences when it comes to self-service ordering kiosks. By highlighting the importance of system quality, innovativeness, safety, and security in driving continuous usage intention, our findings provide a deeper understanding of the factors that shape customer decisions in this context. This insight can serve as a valuable foundation for future research and academic discussions, further enriching the existing body of knowledge related to self-service technologies and their adoption in the fast-food industry. From a practical standpoint, the results of this study offer fast-food restaurant operators' valuable insights into enhancing the customer experience with self-service ordering kiosks. By focusing on attributes related to system quality, innovativeness, safety, and security, businesses can design and implement strategies to encourage sustained kiosk usage. Additionally, the lack of statistical support for service quality, information quality, and self-efficacy emphasizes the need for

businesses to allocate resources and attention wisely. Recognizing the factors that truly matter in this context can help streamline investments and efforts, ultimately leading to more efficient and effective customer service practices.

Despite the valuable contributions made by this study, it is essential to acknowledge its limitations. One limitation lies in the research scope, which focused exclusively on fast-food restaurant contexts. Future research can expand the investigation to different types of self-service systems, such as those in retail or hospitality, to identify potential variations in the drivers of continuous usage intention. Furthermore, the study's reliance on self-reported data may introduce common method bias, and future research could incorporate additional objective measures to mitigate this concern. Lastly, this research primarily focused on individual-level attributes, and future studies might explore the influence of contextual factors, such as location or cultural differences, in influencing customers' choices regarding self-service kiosk usage. These avenues for future research can help further advance our understanding of this dynamic and ever-evolving field.

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AUTHORS' CONTRIBUTION

MHH and AN carried out the introduction and literature review sections. MHH and DA collected and refined the data and performed the data analysis using SPSS. MHH and DA also wrote the data methodology section. MHH, AN, and KC wrote the discussion and implication sections. All authors read and approved the final manuscript.

CONFLICT OF INTEREST

There was no disclosure of any possible conflicts of interest pertaining to this article.

REFERENCES

Abdul Hamid, N. A., Abdullah, N. H., & Seow Chian, N. (2021). The User Experience (UX) Analysis of Self-service ordering kiosks (SSK) in Waiting Time at Fast Food Restaurant Using User Experience (UX) Model. Journal of Social Transformation and Regional Development, 3(2), 85–98. https://doi.org/10.30880/jstard.2021.03.02.010

Abdulkareem, A. K., & Mohd Ramli, R. (2022). Does trust in e-government influence the performance of e-government? An integration of information system success model and public value theory. ("Does trust in e-government influence the performance of e-government ...") Transforming Government: People, Process and Policy, 16(1), 1–17. https://doi.org/10.1108/TG-01-2021-0001

Ain, N. U., Kaur, K., & Waheed, M. (2016). "The influence of learning value on learning management system use: An extension of UTAUT2." ("Factors predicting University students' behavioral intention to use ...") Information Development, 32(5), 1306–1321. https://doi.org/10.1177/0266666915597546

Al-Mamary, Y. H., Shamsuddin, A., & Abdul Hamid, N. A. (2018). The relationship between system quality, information quality, and organizational performance. International Journal of Knowledge and Research in Management & E-Commerce, 4(3), 7–10.

Ali, F., Terrah, A., & Ali, L. (2021). Antecedents and consequences of user engagement in smartphone travel apps. 12(2), 355–371. https://doi.org/10.1108/JHTT-09-2020-0221

Alves, T., Natálio, J., Henriques-Calado, J., & Gama, S. (2020). Incorporating personality in user interface design: A review. Personality and Individual Differences, 155(February), 109709. https://doi.org/10.1016/j.paid.2019.109709

Arsat, A., Hanafiah, M. H., & Che Shalifullizam, N. I. F. (2023). Fast-Food Restaurant Consumer Preferences in Using Self-Service Kiosks: An Empirical Assessment of the 4As Marketing Mix. Journal of Culinary Science & Technology, 1-12.

Arts, S., & Veugelers, R. (2015). Technology familiarity, recombinant novelty, and breakthrough invention. Industrial and Corporate Change, 24(6), 1215–1246. https://doi.org/10.1093/icc/dtu029

Bonnin, G. (2020). The roles of perceived risk, attractiveness of the online store and familiarity with AR in the influence of AR on patronage intention. Journal of Retailing and Consumer Services, 52(August 2019), 101938. https://doi.org/10.1016/j.jretconser.2019.101938

Çelik, K., & Ayaz, A. (2022). Validation of the DeLone and McLean information systems success model: a study on student information system. Education and Information Technologies, 27(4), 4709-4727.

Chatterjee, S., Kar, A. K., & Gupta, M. P. (2018). Success of IoT in smart cities of India: An empirical analysis. Government Information Quarterly, 35(3), 349-361.

Chen, C. W. D., & Cheng, C. Y. J. (2009). Understanding consumer intention in online shopping: a respecification and validation of the DeLone and McLean model. Behavior & Information Technology, 28(4), 335-345.

Chen, S. C., Chen, H. H., & Chen, M. F. (2009). Determinants of satisfaction and continuance intention towards self-service technologies. Industrial Management & Data Systems, 109(9), 1248-1263.

Degirmenci, K. (2020). Mobile users' information privacy concerns and the role of app permission requests. International Journal of Information Management, 50, 261-272

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. Journal of Management Information Systems, 19(4), 9-30.

El-Said, O. A., & Al Tall, T. (2020). Studying the factors influencing customers' intention to use self-service kiosks in fast food restaurants. In Information and Communication Technologies in Tourism 2020: Proceedings of the International Conference in Surrey, United Kingdom, January 08–10, 2020 (pp. 206-217). Springer International Publishing.

Endadul Hoque, M., Rahman, R., Ahmed, S. I., & Liu, L. (2016). Trust-based security auto-configuration for smart assisted living environments. ACM/IEEE International Conference on Human-Robot Interaction, 2016-April (1), 405–419. https://doi.org/10.1007/978-3-319-39949-2

Fianu, E., Blewett, C., & Ampong, G. O. (2020). Toward the development of a model of student usage of MOOCs. Education+ Training, 62(5), 521-541.

Fu Tsang, N. K., Lai, M. T., & Law, R. (2010). Measuring e-service quality for online travel agencies. Journal of Travel & Tourism Marketing, 27(3), 306-323.

Gelbrich, K., & Sattler, B. (2014). Anxiety, crowding, and time pressure in public self-service technology acceptance. Journal of Services Marketing, 28(1), 82–94. https://doi.org/10.1108/JSM-02-2012-0051

Givi, M. E., Keshavarz, H., & Azad, Z. K. (2022). Quality assessment of E-learning website using asymmetric impact–performance analysis and Kano's customer satisfaction model: a case study based on WebQual 4.0. Information Discovery and Delivery, (ahead-of-print)

Grand View Research, 2020. Self-service Technology Market Size Report, 2020-2027. https://www.grandviewresearch.com/industry-analysis/self-service-technology-market

Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2006), Multivariate Data Analysis, 6th ed., Pearson Prentice Hall, NJ.

Han, J. H., Oh, Y. H., & Ham, S. (2019). Influence of ordering kiosk nutrition information transparency and information quality on the customer behavioral intention in fast food restaurants. Journal of the Korean Dietetic Association, 165-177.

Hasan, M. M., Hossain, M. R., Akhter, F., & Uddin, B. The Role of Perceived Reliability on Tourists' Satisfaction in Using Mobile Financial Service (MFS) as Self-Service Technology (SST): A PLS-SEM Approach.

Hedin, P. B. D., Yel, M. B., Sfenrianto, S., Anugrah, R. D., Quality, B. E., Al-nuaimi, I. T. I., Mahmood, M., & Waleed, O. (2020). The effect of information quality, system quality, service quality on intention to use and user satisfaction, and their effect on net benefits primary care application at primary health facilities in Malang the effect of information quality, system qu. https://doi.org/10.1088/1757-899X/732/1/012084

Huang, H. M., Rauch, U., & Liaw, S. S. (2010). Investigating learners' attitudes toward virtual reality learning environments: Based on a constructivist approach. Computers and Education, 55(3), 1171–1182. https://doi.org/10.1016/j.compedu.2010.05.014

Islam, J. U., & Rahman, Z. (2017). The impact of online brand community characteristics on customer engagement: An application of Stimulus-Organism-Response paradigm. Telematics and Informatics, 34(4), 96-109.

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.

Kelly, P., Lawlor, J., & Mulvey, M. (2017). Customer Roles in Self-Service Technology Encounters in a Tourism Context. Journal of Travel and Tourism Marketing, 34(2), 222–238. https://doi.org/10.1080/10548408.2016.1156612

Ketimin, S., & Shami, S. (2021). An Insight of Customer's Behavior Intention to Use Self-Service Kiosk in Melaka Fast Food Restaurant. Journal of Technology Management and Technopreneurship (JTMT), 9(1), 13-24.

Kim, H. B., Lee, D. S., & Ham, S. (2013). Impact of hotel information security on system reliability. International Journal of Hospitality Management, 35, 369-379.

Kim, H. J., & Lee, J. M. (2020). Consumers' Resistance and Continued Use Intention of Self-service Kiosk. Human Ecology Research, 58(3), 401-416.

Kim, M., & Chang, B. (2020). The effect of service quality on the reuse intention of a chatbot: Focusing on user satisfaction, reliability, and Immersion. International Journal of Contents, 16(4), 1-15.

Kim, M., & Qu, H. (2014). Travelers' behavioral intention toward hotel self-service ordering kiosks usage. International Journal of Contemporary Hospitality Management, 26(2), 225–245. https://doi.org/10.1108/IJCHM-09-2012-0165

Kock, N. (2020). Harman's single factor test in PLS-SEM: Checking for common method bias. Data Analysis Perspectives Journal, 2(2), 1-6.

Lai, I. K. W. (2014). The role of service quality, perceived value, and relationship quality in enhancing customer loyalty in the travel agency sector. Journal of Travel & Tourism Marketing, 31(3), 417-442.

Lam, V., Cheung, S., Kastner, M., Sale, J. E. M., Straus, S., & Kaplan, A. (2020). Development process and patient usability preferences for a touch screen tablet–based questionnaire. 1. https://doi.org/10.1177/1460458218824749

Law, R., Leung, D., & Chan, I. C. C. (2020). Progression and development of information and communication technology research in hospitality and tourism: A state-of-the-art review. International Journal of Contemporary Hospitality Management, 32(2), 511-534.

Lawry, S., Popovic, V., Blackler, A., & Thompson, H. (2019). Age, familiarity, and intuitive use: An empirical investigation. Applied Ergonomics, 74(July 2018), 74–84. https://doi.org/10.1016/j.apergo.2018.08.016

Lee, J. (2023). A Study on the Emotional Value and Continuous Usage Intention of Fast-Food Restaurant Kiosk Service Using the Unified Technology Acceptance and Use of Theory (UTAUT). Culinary science & hospitality research, doi: 10.20878/cshr.2023.29.3.010

Lee, W., & Lu, L. (2023). Designing gamified interactions with self-service technology at restaurants. International Journal of Hospitality Management, 113, 103503.

Lee, W., Castellanos, C., & Chris Choi, H. S. (2012). The Effect of Technology Readiness on Customers' Attitudes toward Self-Service Technology and Its Adoption; The Empirical Study of U.S. Airline Self-Service Check-In Kiosks. Journal of Travel and Tourism Marketing, 29(8), 731–743. https://doi.org/10.1080/10548408.2012.730934

Lee, Y., Yen, I., Zheng, M. (2023). Usability Evaluation of Self-Ordering Kiosks in Fast Food Restaurants. In: Tareq Ahram and Christianne Falcão (eds) Usability and User Experience. AHFE (2023) International Conference. AHFE Open Access, vol 110. AHFE International, USA. http://doi.org/10.54941/ahfe1003203

Leung, X. Y., Torres, B., & Fan, A. (2021). Do kiosks outperform cashiers? An SOR framework of restaurant ordering experiences. Journal of Hospitality and Tourism Technology, 12(3), 580-592.

Li, Y., & Shang, H. (2020). Service quality, perceived value, and citizens' continuous-use intention regarding e-government: Empirical evidence from China. Information and Management, 57(3), 103197. https://doi.org/10.1016/j.im.2019.103197

Lin, J. S. C., & Hsieh, P. L. (2011). Assessing the self-service technology encounters: development and validation of SSTQUAL scale. Journal of retailing, 87(2), 194-206.

Liu, Jinghua, Yaojin Lin, Menglei Lin, Shunxiang Wu, and Jia Zhang. "Feature selection based on quality of information." Neurocomputing 225 (2017): 11-22.

Loureiro, S. M. C. (2015). The role of website quality on PAD, attitude and intentions to visit and recommend island destination. International Journal of Tourism Research, 17(6), 545-554.

Masri, N. W., You, J. J., Ruangkanjanases, A., Chen, S. C., & Pan, C. I. (2020). Assessing the effects of information system quality and relationship quality on continuance intention in e-tourism. International Journal of Environmental Research and Public Health, 17(1). https://doi.org/10.3390/ijerph17010174

McKinney, V., Yoon, K., & Zahedi, F. M. (2002). The measurement of web-customer satisfaction: An expectation and disconfirmation approach. Information systems research, 13(3), 296-315.

McKnight, D. H., Lankton, N. K., Nicolaou, A., & Price, J. (2017). Distinguishing the effects of B2B information quality, system quality, and service outcome quality on trust and distrust. Journal of Strategic Information Systems, 26(2), 118–141. https://doi.org/10.1016/j.jsis.2017.01.001

Mittendorf, C. (2018). Collaborative consumption: the role of familiarity and trust among Millennials. Journal of Consumer Marketing, 35(4), 377–391. https://doi.org/10.1108/JCM-12-2016-2040

Munir, R., & Beh, L. S. (2019). Measuring and enhancing organisational creative climate, knowledge sharing, and innovative work behavior in startups development. Bottom Line, 32(4), 269–289. https://doi.org/10.1108/BL-03-2019-0076

Na, T. K., Lee, S. H., & Yang, J. Y. (2021). Moderating effect of gender on the relationship between technology readiness index and consumers' continuous use intention of self-service restaurant kiosks. Information (Switzerland), 12(7). https://doi.org/10.3390/info12070280

Nie, L., Oldenburg, B., Cao, Y., & Ren, W. (2023). Continuous usage intention of mobile health services: model construction and validation. BMC Health Services Research, 23(1), 442.

Noradzhar, B., Aslinda, M. S., & Mohd, H. H. (2020). Self-ordering kiosk usage and post-purchase behaviour in quick service restaurant. Journal of Tourism, Hospitality and Culinary Arts, 12(1), 360-376.

Oday, A., Ozturen, A., Ilkan, M., & Abubakar, A. M. (2021). Do eReferral, eWOM, familiarity and cultural distance predict enrollment intention? An application of an artificial intelligence technique. Journal of Hospitality and Tourism Technology, 12(3), 471–488. https://doi.org/10.1108/JHTT-01-2020-0007

Othman, A. K., Hamzah, M. I., & Hassan, L. F. A. (2020). Modeling the contingent role of technological optimism on customer satisfaction with self-service technologies: A case of cash-recycling ATMs. Journal of Enterprise Information Management.

Pai, C. K., Wu, Z. T., Lee, S., Lee, J., & Kang, S. (2022). Service Quality of Social Media-Based Self-Service Technology in the Food Service Context. Sustainability, 14(20), 13483.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. Journal of applied psychology, 88(5), 879.

Rastegar, N. (2018). Adoption of self-service kiosks in quick-service restaurants (Doctoral dissertation, University of Guelph).

Ratten, V. (2016). Continuance use intention of cloud computing: Innovativeness and creativity perspectives. Journal of Business Research, 69(5), 1737–1740. https://doi.org/10.1016/j.jbusres.2015.10.047

Safaeimanesh, F., Kılıç, H., Alipour, H., & Safaeimanesh, S. (2021). Self-service technologies (SSTs)—the next frontier in service excellence: Implications for tourism industry. Sustainability, 13(5), 2604.

Seo, K. H. (2020). A study on the application of kiosk service as the workplace flexibility: The determinants of expanded technology adoption and trust of quick service restaurant customers. Sustainability (Switzerland), 12(21), 1–16. https://doi.org/10.3390/su12218790

Shahril, Z., Zulkafly, H. A., Ismail, N. S., & Sharif, N. U. N. M. (2021). Customer Satisfaction Towards Self-Service Kiosks for Quick Service Restaurants (QSRs) in Klang Valley. International Journal of Academic Research in Business and Social Sciences, 11(13), 54-72.

Shao, Z., Zhang, L., Li, X., & Guo, Y. (2019). Antecedents of trust and continuance intention in mobile payment platforms: The moderating effect of gender. Electronic Commerce Research and Applications, 33, 100823

Shiau, W. L., Yuan, Y., Pu, X., Ray, S., & Chen, C. C. (2020). Understanding fintech continuance: perspectives from self-efficacy and ECT-IS theories. Industrial Management & Data Systems.

Soleimani, A. G., & Einolahzadeh, H. (2018). The influence of service quality on revisit intention: The mediating role of WOM and satisfaction (Case study: Guilan travel agencies). Cogent Social Sciences, 4(1), 1560651

Walter, N., Ortbach, K., & Niehaves, B. (2015). Designing electronic feedback–analyzing the effects of social presence on perceived feedback usefulness. International Journal of Human-Computer Studies, 76, 1-11.

Wang, Edward Shih Tse; Chou, Nicole Pei Yu (2016). Examining social influence factors affecting consumer continuous usage intention for mobile social networking applications. International Journal of Mobile Communications, 14(1), 43–. doi:10.1504/IJMC.2016.073358

Wooder, S., Baker, S., & Gynane, C. (2012). Extracting key lessons in service innovation. Journal of Product Innovation Management, 29(1), 13–20. https://doi.org/10.1111/j.1540-5885.2011.00875.x

Yaacob, S. A., Aziz, A., Bakhtiar, M., Othman, Z., & Ahmad, N. (2021). A concept of consumer acceptance on the usage of self-ordering kiosks at McDonald's. International Journal of Academic Research in Business and Social Sciences, 11(13), 12-20.

Yang, Kiseol (2010). The Effects of Technology Self-Efficacy and Innovativeness on Consumer Mobile Data Service Adoption between American and Korean Consumers. Journal of International Consumer Marketing, 22(2), 117–127. doi:10.1080/08961530903476147

Yang, Q., Goodsir, W., & Poulston, J. (2019). Automation of the fast-food industry: Gen Z perspectives of self-service kiosks versus employee service. Hospitality Insights, 3(2), 7-8.

Yang, Z., Zhou, Q., Chiu, D. K. W., & Wang, Y. (2022). Exploring the factors influencing continuous usage intention of academic social network sites. Online Information Review. https://doi.org/10.1108/OIR-01-2021-0015

Ye, C., Seo, D., Desouza, K. C., Sangareddy, S. P., & Jha, S. (2008). Influences of IT substitutes and user experience on post-adoption user switching: An empirical investigation. Journal of the American Society for Information Science and Technology, 59(13), 2115-2132.

Zhou, T. (2013). An empirical examination of continuance intention of mobile payment services. Decision support systems, 54(2), 1085-1091.

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