



Examining the Antecedents of Continuous Usage Intention for Smart Self-Service Automated Kiosks in Bangkok

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Abstract

The implementation of self-service automation technology is acknowledged as an essential strategy to enhance service quality and profitability in the fast-food industry. This study, informed by Cognitive Appraisal Theory, examines the factors influencing the continuing intention to use smart self-service automated kiosks among Thai young adults. Based on Partial Least Squares-Structural Equation Modeling, the study found substantial empirical evidence linking perceived responsiveness, customization, convenience, and innovativeness with attitudes toward smart self-service technologies, which then affect continuous usage intentions. Interestingly, perceived functionality, interface design, and payment security did not significantly influence attitudes toward smart self-service technologies. The current study enhances both theoretical and practical comprehension of the elements influencing prolonged technology utilization in the digital service domain. Theoretically, the findings highlight the essential importance of smart self-service technology (SST) features in maintaining user engagement with smart kiosks. This study offers significant implications for fast-food companies, highlighting the necessity to improve customer sentiment through dependable and intuitive kiosk interfaces. Subsequent study ought to investigate these links within diverse demographic contexts and employ longitudinal methodologies to track the progression of user behaviors.

Keywords

Self-Service Technology, Self-Service Kiosk, Fast-Food Restaurant, Innovativeness

Introduction

The fast-food sector in Southeast Asia has had substantial expansion recently, attributed to the embrace of fast-food cultures, evolving food landscapes, and transforming consumer preferences (Shawon et al., 2022). Urban customers in the region are progressively pursuing higher-value food products, resulting in a revolution of agricultural techniques and the industrialization of food production (Wang, 2018). Countries such as China have witnessed significant expansion in their food manufacturing sector, accompanied by heightened intra-industry trade within East Asia and beyond (Furuzawa & Kiminami, 2017). In Southeast Asia, Thailand is a major player in the global food market, ranking among the world's largest food exporters and holding the position of the second largest in Asia (Bandoophanit & Pumprasert, 2022).

Economic expansion and industrialization in Southeast Asia have been instrumental in the advancement of the fast-food sector. Elements such as trade liberalization and foreign direct investment have significantly contributed to the swift expansion of South-East Asian economies (Chongvilaivan, 2020). Moreover, initiatives designed to augment agricultural output, liberalize the economy, and enhance infrastructure have been vital in maintaining growth in the region (Van Donge et al., 2012).

In the hospitality industry, self-service technology (SST) enables hospitality firms to deliver services with fewer employees, leading to substantial cost savings by reducing personnel expenses. These benefits are particularly significant in the hospitality industry, including restaurants, which has traditionally been more labor-intensive than other sectors (Park et al., 2021). Apart from the usage of SST for the cost reduction purpose, the incorporation of automation technology, such as robotics and artificial intelligence, has been recognized as a crucial method to improve service quality and profitability in the fast-food sector (Saravanakumar & Narayanan, 2018). For instance, the adoption of self-service kiosks has become considerably more common in restaurants, and the technology itself has become more convenient and user-friendly (Yoon, 2023).

Furthermore, the implementation of automation in fast-food establishments for functions such as food calorie assessment has become crucial in tackling health issues and fulfilling consumer demand (Haque et al., 2022). The fast-food industry's implementation of SST has fundamentally altered consumer interactions and influenced workforce dynamics. The rapid dynamics of the food and beverage service sector require efficient communication between staff and patrons to promptly adjust to automation and workflow modifications (Prayogo et al., 2020). Challenges such as turnover intention have arisen, underscoring the necessity for effective methods to retain staff and sustain productivity (Langove et al., 2022).

Notwithstanding substantial investment in SST, the research reveals inadequate acceptability or utilization of such technology within the fast-food sector. A notable concern is consumers' hesitance to engage with interactive self-service technologies, attributed to technical malfunctions, device failures, and the compulsory character of their involvement in such systems. These issues may induce frustration in customers, adversely affecting their overall experience and pleasure with the service (Samengon et al., 2023).

Furthermore, the absence of performance expectancy and favorable conditions can directly influence customers' behavioral intentions toward the use of self-service kiosks in quick-service restaurants (Seo, 2020). If clients do not regard the technology as efficient or user-friendly, they may be disinclined to utilize it, resulting in low acceptance rates. Moreover, factors such as the influence of generational preferences might affect purchase intentions and the perception of service quality in the fast-food sector (Xiao et al., 2018). Comprehending these elements is crucial for fast-food companies to customize their self-service technologies to properly cater to the interests of various client segments.

Although SST-based services are rapidly expanding to restaurants with a contactless trend, studies on restaurants remain limited (Ro & Kwon, 2023). Based on identified research gaps, the study intends to examine the elements associated with attitudes toward self-service kiosks. From a theoretical standpoint, comprehending the correlation between users' sentiments about self-service kiosks and their desire to persist in using the technology may enhance the literature on technology acceptance. This can enhance comprehension of the elements influencing user acceptability and the adoption of self-service technologies within the fast-food restaurant sector. The study provides significant data for fast food operators aiming to improve user experience by using self-service kiosks. By discerning the elements that affect user attitudes and intents regarding continued technology usage, they can enhance self-service kiosk functionalities to more effectively align with user expectations. This may result in enhanced user experiences and, consequently, increased adoption rates for fast-food self-service kiosks.

Literature Review

The Growth of the Fast-Food Industry in Southeast Asia

In recent decades, the fast-food restaurant industry has undergone swift global expansion, eliciting scholarly interest in the determinants of customer purchase behavior within this sector (Veas-González et al., 2024). In Southeast Asia, swift economic growth, enhancements in infrastructure, heightened trade activities, and increasing consumer incomes have substantially fostered the growth of the food business in the region (Spohrer et al., 2013). This expansion has

been especially prominent in nations such as Indonesia, Malaysia, and Thailand, where urbanization and globalization have intensified the desire for accessible and economical food alternatives (Pingali, 2007). The growing presence of multinational fast-food chains, such as McDonald's, has significantly contributed to the industry's expansion throughout Southeast Asia (Du et al., 2018). The proliferation of these multinational companies has not only provided novel dining experiences but has also fostered economic progress in the region (Ghazali & Roslan, 2021).

The evolving dietary choices and consumption trends in Southeast Asia, shaped by urbanization and globalization, have resulted in a heightened intake of fast food and processed foods (Cheung et al., 2021). This transition is propelled by the convenience, cost-effectiveness, and diversity provided by fast food restaurants, accommodating the changing lifestyles of consumers in the area. Moreover, strategic trade and investment partnerships between Southeast Asia and other countries have fostered the expansion of the fast-food sector by facilitating the cross-border movement of goods, services, and capital (King & Du, 2022). This interconnection has stimulated economic growth and generated chances for market expansion and diversification in the food business.

The Fast-Food Industry in Thailand

As Grand View Research (2025) has pointed out, the global fast-food and quick service restaurant (QSR) market was valued at USD 257.19 billion in 2019 and is projected to reach USD 383.81 billion by 2027, representing a compound annual growth rate (CAGR) of 5.1% from 2020 to 2027. The Asia-Pacific region stands out as the fastest-growing market, with a forecast CAGR of 6.2% over the same period. The region is characterized by the presence of both international and domestic fast-food chains, including major U.S. brands such as McDonald's, Burger King, and KFC, alongside regional players such as Trung Nguyen Coffee in Vietnam, Kebab Turki Baba Raffi in Indonesia, Café Amazon in Thailand, and Jollibee Foods in the Philippines.

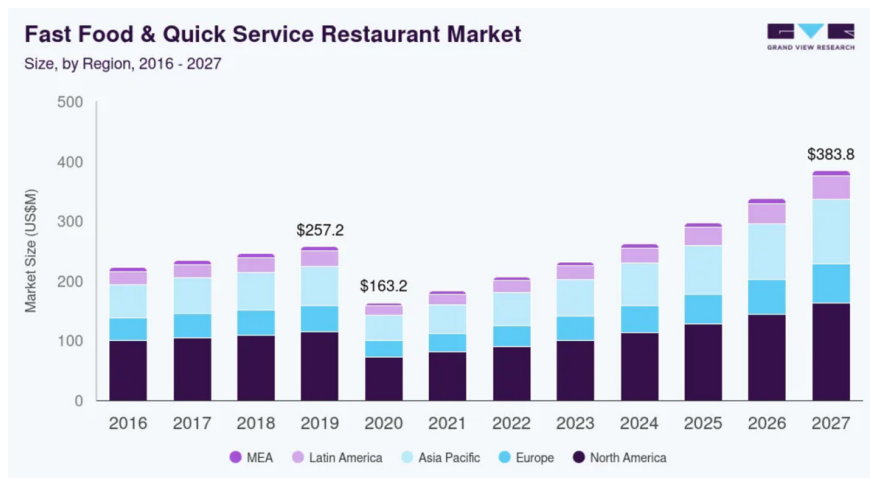


Figure 1 Fast Food & Quick Service Restaurant Market

Source: Grand View Research (2025)

Young adults, in particular, are central to this growth trajectory, as they frequently opt for fast-casual restaurants, fast-food outlets, and coffee shops due to their affordability and convenience (Okumus et al., 2021). In Thailand, this demographic represents a critical share of both the population and the labor force. Their digital proficiency and ability to adapt to time constraints make them a significant driver of both the fast-food and food delivery markets (Keawchuer et al., 2022).

According to Mondor Intelligence (2025), Thai fast-food restaurants have expanded consistently, with the number of outlets increasing by 1.97% between 2017 and 2022. International chains such as McDonald's, KFC, and Burger King continue to dominate in urban areas, while regional brands including Swensen's, MK Restaurant, and Yum Yum offer diverse menu options catering to both local and global tastes. This expansion is largely underpinned by young adults (aged 18-35), who not only perceive fast food as affordable and appealing but also demonstrate a strong inclination toward dining out, rendering them an attractive consumer base for QSR operators.

The Advancement of SST in the Foodservice Industry

The demand for SST in the foodservice industry has arisen due to labor shortages, an aging workforce, and the impact of COVID-19. Firstly, labor shortages significantly affect the fast-food business, influencing operational efficiency and service quality. Numerous variables contribute to this issue, as emphasized in the literature. Inadequate compensation, inconsistent working

hours, and unfavorable industry perceptions have all led to workforce shortages in the fast-food business (Innerhofer et al., 2022). Secondly, an aging workforce and inadequate skill levels among employees have intensified the issue (Yang et al., 2022). Thirdly, COVID-19 has accelerated digital transformation, reshaping service models across various industries. Rising labor costs and shifts in the labor environment have driven the adoption of SST as a substitute for human labor.

As a result, the foodservice and hospitality industries have progressively adopted advanced technologies, integrating them into their operations (Wong et al., 2024), including SST. SST refers to services that customers perform independently using technological tools during service encounters, without direct interaction with frontline employees. In this context, customers act as co-producers and contribute to the overall service delivery process. The restaurant industry, a key segment of the hospitality sector, has embraced SST enthusiastically. Modern diners can engage with SST through mobile apps, table-mounted tablets, and self-service kiosks, allowing them to browse menus, place orders, and customize their meals. Innovative solutions like tabletop multi-touch screens further enhance customer engagement, promoting active participation in the service process (Samengon et al., 2023).

Various forms of self-service technologies are prevalent in the foodservice sector, each providing distinct functionality and advantages. Self-ordering kiosks enable users to freely explore menus, submit orders, and process payments, thereby minimizing order inaccuracies and wait durations (Kincaid & Baloglu, 2005). Mobile ordering applications allow users to order remotely, monitor delivery status, and accumulate loyalty benefits, hence improving convenience and engagement (Habib et al., 2022). Automated payment systems optimize the checkout process by providing secure and contactless payment alternatives for consumers (Han et al., 2020). Furthermore, robotics and automation technologies are progressively being used into the foodservice sector to improve operational efficiency and service quality. Robots can aid in food preparation, delivery, and customer service, providing novel solutions to manpower shortages and enhancing the overall service experience (Jain et al., 2021). Moreover, intelligent service technologies, like AI-driven chatbots and tailored recommendation systems, are revolutionizing consumer engagement and service provision in the foodservice industry (Kabadayi et al., 2019).

Continuous Usage Intention for Self-Service Automation Technology

The application of SST should enhance customers satisfaction, influence their desire to return and intention to reuse the SST (Fernando et al., 2020). To examine the customers' continuous usage intention of SST, the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) are frequently employed frameworks for comprehending and forecasting

consumers' intentions to utilize SST. TAM is excellent for predicting initial adoption based on perceived usefulness and perceived ease of use. Similarly, TPB expands on this by adding social pressures (subjective norms) and a user's self-efficacy (perceived behavioral control). These models account for variables including perceived utility, perceived ease of use, attitude, subjective norms, trust, and behavioral intention in influencing consumer acceptance and the ongoing utilization of SST in foodservice environments (Kaushik & Rahman, 2015).

Studies has shown that factors like economic benefits, ease of use, convenience, and security are closely linked to the perceived value of self-service although their individual contributions may vary. These factors significantly impact customers' intention to continue using self-service options. Among them, perceived usefulness stands out as a critical determinant. Consumers generally believe that the availability, user-friendliness, and ease of navigating self-service technologies play a central role in shaping their intention to use them (Khalufi & Shah, 2022). It should be pointed out, however, that perceptions of the SST likely vary and could consequently lead to the continuance or discontinuance of technology usage (Wu & Wu, 2019). This suggests that scholars should consider other relevant theories to examine SST users' behaviors.

Research Framework and Hypothesis Development

Cognitive Appraisal Theory

Although TAM and TPB are widely used in predicting technology usage behaviors, they primarily focus on rational, goal-oriented drivers of behavior. They tend to overlook the appraisal-driven predictors of attitude and behavior which often arise from user usage experiences. The current study goes beyond TAM and TPB frameworks by examining technology usage behavior from the standpoint of users' appraisal of the SSTs that they experienced. For this purpose, Cognitive Appraisal Theory (CAT) offers a useful framework for comprehending how users appraise the characteristics of self-service automated kiosks, develop attitudes toward them, and decide on their intention for further usage. According to Albert (1989), the theory posits that individuals assess and interpret their experiences via the lens of their beliefs, values, and emotions.

The CAT is relevant in this study as it reflects the study's digital-native demographic, basic functionality is an expectation, not a driver. Their continued loyalty is more likely influenced by how the technology they experienced makes them feel. For instance, whether the experience is innovative, convenient, or personalized. Also, the theory is better suited in this study to explain how specific features of the kiosk (like responsiveness or customization) are appraised by the user, leading to a positive or negative attitude. In the current study, the CAT helps to frame the

interaction not just as a task to be completed, but as an experience to be evaluated. The CAT has been employed to examine individuals' assessments and responses to service technologies. For example, Song et al. (2023) utilized cognitive evaluation theory to illustrate that functional service quality favorably influences restaurant robotic service and existential authenticity. In the study, CAT effectively elucidates user attitudes and behavioral intentions for self-service automated kiosks.

The Antecedents of Attitudes Toward Self-Service Automated Kiosks

This study examines critical elements including the functionality, responsiveness, interface design, payment security, customization, convenience, and innovativeness of self-service automated kiosks, which are posited to affect attitudes towards these kiosks in fast food outlets.

The efficacy of self-service kiosks in improving service delivery and augmenting client experiences significantly influences customer perceptions. Furthermore, the efficacy of self-service kiosks in delivering a smooth and pleasurable client experience has been demonstrated to affect perceptions of technology-driven self-service options (Mason et al., 2023). Consequently, consumer opinions regarding self-service kiosks may be influenced by their impressions of the technology's functionality. An affirmative consumer experience with self-service kiosks, influenced by their functionality and usability, can result in favorable perceptions and heightened acceptance of the technology.

The importance of perceived functionality is supported by Zaitouni and Murphy (2023) who analyzed restaurant kiosk models and highlighted the importance of functional values in enhancing customer satisfaction and continuance intention, particularly for fast food restaurants. Managers should focus on providing user-friendly kiosks with error-free systems that simplify menu exploration, ordering, and payment. Meeting these criteria ensures a positive customer experience. SST providers should also incorporate functional elements into kiosk designs.

H1: Perceived functionality has a significant effect on attitudes toward self-service automated kiosks.

Baba et al. (2023) emphasized the importance of performance expectancy, effort expectancy, facilitating conditions, social influence, and trust in shaping users' purchasing behavior via self-service kiosks. These characteristics are intricately linked to the self-service kiosk's responsiveness as an efficient and responsive system is more likely to fulfill consumer expectations and improve their overall experience. Research indicates that consumer impressions of self-service technologies are shaped by their assessments of the technology's utility, user-friendliness, and general responsiveness (Baba et al., 2023). A responsive interface can significantly influence user

perceptions by improving usability, efficiency, and happiness with the technology. Users tend to have a favorable disposition towards self-service kiosks that are efficient and adequately address their requirements.

H2: Perceived responsiveness has a significant effect on attitudes toward self-service automated kiosks.

Studies indicate that a well-designed interface significantly influences user perceptions, interactions, and overall experiences with self-service kiosks (Yum, 2021). Yum (2021) underscored the significance of interface ergonomics and virtual ergonomic attributes in improving user experiences with self-service kiosks. Emphasizing user experience and usability in interface design can enhance consumer perceptions of self-service kiosks, resulting in more happiness and acceptance of the technology. Zhang et al. (2013) validated an approach for developing prototypes grounded in user-centered design principles to improve usability and user satisfaction. Efficient interface design that minimizes cognitive burden, promotes performance, and elevates user pleasure can foster favorable attitudes and adoption of self-service kiosks.

H3: Perceived interface design has a significant effect on attitudes toward self-service automated kiosks.

Fan et al. (2018) emphasized the significance of perceived security and trust in shaping user attitudes toward mobile payment use. They indicated that higher levels of security and trust in the payment process led to more positive attitudes toward mobile payment services. Payment security is a critical factor that enhances user confidence and comfort in utilizing self-service automated kiosks for transactions. Moreover, Zulkafly et al. (2021) discussed user concerns regarding technical errors and data security when using SST. Users may be reluctant to use self-service kiosks if they fear technical mistakes or the security of their personal information, such as debit card passwords used for payments. Addressing these security apprehensions and ensuring a secure payment environment are essential for cultivating positive attitudes and trust among users.

H4: Perceived payment security has a significant effect on attitudes toward self-service automated kiosks.

Han et al. (2020) conducted a study examining the influence of menu information quality and nutritional information quality on user acceptability traits and behaviors at fast-food restaurant kiosks. The study examined the impact of menu information quality, including personalization elements, on customer behavioral intentions for self-service kiosks in fast food establishments.

Customized menu options enhance user experiences, contentment, and perceptions of self-service kiosks by providing pertinent and tailored selections that correspond with individual preferences. Zulkafly et al. (2021) examined customer satisfaction with self-service kiosks in quick-service restaurants, emphasizing the importance of image and menu design in capturing customer attention and improving user experiences. An effectively designed and tailored menu interface can enhance consumer perceptions of self-service kiosks, resulting in heightened engagement, contentment, and adoption of the technology.

H5: Perceived customization has a significant effect on attitudes toward self-service automated kiosks.

In the self-service sector, perceived convenience refers to how easily and efficiently customers can use SST with minimal time and effort. It reflects the system's user-friendliness and the simplicity of its functions and services. Convenience also encompasses situational factors that enable customers to complete transactions quickly and smoothly. By reducing service time, SST convenience becomes a key factor influencing customer adoption and usage (Kim et al., 2023).

Convenience is a key value proposition for customers using SST, often linked to the ability to access services anytime and anywhere. With advancements in technology, convenience has become a fundamental aspect of the service experience, significantly shaping consumer attitudes and purchasing decisions. However, it is important to note that the specific environment and unique features of SST in restaurants can influence how consumers perceive convenience (Lu et al., 2023).

H6: Perceived convenience has a significant effect on attitudes toward self-service automated kiosks.

Innovativeness denotes the perceived originality, ingenuity, and distinctiveness of technology, which can affect consumer perceptions and attitudes. Lu et al. (2019) investigated the influence of perceived innovativeness on consumer views about service line extensions, highlighting the significance of perceived quality and innovation in determining user perceptions. The research indicates that perceived innovativeness favorably affects customer sentiments regarding new service line extensions, underscoring the significance of innovation in fostering favorable user perceptions. Wang et al. (2018) examined the correlation between perceived observability and social presence in the context of innovation adoption, suggesting that perceived observability facilitates innovation adoption whereas observation by others may induce

technological fear. This indicates that the perceived innovativeness of a technology might influence consumer views and adoption habits.

H7: Perceived innovativeness has a significant effect on attitudes toward self-service automated kiosks.

Attitudes Toward Self-Service Automated Kiosks and Continuous Usage Intention

The attitudes of users towards self-service kiosks, including their views, emotions, and beliefs regarding the technology, might profoundly affect their intention to utilize a self-service kiosk in the future. Veeramootoo et al. (2018) corroborated an integrated model of e-filing continuing usage, highlighting the significance of user attitudes in ascertaining the efficacy of an e-government service. The study emphasized the influence of views on user intentions to persist in utilizing the service, suggesting that favorable attitudes towards the technology can result in sustained utilization. Foroughi et al. (2019) investigated the factors influencing the intention to continue using mobile banking, highlighting the effect of user attitudes on their usage intentions. The research indicates that a favorable disposition towards mobile banking services is associated with user intentions to persist in utilizing the service, underscoring the significance of user attitudes in promoting ongoing usage.

H8: Attitudes toward self-service automated kiosks have a significant effect on continuous usage intention.

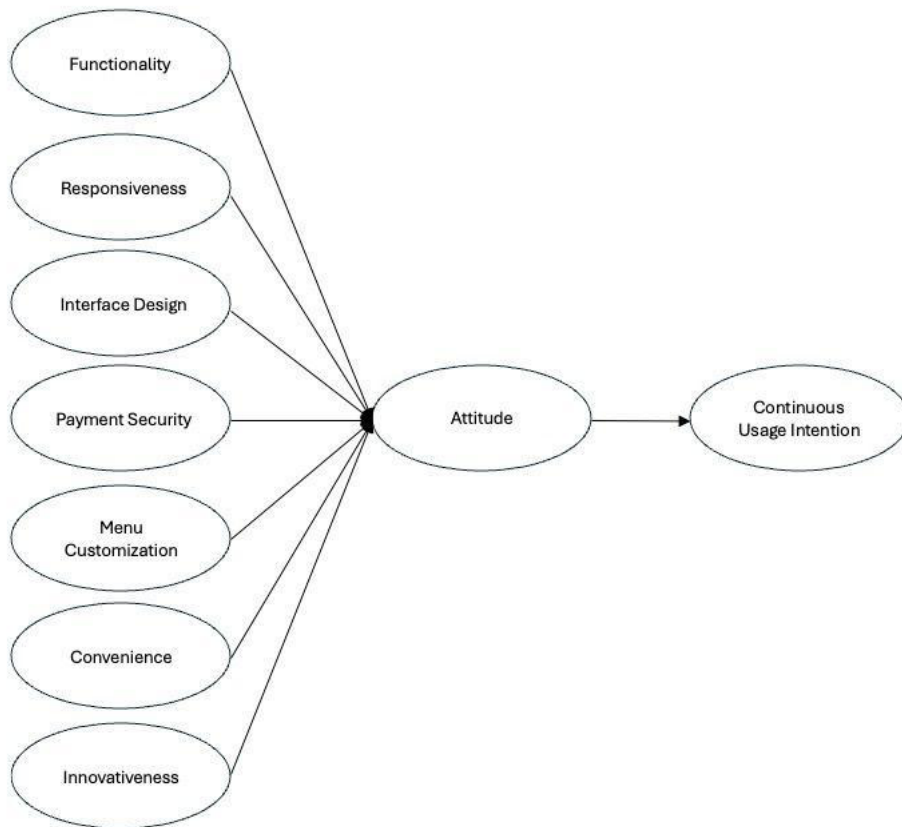


Figure 2 The Research Model

Source: The Authors

Research Method

Research Approach

The study investigates the indirect influence of the functionality, responsiveness, interface design, payment security, customization, convenience, and innovativeness of self-service kiosks on the intention for ongoing usage, mediated by attitudes towards self-service kiosks. The study employed a quantitative research methodology, focused on scientific investigation and dependent on observed or measured data to address inquiries on the sample population in order to achieve the specified objective.

Population and Sampling

The study's target demographic comprises Thai young adults with experience utilizing self-service kiosks in fast-food establishments in the Bangkok city center area. According to several studies on fast-food restaurants, young adults can be defined as individuals aged 18-36 (Çon & Bennett, 2024; Mondor Intelligence, 2025). A series of screening questions were employed to ascertain the predetermined sample. The study employed purposive sampling, a non-probability sampling method, due to the absence of a sample frame for this population. Based on computations using G*Power software (version 3.1), the minimum sample size necessary for the study is 103 respondents. This calculation is based on an effect size of 0.15, a significance level of 0.05, statistical power of 80%, and seven predictors.

Research Instruments

This research employed validated measurement instruments derived from prior investigations. The initial section of the survey addresses demographic attributes, encompassing gender, age, educational attainment, and monthly income. The primary segment of the survey records participants' feedback on the nine constructs pertinent to the study. Functionality (four items) was established by Hedin et al. (2020) and Ali et al. (2021). Responsiveness, comprising four items, was established by Yang et al. (2020); innovativeness, consisting of three items, was formulated by Ain et al. (2016). Interface design (three items) was created by Ali et al. (2021), customization and convenience (three items) were established by Ali et al. (2021), payment security (four items) was formulated by Fu Tsang et al. (2010), and continuous usage intention (four items) was devised by Pai et al. (2022). All items were assessed utilizing a seven-point Likert scale, where 1 signifies "strongly disagree" and 7 denotes "strongly agree." Table 1 shows the measurement items employed in the study.

Table 1 Measurement Scales

Constructs	Items	Measurement items	Source(s)
Functionality	FCT1	I can complete my order quickly using the Self-Service Automated Kiosk.	Hedin et al. (2020) and Ali et al. (2021)
	FCT2	The steps involved in the Self-Service Automated Kiosk process are clear to me.	
	FCT3	Using the Self-Service Automated Kiosk requires minimal effort on my part.	
	FCT4	I can smoothly navigate through the Self-Service Automated Kiosk to get my order done.	
Responsiveness	RES1	The Self-Service Automated Kiosk responds quickly to my touch inputs.	Yang et al. (2020)
	RES2	I receive immediate feedback from the kiosk when making selections or customizing my order.	
	RES3	The Self-Service Automated Kiosk processes my transactions quickly, from item selection to order confirmation.	
	RES4	I experience minimal delays when navigating through the Self-Service Automated Kiosk menus.	
Interface Design	IFT1	The Self-Service Automated Kiosk interface is intuitive, making it easy for me to purchase items.	Ali et al. (2021)
	IFT2	The menu interface on the Self-Service Automated Kiosk is presented in a clear and understandable way.	
	IFT3	I find the Self-Service Automated Kiosk interface easy to navigate.	
Payment Security	SEC1	I trust the Self-Service Automated Kiosk payment system will not be misused to collect my personal information.	Fu Tsang et al. (2010)
	SEC2	The Self-Service Automated Kiosk payment system has adequate security features.	
	SEC3	My transactions using the Self-Service Automated Kiosk payment system are protected.	
	SEC4	My transactions using the Self-Service Automated Kiosk payment system are safe.	

Table 1 Measurement Scales (continued)

Constructs	Items	Measurement items	Source(s)
Menu Customization	CUS1	The Self-Service Automated Kiosk understands my specific needs.	Ali et al. (2021)
	CUS2	The Self-Service Automated Kiosk has my best interests at heart.	
	CUS3	The Self-Service Automated Kiosk has features that are personalized for me.	
Convenience	CON1	I find the Self-Service Automated Kiosk is easy to use.	Ali et al. (2021)
	CON2	I find it easy to get the Self-Service Automated Kiosk to do what I want.	
	CON3	Learning to operate the Self-Service Automated Kiosk was easy for me.	
Innovativeness	INV1	The Self-Service Automated Kiosk seems unique.	Ain et al. (2016)
	INV2	The Self-Service Automated Kiosk seems innovative.	
	INV3	The Self-Service Automated Kiosk seems creative.	
Attitude	ATT1	All things considered, using self-service automated kiosk is a good idea.	Sahi and Gupta (2013)
	ATT2	All things considered, using self-service automated kiosk is pleasant.	
	ATT3	All things considered, using self-service automated kiosk is favorable.	
	ATT4	All things considered, using self-service automated kiosk is likeable.	
Continued Usage Intention	CUI1	I intend to continue using the Self-Service Automated Kiosk.	Pai et al. (2022)
	CUI2	I will regularly use the Self-Service Automated Kiosk in the future.	
	CUI3	I will continue using the Self-Service Automated Kiosk.	
	CUI4	I will recommend others to use the Self-Service Automated Kiosk.	

Note: RES4 was deleted due to low factor loadings

Source: The Authors

Data Collection Procedure

The data for this study were collected through a structured online survey administered via Google Forms over a one-month period in March 2024. Online surveys were selected as the primary method because they offer several methodological advantages, including cost efficiency, broad accessibility, and the ability to capture responses from diverse participants within a relatively short timeframe. As Singh and Sagar (2021) note, online survey or questionnaire-based studies enable researchers to gather information from respondents via internet-based communication technologies (e.g., email, online platforms). Compared with other forms of remote data collection such as telephone interviews, online surveys also eliminate interviewer bias, streamline the response process, and allow for automatic data entry, thereby enhancing both the speed and accuracy of data collection.

Following a review of potential study settings, Bangkok's city center was identified as the most appropriate research location. This area hosts a high concentration of fast-food restaurants equipped with self-service technologies (SSTs), such as ordering kiosks and digital payment systems. Conducting the study in this context provided ecological validity and ensured that the data collected were relevant to consumer interaction with SSTs in real consumption environments (Saunders et al., 2019).

Participants were recruited using a snowball sampling technique, initiated through online communities and personal networks and subsequently extended via participant referrals. As Ting et al., 2025 has pointed out, snowball sampling has been widely recognized in social science and business management research as an effective strategy for accessing targeted populations. The method involves inviting initial respondents to recommend additional individuals who meet the study's eligibility criteria, thereby enabling the sample to expand organically through social networks. By leveraging connections such as friends, colleagues, mentors, customers, and community members, snowball sampling facilitates access to respondents who may be difficult to reach through conventional recruitment approaches, while also improving response rates and reducing the time and resources required for data collection.

Such an approach enabled the study to focus on young adults, a demographic group known to be active adopters of fast food and SSTs, thereby aligning with prior studies emphasizing the significance of this consumer segment (e.g. Keawchuer et al., 2022). Participation in the study was voluntary, and all respondents provided informed consent before accessing the survey. Ethical guidelines for social research were followed throughout the process, ensuring transparency, confidentiality, and respect for participants' rights (Bryman, 2016). To enhance internal validity, eligibility criteria were established: only individuals with prior experience using self-service kiosks

in fast-food restaurants located in Bangkok's city center were invited to complete the survey. Screening questions were included at the beginning of the instrument to confirm participants' eligibility, thereby ensuring that responses were directly relevant to the study objectives (Malhotra & Dash, 2016).

Data Analysis and Results

The data underwent analysis in two phases. In the initial phase, the researchers utilized the statistical program IBM Statistical Package for Social Science (SPSS), version 26. At this stage, the researchers analyzed survey items and socio-demographic information. The preliminary statistical analyses aim to assess common technique bias, outliers, data normality, and the descriptive socio-demographic background of respondents. In the subsequent phase, the researchers utilized SmartPLS Structural Equation Modeling software. The software assists in assessing the research measurement and structural model. The initial assessment is essential for determining the reliability and validity of the measurement model whereas the subsequent assessment ascertains the significance, explanatory power, effect size, and predictive relevance of the proposed relationships within the structural model (Hair et al., 2021).

Findings

Respondent Profiles

A total of 128 replies were initially gathered for the study. After thorough data cleaning, a modified dataset of 125 replies was considered appropriate for further research. The demographic profile of the responses reveals a significant predominance of young adults. The majority of respondents, 97.6% (n = 122), fell within the 18-24 age group. In contrast, a small percentage, comprising only 2.4% (n = 3), was from the 25 to 34 years age group. The research indicates complex patterns in consumption frequency. 54.4% (n = 68) of respondents use self-service kiosks fewer than three times per month, whilst 37.6% (n = 47) employ them four to six times during the same period. A small percentage, at 3.2% (n = 4), has a higher frequency of usage, visiting the kiosks seven to nine times weekly while an additional 4.8% (n = 6) employs them ten times or more each month. Most respondents, accounting for 69.6% (n = 87), utilize the self-service kiosks in McDonald's restaurants, indicating a notable preference within the sample. Conversely, 23.2% (n = 29) of participants prefer KFC establishments, whilst only 3.2% (n = 4) utilize the self-service kiosk at Burger King locations. The remaining respondents utilize the self-service kiosks at different dining establishments. This explanation highlights the complex dynamics of consumer behavior with self-service kiosks, revealing demographic tendencies and usage preferences among various fast-food companies.

Common Method Bias

This study employed the partial least squares – structural equation modeling (PLS-SEM) methodology utilizing SmartPLS version 4.0.9.5 for data analysis (Ringle et al., 2024). Kock et al. (2021) posited that common method bias may occur when both independent and dependent variables are assessed using the identical response method. Kock (2015) proposed utilizing full collinearity values as metrics to mitigate common technique bias. The collinearity statistics (VIFs) are as follows: CON = 2.458, CUS = 1.571, FCT = 2.646, IFT = 3.120, INV = 1.470, RES = 2.277, and SEC = 1.574. Given that all Variance Inflation Factors (VIFs) are below 3.3, common method bias is not a concern in this study.

Measurement Model Assessment

SmartPLS provides standardized root mean square residual (SRMR), bootstrap-based tests for precise overall model fit (d_ULS and d_G), normed fit index (NFI), and Chi-squared as fit metrics. This study reports an SRMR of 0.068 (< 0.08), signifying an acceptable fit. Furthermore, both d_ULS and d_G fall beneath the 95% bootstrapped quantile (HI 95% of d_ULS and d_G) as advised by Henseler et al. (2016). The normed fit index (NFI) is 0.72, which is below the recommended level of 0.90 proposed by Bentler and Bonett (1980). Researchers contend that the Normed Fit Index (NFI) possesses considerable drawbacks and is not strongly endorsed; rather, the Non-Normed Fit Index (NNFI) is advocated. Nonetheless, it has yet to be incorporated into SmartPLS. The measurement model exhibits a satisfactory match with the data.

Table 2 indicates that factor loadings, Cronbach's alpha, and composite reliability (ρ_c) for all constructs exceed 0.70, demonstrating the reliability and internal consistency of the measuring equipment. Moreover, the average variance extracted (AVE) scores for all components was above 0.50, indicating that the convergent validity of the constructs has been demonstrated.

Table 2 Construct's Reliability and Validity

Constructs	Items	Loading	CA	CR	AVE
Functionality	FCT1	0.807	0.835	0.890	0.669
	FCT2	0.846			
	FCT3	0.828			
	FCT4	0.790			
Responsiveness	RES1	0.802	0.736	0.844	0.645
	RES2	0.851			
	RES3	0.753			
Interface Design	IFT1	0.831	0.814	0.888	0.725
	IFT2	0.898			
	IFT3	0.823			
Payment Security	SEC1	0.837	0.908	0.932	0.775
	SEC2	0.879			
	SEC3	0.896			
	SEC4	0.906			
Menu Customization	CUS1	0.898	0.864	0.906	0.762
	CUS2	0.862			
	CUS3	0.858			
Convenience	CON1	0.908	0.860	0.908	0.767
	CON2	0.836			
	CON3	0.882			
Innovativeness	INV1	0.832	0.826	0.891	0.731
	INV2	0.901			
	INV3	0.831			
Attitude	ATT1	0.819	0.873	0.912	0.720
	ATT2	0.838			
	ATT3	0.879			
	ATT4	0.858			
Continued Usage Intention	CUI1	0.887	0.915	0.939	0.794
	CUI2	0.897			
	CUI3	0.929			
	CUI4	0.850			

Note: RES4 was deleted due to low factor loadings

Source: The Authors

This study employed the heterotrait-monotrait ratio of correlations (HTMT) criterion to evaluate discriminant validity (Henseler et al., 2015). Franke and Sarstedt (2019) proposed that HTMT values should preferably be 0.85 or lower, however Henseler et al. (2015) recommended a threshold of 0.9 for constructs that are conceptually identical. Analysis of Table 3 revealed that most HTMT values satisfied this requirement, demonstrating a clear differentiation among measures. Despite some HTMT values ranging from 0.85 to 0.90, a detailed examination of alternative discriminant validity metrics, including factor loadings, cross-loadings, and the Fornell-Larcker criterion, indicated no substantial concerns. Thus, the study effectively demonstrates discriminant validity.

Table 3 Discriminant Validity (HTMT)

Constructs	ATT	CON	CUI	CUS	FCT	IFT	INV	RES	SEC
1. Attitude (ATT)	1.000								
2. Convenience (CON)	0.790	1.000							
3. Continuous Usage Intention (CUI)	0.862	0.684	1.000						
4. Menu Customization (CUS)	0.649	0.497	0.544	1.000					
5. Functionality (FCT)	0.737	0.800	0.635	0.351	1.000				
6. Interface Design (IFT)	0.777	0.864	0.566	0.505	0.884	1.000			
7. Innovativeness (INV)	0.687	0.548	0.619	0.473	0.578	0.610	1.000		
8. Responsiveness (RES)	0.820	0.685	0.552	0.641	0.777	0.883	0.546	1.000	
9. Payment Security (SEC)	0.555	0.564	0.445	0.487	0.559	0.566	0.439	0.625	1.000

Source: The Authors

Structural Model Assessment

In accordance with the recommendations of Hair et al. (2022), a five-step strategy was employed to evaluate the hypotheses formulated for the structural model. The structural model was initially assessed for potential multicollinearity concerns. All VIF values were below 5, ranging from 1.470 to 3.12, indicating the absence of significant collinearity. The importance and pertinence of the structural model relationship were evaluated. A bootstrapping approach utilizing 10,000 subsamples, a one-tailed test, and a significance level of 0.05 were conducted to derive path

coefficients, standard errors, t-values, p-values, coefficient of determination (R^2), and effect size (f^2).

Table 4 displays the results of the hypothesis testing. The findings demonstrated that Functionality (FCT) exerted no significant effect on Attitude (ATT) ($\beta = 0.131$, $p > 0.05$). Consequently, H1 was not corroborated. Responsiveness (RES) had a positive correlation with Attitude (ATT) ($\beta = 0.216$, $p < 0.05$), indicating support for H2. Conversely, both Interface Design (IFT) ($\beta = 0.020$, $p > 0.05$) and Payment Security (SEC) ($\beta = 0.004$, $p > 0.05$) exhibited no significant effect on Attitude (ATT), hence rendering H3 and H4 unsupported. Conversely, Menu Customization (CUS) ($\beta = 0.208$, $p < 0.05$), Convenience (CON) ($\beta = 0.275$, $p < 0.05$), and Innovativeness (INV) ($\beta = 0.210$, $p < 0.05$) demonstrated a substantial impact on Attitude (ATT). Consequently, H5, H6, and H7 were validated. Ultimately, Attitude (ATT) demonstrated a significant and favorable impact on continuing usage intention (CUI) ($\beta = 0.771$, $p < 0.05$). Consequently, H8 was validated.

Table 4 Hypothesis Testing

Hypo	Path	Std. beta	Std. error	t-value	p-value	BCI LL	BCI UL	f^2	Supported
H1	FCT → ATT	0.131	0.100	1.303	0.096	- 0.034	0.296	0.019	No
H2	RES → ATT	0.216	0.098	2.201	0.014	0.055	0.378	0.062	Yes
H3	IFT → ATT	0.020	0.105	0.193	0.423	- 0.148	0.197	0.000	No
H4	SEC → ATT	0.004	0.095	0.046	0.482	- 0.160	0.152	0.000	No
H5	CUS → ATT	0.208	0.085	2.456	0.007	0.075	0.352	0.082	Yes
H6	CON → ATT	0.275	0.089	3.098	0.001	0.125	0.415	0.092	Yes
H7	INV → ATT	0.210	0.071	2.975	0.001	0.100	0.332	0.090	Yes
H8	ATT → CUI	0.771	0.038	20.423	0.000	0.707	0.830	1.468	Yes

Notes: Functionality (FCT); Responsiveness (RES); Interface Design (IFT); Payment Security (SEC); Menu Customization (CUS); Convenience (CON); Innovativeness (INV); Attitude (ATT); Continuous Usage Intention (CUI). Bootstrapping involved generating 10,000 sub-samples, with a 95% confidence interval utilized for analysis.

Source: The Authors

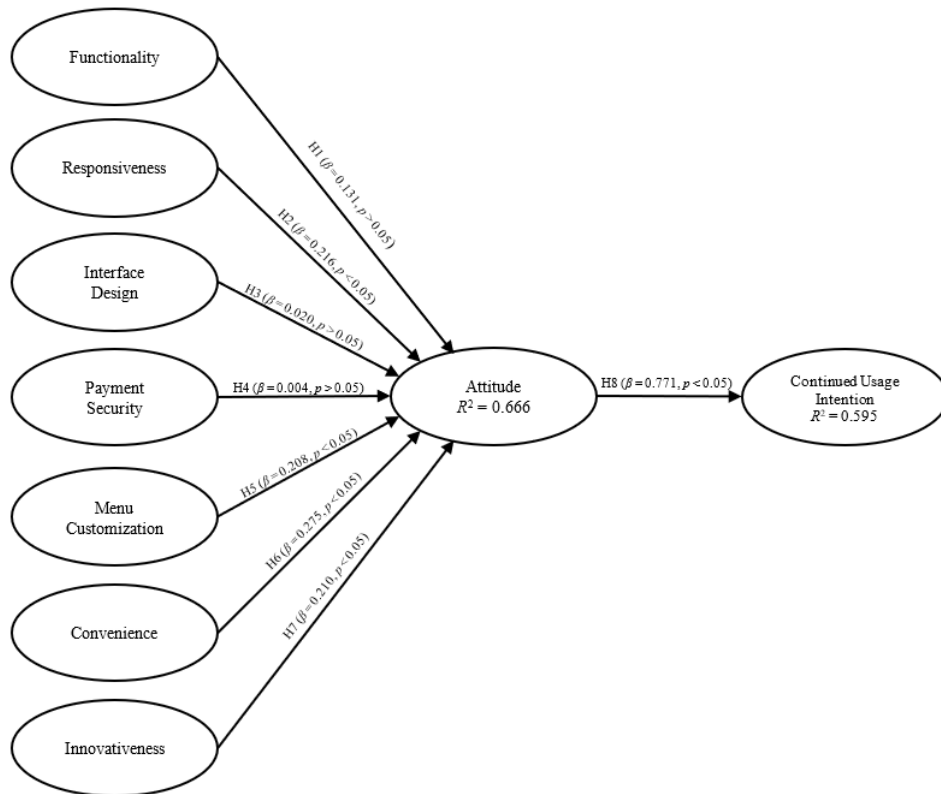


Figure 3 Results of the Structural Model Assessment

Source: The Authors

The third step in the structural model assessment was evaluating the model's explanatory power through the coefficient of determination (R^2) value. Figure 2 shows that the R^2 value for attitude (ATT) is 0.666, indicating that functionality (FCT), responsiveness (RES), interface design (IFT), payment security (SEC), menu customization (CUS), convenience (CON), and innovativeness (INV) account for 66.6% of the variance in ATT. The R^2 score for continuing usage intention (CUI) is 0.595, signifying that attitude (ATT) accounts for 59.5% of the variance in CUI.

PLSPredict

The PLSpredict analysis was performed as the fourth stage in evaluating the model's predictive capability. Concerns have been expressed over the exclusive dependence on the Q2 statistic derived from the blindfolding technique as the sole metric for evaluating a model's predictive capability (Shmueli et al., 2019). This objection underscores the insufficiency of the Q2 value in comprehensively reflecting a model's predictive efficacy. Hair et al. (2022) opposed the utilization

of PLS-SEM for evaluating model predictive power. A new method called PLSpredict was created to improve prediction accuracy by dividing samples into training and testing datasets (Shmueli et al., 2019). PLSpredict functions by employing the observed values of indicators for independent constructs from the holdout sample while applying model parameter estimates obtained from the training sample to produce predictions for indicators of dependent constructs (Shmueli et al., 2019). The predictive capability of the structural model in this study was assessed using PLSpredict with a 10-fold approach. Table 5 presents the findings of PLSpredict. Shmueli et al. (2019) stated that a positive Q^2_{predict} value indicates that the prediction error of the PLS-SEM results is less than that of merely employing the mean values. This analysis indicates that all Q^2_{predict} values are positive, implying that the PLS-SEM model demonstrates superior predictive capability.

Additionally, Shmueli et al. (2019) proposed that a model's predictive efficacy can be assessed by contrasting the root mean square error (RMSE) or mean absolute error (MAE) values derived from the Partial Least Squares-Structural Equation Modelling (PLS-SEM) analysis with the Linear Model (LM) values for each indicator of the principal target construct. A model is said to possess good predictive power if all RMSE (or MAE) values from PLS-SEM are inferior to those from LM. Nonetheless, the model may be regarded as possessing moderate predictive power if the majority (or an equivalent number of) PLS-SEM values are inferior to the LM values. A model may be considered to lack predictive potential if all PLS-SEM values exceed LM values (Hair et al., 2022). The PLSpredict results in Table 5 indicate that all RMSE values from the PLS-SEM analysis were lower than the LM values. Consequently, the model created in this research is considered to possess significant predictive capability.

Table 5 PLSpredict

Items	Q^2_{predict}	PLS		LM		PLS – LM	
		RMSE	MAE	RMSE	MAE	RMSE	MAE
ATT1	0.388	0.677	0.381	0.708	0.411	-0.031	-0.030
ATT2	0.470	0.534	0.330	0.541	0.322	-0.007	0.008
ATT3	0.431	0.621	0.363	0.690	0.397	-0.069	-0.034
ATT4	0.395	0.708	0.373	0.823	0.423	-0.115	-0.050
CUI1	0.313	0.790	0.449	0.891	0.517	-0.101	-0.068
CUI2	0.279	0.756	0.442	0.854	0.475	-0.098	-0.033
CUI3	0.362	0.760	0.440	0.821	0.455	-0.061	-0.015
CUI4	0.380	0.829	0.464	0.913	0.520	-0.084	-0.056

Note: RMSE = root means square error; MAE = mean absolute error

Source: The Authors

Discussion

The findings of this study highlight that perceived responsiveness, customization, convenience, and innovativeness significantly influenced attitudes toward the self-service kiosks. These support hypotheses H2, H5, H6 and H7. First, perceived responsiveness was found to have a significant positive effect on attitudes, aligning with Baba et al. (2023), who noted that responsive systems enhance usability and satisfaction. In this study, responsiveness likely reinforced the sense of efficiency and control, which are critical for fast-paced environments like quick-service restaurants. The ability of self-service kiosks to meet user expectations promptly appears to foster favorable attitudes among young adults. Second, perceived customization had a significant positive effect on attitudes, consistent with the findings of Han et al. (2020) and Zulkafly et al. (2021).

Customized menu options likely enhanced user satisfaction by offering choices that align with personal preferences, thus creating a more engaging and enjoyable experience. This finding underscores the value of personalization in technology adoption. Third, convenience was identified as a significant predictor of attitude, reaffirming the findings of Kim & Qu (2014) and Weijters et al. (2007). Young adults likely appreciated the time-saving and user-friendly nature of self-service kiosks, which aligned with their fast-paced lifestyles. The ability to quickly and efficiently complete transactions reinforced positive attitudes toward the technology. Fourth, perceived innovativeness significantly influenced attitudes, supporting studies by Lu et al. (2019) and Wang et al. (2018). Young adults may view self-service kiosks as novel and technologically advanced solutions, which can enhance their overall perception and interest. The appeal of using innovative technology appears to resonate with their preferences for modern and engaging experiences.

The study also provides empirical support for Hypothesis H8 that predicts the relationship between attitudes and continuous usage intention. The finding aligns with Veeramootoo et al. (2018) and Foroughi et al. (2019) which stated that positive attitudes fostered by the self-service kiosk's responsiveness and convenience can translate into higher intentions to continue using the self-service kiosks. This underscores the importance of fostering favorable attitudes to sustain technology adoption and usage over time.

Interestingly, the study found that perceived functionality, interface design, and payment security did not significantly influence user attitudes. The explanations for these unsupported hypotheses are rooted in the specific demographic studied (young, tech-savvy adults) and the context (well-known fast-food chains). Based on the work of Herzberg (2015), the lack of a significant relationship is more likely due to functionality being a baseline expectation or a "hygiene factor" for the study's target population. The study's participants were predominantly Thai young

adults aged 18-36, a demographic often described as digital natives. Having grown up with advanced technology, they expect SST systems to be functional by default. An appraisal of functionality would likely only influence their attitude if the kiosk was remarkably efficient or, more likely, if it failed significantly.

The non-significant impact of interface design can be attributed to the high digital fluency of the participants. Young users interact with countless digital interfaces daily across various apps and devices. This constant exposure makes them highly adaptable and less sensitive to minor variations in design if the core usability is intact. While a truly poor or confusing interface would certainly create a negative attitude, the standardized and professionally designed interfaces of major chains like McDonald's and KFC are likely "good enough" to not be a differentiating factor in their overall attitude.

The insignificance of payment security in shaping attitudes is likely due to an implicit trust in established brands and standardized payment systems. Individuals' trust in the self-service kiosk technology usually occurs due to their repetitive experiences with the usage of payment method options (Baba et al., 2023). When using a kiosk at a global chain like McDonald's and KFC, young consumers generally assume that standard security protocols are in place. Their cognitive appraisal of security is not strongly triggered because they don't perceive an immediate threat. Users' concerns about security are often more pronounced in unfamiliar or less-trusted digital environments. Moreover, in the context of a quick, low-value transaction at a reputable fast-food restaurant, factors like convenience and speed might take precedence over active consideration of data security.

The current study offers several theoretical implications to the existing literature on technology acceptance and post-adoption behaviors, particularly within the context of self-service kiosks in fast-food restaurants. By incorporating Cognitive Appraisal Theory, the study extends the understanding of the role of user attitudes in influencing continuous usage intentions. The findings reinforce the significance of constructs like responsiveness and convenience in shaping attitudes. The study also adds to the literature by suggesting that customization and innovativeness are critical in fostering positive user experiences, particularly among younger demographics. This understanding invites future research to refine existing theoretical models to better capture demographic-specific predictors of technology adoption. The study also highlights the limited impact of traditionally important factors like functionality, interface design, and payment security in the context of digital-native populations. The unexpected insignificance of payment security and interface design challenges traditional assumptions about their universal importance, urging scholars to explore how contextual and demographic factors (e.g., cultural norms, digital fluency) moderate these relationships.

From a practical standpoint, the findings underscore the need to prioritize self-service kiosk features that enhance user attitudes and foster continuous usage. Fast-food providers should ensure that self-service kiosks operate seamlessly with minimal lag and offer quick transaction processes. Investing in robust software and high-performing hardware can significantly improve user perceptions of responsiveness and convenience. Customization features such as personalized menus, tailored promotions, and interactive options can positively influence attitudes. Providers can leverage customer data to offer personalized experiences, increased satisfaction and greater loyalty. The perceived novelty of self-service kiosks is an attractive feature for young adults. Businesses should periodically update self-service kiosk functionalities and incorporate emerging technologies (e.g., voice commands, augmented reality) to maintain a sense of innovation and engagement. Incorporating real-time feedback mechanisms into self-service kiosks can help to identify areas for improvement and ensure the technology evolves in line with user expectations. Marketing campaigns should highlight the time-saving and innovative aspects of self-service kiosks. Communicating the ease of use, advanced features, and personalized experiences can enhance adoption rates among targeted demographics.

Conclusion

This study examined the factors affecting the ongoing intention to use smart self-service kiosks among young adults in Bangkok, Thailand. This study addressed notable deficiencies in the literature by employing cognitive appraisal theory, providing theoretical progress and practical recommendations for improving user attitudes and usage of self-service kiosks. The study has highlighted the crucial influence of responsiveness, personalization, convenience, and innovativeness on perceptions about self-service kiosks. These findings highlight the increasing focus on user-centered and innovative technical solutions that correspond with the rapid and individualized demands of young, digital-native consumers. The research emphasized the importance of attitudes in influencing ongoing usage intention, underscoring the necessity of cultivating favorable user experiences. Nonetheless, the triviality of elements such as functioning, payment security, and interface design in shaping views presents a compelling divergence from conventional viewpoints. This indicates that fundamental expectations for such services may diminish their impact unless they significantly diverge from user anticipations, thereby compelling service providers to exceed basic offerings to generate value.

Notwithstanding its merits, this study is not without limitations. First, the focus on young adults within a single cultural setting (Thailand) may constrain the external validity and limit the generalizability of the findings to other contexts. Furthermore, the study approached young adults

as a homogeneous cohort, overlooking the heterogeneity that exists between different generational groups. It is conceivable that Generation Y and Generation Z, despite both being digitally savvy, may exhibit distinct motivations, expectations, and adoption behaviors in relation to smart self-service technologies. Future research should therefore consider applying multi-group analysis to examine the model's applicability across generational cohorts, thereby offering a more refined understanding of consumer heterogeneity. Second, the use of a cross-sectional design restricts the ability to assess temporal changes in attitudes and behaviors. A longitudinal approach would allow researchers to capture shifts in user expectations, adoption trajectories, and satisfaction over time, providing a richer picture of consumer–technology dynamics. Finally, while the present research investigated existing self-service technologies in the fast-food sector, the pace of technological innovation suggests that future studies should broaden their scope to include emerging tools such as AI-driven personalization, voice-activated ordering systems, and biometric payment mechanisms. Incorporating such advancements into future models would not only enhance theoretical robustness but also yield practical insights into how fast-food operators can better align with evolving consumer preferences. Taken together, addressing these limitations by expanding cultural contexts, employing multi-group and longitudinal analyses, and incorporating emerging technologies will provide a more comprehensive understanding of SST adoption in the fast-food industry.

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