

Effects of perceived value and technology self-efficacy on restaurant operators' continued use of restaurant management systems

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ABSTRACT

Restaurants invest in technology and use innovations such as restaurant management systems (RMS) to manage and optimize their operations more effectively and efficiently. Using the value-based adoption model (VAM), this study investigated the effects of perceived benefit, perceived risk, perceived value, and technology self-efficacy on continuous RMS usage intention among small- to medium-sized enterprise restaurant operators. The researchers developed an online questionnaire and distributed the link among the SME restaurant operators in Kuala Lumpur. A total of 352 valid responses were collected and analyzed using the Partial Least Squares Structural Equation Modelling. Results show that perceived benefit and perceived risk significantly influenced the perceived value of RMS. Moreover, this study finds a complementary partial mediating role of perceived value in the association between perceived benefit, perceived risk, and continuous usage intention. This study also finds that low technology self-efficacy has a more substantial impact on the perceived value's effect on continuous usage intention. The findings highlight the VAM to bridge a gap between perceived value and continuous usage intention of RMS and emphasize the moderating role of technology self-efficacy. Findings offer benefits to restaurant operators by increasing their productivity through automation and digitalization. Implementing RMS and continuing to use the system could help restaurant business run efficiently in the long term. Future researchers could use qualitative interview methods to gather restaurant operators' detailed experience and perspectives about using RMS.

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1. INTRODUCTION

Technological advancement has advanced rapidly over the years. Technology is used across every industry, from manufacturing and services to society and education, including the small- and medium-sized enterprise (SME) restaurant industry, which is slowly adopting technological advancements (Abdul Halim et al., 2025; Ocloo et al., 2024). Compared to older methods of managing a restaurant business, technology is a valuable aid in increasing efficiency and streamlining operations. Technology adoption by the restaurant sector for managing business operations has shown a rising trend (Blöcher & Alt, 2021). It benefits restaurants by enhancing productivity and increasing organizational profitability, thereby improving competitiveness and adaptation to crisis conditions (Asrihapsari & Setiawan, 2020; Gao & Su, 2018; Kasavana, 2011; Ocloo et al., 2024). Many foodservice establishments have adopted the restaurant management system (RMS), software specifically designed to assist in managing the business and help carry out many critical managerial tasks (Kocaman, 2021; Panneerselvam et al., 2022). RMS assists in managing and optimizing operations, such as inventory management, payment processing, workforce management, and customer relationships (Panneerselvam et al., 2022; Sultana & Islam, 2020).

In Malaysia, SMEs are defined as firms with sales turnover not exceeding RM20 million or with fewer than 75 full-time employees per year (SME Corporation Malaysia, 2020). The Institute for Capital Market Research Malaysia (2025) reported that SMEs play a major role in the country's economic growth. SMEs accounted for 96.1% of all business establishments in Malaysia in 2024, and the services sector, including food and beverage, accounted for over 80% of total SMEs (more than 900,000 companies) (SME Corporation Malaysia, 2024). Food and beverage, which is part of the services industry, remains one of the primary drivers of SMEs' GDP, contributing approximately 43.1% in 2024 (Department of Statistics Malaysia, 2025). Such figures emphasize the importance of technology adoption in supporting the country's digitalization agenda while meeting customer demand through efficient operations. About 90% to 95% of SME business operators in Malaysia with more than 10 employees are transitioning to digital platforms (Khoo, 2025). The global economic crisis during COVID-19 became the driving force for many restaurants to shift to technology to meet customers' new needs and adapt RMS with features such as online ordering management (QR code menu), online payment (cashless transaction, touchless payment), and a delivery system (Che Ahmat et al., 2023). Since many SME business operators in Malaysia have transitioned to digital platforms, this study aims to investigate their continued intention to use RMS. While retaining existing RMS users is cost-effective, the intention to continue using RMS among SME restaurant operators demonstrates that RMS offers value and drives long-term loyalty. Additionally, perceived value and technology self-efficacy are investigated to better understand SME restaurant operators' positive and negative experiences with RMS and their ongoing usage behavior in continuing to adopt RMS.

This study examined restaurant efficiency from the perspective of restaurant operators who utilize RMS in their operations, using the value-based adoption model (VAM). Specifically, this study investigated: (a) the effect of perceived benefit (i.e., perceived enjoyment and perceived usefulness) on perceived value and continuous usage intention of RMS, (b) the effect of perceived risk (i.e., perceived fee and technicality) on perceived value and continuous usage intention of RMS, (c) the mediating effect of perceived value on the relationships between perceived benefit, perceived risk, and continuous usage intention of RMS, and (d) the moderating effect of technology self-efficacy on the relationships between perceived value and continuous usage intention of RMS. Our study makes a significant contribution to explaining the adoption

of RMS among SME restaurant operators, particularly after a crisis like COVID-19, which could serve as a spearhead for digitalization. To the best of our knowledge, this study is among the first to empirically examine the mediating role of perceived value and the moderating role of technology self-efficacy in influencing the association between perceived benefit, perceived risk, and continuous usage intention, simultaneously, from the lens of the VAM.

2. LITERATURE REVIEW

2.1 The Application of RMS in the SME Restaurant Industry

RMS is point-of-sale software designed for restaurants, cafés, and bars, built to integrate all back-end needs, including inventory and staff management. It is a tool that looks up the restaurant's activities daily. RMS enables serving more customers while reducing wait times, increasing customer loyalty through improved customer experience, decreasing labor costs, and enhancing manufacturing and delivery effectiveness. Despite the benefits, implementing RMS incurs cost (Kocaman, 2021; Udoh & Inuwa, 2016) that may cause a challenge for SME restaurant operators. The fundamental expenses for RMS include technology, system licensing fees, internal and external staff and service provider expenses, infrastructure, networking, and telecommunications (Cavusoglu, 2019). Consequently, the budget allocation should have been determined by weighing the RMS expense against the predicted revenue growth and other potential advantages (Kimes, 2008; Lavu, 2022). The use of RMS in SME restaurants improves business performance, enhances competitiveness, and enables rapid adaptation to change conditions, thereby supporting business sustainability. Ocloo et al. (2024) reported that SME restaurant managers' skills and attitudes positively mediated the digitization of SMEs. SMEs are known for their limited financial resources and often struggle to survive in the foodservice sector due to competition and are left behind when they still use manual systems, which are inefficient in today's environment (Khandwani et al., 2023). With RMS, they could enhance and optimize their restaurant business operations through an online ordering system and inventory management, as RMS helps users (SME restaurant operators) utilize the system (Panneerselvam et al., 2022).

2.2 Value-Based Adoption Model

The value-based adoption model (VAM) measures technology adoption by assessing benefits and costs from a value-maximization perspective (Kim et al., 2007). The theory defined the value function as a perceived over-benefit or risk. VAM is a cost-benefit paradigm that becomes the main factor in the decision-making process, in which decisions are made by comparing the costs of uncertainty when choosing a new technology or product (Lin et al., 2012). The researchers used VAM in the current study to explain the positive or negative experiences of a user (an SME restaurant operator). The theory includes functionality (perceived usefulness), intrinsic (perceived enjoyment), monetary (perceived cost), and effort (technicality) factors, which would better explain SME restaurant operators' overall decision-making regarding continued use of RMS. Many technology-related studies have used the VAM and reported meaningful results (Kim et al., 2007; Liao et al., 2022; Sohn & Kwon, 2020; Veronika et al., 2025; Wong et al., 2025; Yu & Sung, 2023). The VAM provides rich, in-depth insights that drive intentions to use digital technologies and their continuity and emphasizes the significance of perceived value during implementation (Yu & Sung, 2023).

2.3 Research Model and Hypotheses

Continuous Usage Intention of RMS

The success of a technology system largely depends on users' willingness to adopt and continue using it. Continuous usage intention of technology is a form of post-adoption behavior that comprises continued use and could be influenced by the value and benefits the technology offers (Bhattacharjee & Lin, 2015). In other words, continuous usage intention is a behavioral intention that reflects users' end-state desire to use technology. After the initial adoption of technology, individuals' decisions to continue using it are important for determining long-term user retention and digital platform success. For that reason, the continuous usage intention of RMS is a central focus of this study, as it is more cost-effective to retain existing users than to recruit new ones. Moreover, the intention to continue using RMS indicates that it offers value and fosters long-term loyalty. Prior studies on technologies such as mobile loyalty applications, e-commerce, and chatbot services have reported sustained positive behaviors, highlighting user satisfaction and perceptions of system quality and functionality as the underlying forces (Choi et al., 2025; Harasis et al., 2018; Lai Teik et al., 2019). Based on past literature, continuous usage intention has been popularly used by researchers when examining the outcomes of technology application continuance.

Veronika et al. (2025) reviewed 119 studies from various countries on continued intentions for mobile applications and identified several antecedents, including perceived usefulness, perceived ease of use, perceived risk, perceived value, and perceived enjoyment. Their paper acknowledged the perceived value has been widely used in research on mobile applications. Perceived value is a critical determinant of behavioral intention to use system technology (Kim et al., 2007; Kim et al., 2017), and the greater the value attributed to a specific service, the stronger the behavioral intention to use it in the future (Zeithaml, 1988). Wang et al. (2010) showed that perceived value significantly influences the acceptance of mobile internet, and their results also indicated that perceived value needs to be studied as a factor in technology adoption. Later, Lin et al. (2012) stated that perceived value directly influences the intention to continue using Internet Protocol Television (IPTV) in Taiwan. The success or failure of a technology system depends on whether users are willing to embrace and engage with it (Anda & Temmen, 2014). Continuous usage intention will investigate a user's desire to continue using a product or service they are currently using. Many researchers have previously focused on user satisfaction and its association with technology quality or functionality to investigate users' decisions to continue using a technology (Amoroso & Chen, 2017; Harasis et al., 2018; Vedadi & Warkentin, 2016). Accordingly, investigating the continuous usage intention for RMS among SME restaurant operators can offer valuable insights into how perceived benefit and perceived risk influence their perceived value. Hence, the current research aims to investigate the intention to continue using RMS among SME restaurant operators and to examine whether they are satisfied with the existing RMS, which may influence their continued use. The overall research model is displayed in Figure 1.

Perceived Benefit

Kim et al. (2007) stated that perceived benefit is the extent to which users believe the system is superior to other applications. Benefits of VAM are linked to attitudes toward internet-based purchasing and the desire to buy (Jarvenpaa & Todd, 1996). In fact, users are fond of and consider the increase in ordering advantages or pleasure that fulfills their needs and wants (Delafrooz et al., 2011). Researchers have identified several advantages of making purchases, including accessibility, product selection, ease of purchase, and shopping satisfaction. Perceived benefit exhibited a significant positive relationship with

perceived value, and enabling conditions were the most critical sub-variable. In the context of RMS, SME restaurant operators measure value by comparing the benefits they receive, such as enjoyment, convenience, and usefulness, with the costs or risks involved. As perceived benefits increase, SME restaurant operators are more likely to view RMS as valuable, thereby enhancing its overall perceived value. Therefore, this study proposes that:

Some researchers have shown that the perceived usefulness of an innovative mobile system is directly related to the desire to use it (Liébana Cabanillas et al., 2014; López-Nicolás et al., 2008). Users of mobile services make decisions about future usage depending on their preferences for usage or the usability of the resources (Liébana-Cabanillas et al., 2014; Thong et al., 2006). Perceived enjoyment is categorized as an intrinsic factor, defined as the cause of motivation to use new technology. Kim et al. (2007) stated that enjoyment positively influences technology acceptance because it provides immediate pleasure and joy to those who use new technology. It is also stated that consumers judge products not only by their performance, value for money, or usefulness, but also by the enjoyment or pleasure they derive from using the product (emotional value). Davis et al. (1989) also stated that enjoyment has a significant effect on technology beyond usefulness. Lew et al. (2020) sampled mobile wallet users in Malaysia and found that perceived usefulness and perceived enjoyment positively influenced their behavioral intention to use mobile wallets. In a similar vein, Harjati et al. (2025) reported that perceived usefulness positively affects the perceived value of e-commerce users. Regarding RMS, perceived enjoyment and perceived usefulness boost perceived value by increasing the benefits that the SME restaurant operators associate with it. When they enjoy using the RMS, they experience intrinsic pleasure and satisfaction, and its usefulness makes them feel extrinsically capable of accomplishing their tasks effectively and efficiently with the RMS. These benefits enhance SME restaurant operators' overall assessment of RMS, thereby increasing perceived value. Based on previous literature, this study hypothesizes that:

H1. Perceived benefit positively influences the perceived value of RMS.

H1a. Perceived enjoyment positively influences the perceived value of RMS.

H1b. Perceived usefulness positively influences the perceived value of RMS.

Wang and Wang (2010) and Kim et al. (2013) reported that the impact of perceived benefits (perceived enjoyment and perceived usefulness) on attitudes and behavioral intentions to use was significant, implying that the potential users will embrace a new service only if the expenditure of tangible and intangible expenses yields fair rewards within the influence of perceived benefit. Perceived benefit in the current context measures the extent to which the system improves performance, increases work productivity and effectiveness, and increases comfort with the technology system (RMS) to ease a particular task (Basuki et al., 2022). Past research indicates that perceived benefits have a significant impact on continuance intention for FinTech services (Nurlaily et al., 2021) and for food delivery applications (Aslam et al., 2021). In relation to RMS, the SME restaurant operators who experience the advantages of RMS in terms of convenience, efficiency, and improved performance are more likely to view RMS as a valuable technology that is worth continuing to use. This study thereby hypothesizes that:

H2. Perceived benefit positively influences the intention to continue using RMS.

Perceived Risk

Perceived risk is defined as the potential loss associated with a desired outcome (Featherman & Pavlou, 2003). Users often dwell on the risks they may encounter, such as system incompatibility, security risks, and quality of service. Hanafizadah et al. (2014) stated that the higher the risk of using new technology, the lower the willingness to use it. Similarly, Alrawad et al. (2023) reported that perceived risk negatively influenced intention to use mobile payment technology; in other words, higher perceived risk was associated with lower intention to use the technology. Perceived risk in VAM consists of two variables: perceived fee (monetary sacrifice) and technicality (non-monetary sacrifice). Perceived fee is an evaluation of the service's benefits relative to the cost of using the technology (Cheong & Park, 2005). It means that if the benefits of using the technology outweigh its cost, users will continue to use it. In other words, costs and fees play a significant role in determining technology adoption among potential users. Perceived fees may deter users eager to adopt and use the system. When the price exceeds the service's actual benefit, the user will decide not to continue using it. Thus, the cost or fee of a service plays a significant role in determining technology adoption among users.

Meanwhile, technicality refers to the degree to which the technology is perceived as technically excellent in the service delivery process, as determined by users' perceptions of ease of use and the least effort required (Davis, 1992). Technical issues are difficulties that affect the perceived value of the system or service. Technicality is determined by users' perceptions of ease of use, reduced effort, error-free operation, security, and the efficiency of the system's technology (Davis et al., 1989). Technicality is crucial to ensuring proper use and consistent implementation of the system or application, thereby increasing perceived value. In line with this study, SME restaurant operators who perceive that the RMS helps them prevent losses and operate more securely will place greater value on the system and have a likelihood to continue using it. Based on the overall review of the literature, this study proposes that:

H3. Perceived risk positively influences the perceived value of RMS.

H3a. Perceived fee positively influences the perceived value of RMS.

H3b. Technicality positively influences the perceived value of RMS.

H4. Perceived risk positively influences the intention to continue using RMS.

Perceived Value

Perceived value is defined as a user's overall perspective of an online content service based on the consideration of its benefits and sacrifices (Zeithaml, 1988). In consumer research, one of the most critical aspects is customer-perceived value. In this regard, perceived value is a strong predictor of attracting new users and maintaining existing ones. For the current study, the perceived value determinant is a critical factor in shaping users' (SME restaurant operators') choices for achieving goals through product appraisal and perceived preference. Perceived value is a variable that can affect the intention to perform a particular behavior. Ko (2020) indicated that investing in technology is worthwhile for restaurant businesses, stating that approximately 5% to 10% of annual restaurant profits is well spent on technology such as RMS. In addition, they found that restaurant owners perceive value in incorporating technology to help ease operations. However, limited research has examined in depth how restaurant operators perceive the value of the RMS. Several studies are more focused on the usability, functionality, and satisfaction with the RMS

(Rosnan et al., 2023). SME restaurant operators who believe the benefits they receive exceed the associated costs will view RMS as beneficial, thereby increasing their willingness to continue using it over time. Based on the literature, this study proposes that:

H5. Perceived value positively influences the intention to continue using RMS.

The current study proposed that perceived value would directly affect the behavioral intention to continue using RMS among SME restaurant operators. This study can improve the explanation of a person's intention for a given behavior by including the perceived value variable. Furthermore, perceived value has become a helpful determinant of consumer behavior (Fornell et al., 1996). A few studies suggest that customer-perceived value is a significant factor in shaping behavioral intention to purchase and adopt online services for electronic and mobile devices (Chen et al., 2008; Kim et al., 2007). Kim et al. (2007) indicated that perceived value mediates the relationships among four antecedents (usefulness, enjoyment, technicality, and perceived fee) and adoption intention, as perceived value reflects the overall comparison of costs and benefits. Wang et al. (2020) also indicated that perceived value mediates the relationship between perceived value and continuous intention toward mobile government applications. The current study may fill research gaps by examining perceived value determinants as mediating effects, which measure the benefits (e.g., functionality of the technology system) and risks (e.g., monetary and effort factors), thereby providing a deeper understanding of the continuous usage intention of RMS.

Based on past studies, perceived value is commonly used as a mediator for assessing continuous usage intention of technology (Veronika et al., 2025). In this study, perceived value will act as a mediator between perceived benefit and perceived risk in the intention to continue using the RMS, through which these perceptions shape SME restaurant operators' decisions to continue using the RMS. It is hypothesized that higher perceived benefits will increase overall value, thereby increasing SME restaurant operators' intention to continue using it. On the other hand, lower perceived risk increases perceived value by reducing concerns about potential losses, thereby promoting continued intention to use. Below is the list of proposed mediation hypotheses:

H6. Perceived value positively mediates the relationship between perceived benefit and continuous usage intention of RMS.

H7. Perceived value positively mediates the relationship between perceived risk and continuous RMS usage intention.

Technology Self-Efficacy

Self-efficacy is an individual's belief in their ability to succeed in a particular task (Bandura, 1997). Meanwhile, technology self-efficacy is a specific application of the general construct of self-efficacy, which is defined as an individual's belief in their ability to perform a technology-related task successfully (McDonald & Siegall, 1992). The technology self-efficacy structure was intended to describe the general ability to adopt technology and is usually thought to be based on previous performance, vicarious experience, verbal persuasion, and emotional arousal (Bandura, 1997). Self-efficacy judgments tend to be specific to an individual's behavior, and this can be measured by asking individuals how confident they are in their capabilities to perform a task (Maibach & Murphy, 1995). Bandura (1997) posits that people with higher self-efficacy engage more in technology-related activities, whereas individuals with lower self-

efficacy or confidence tend to give up more easily on such tasks. The current study examined technology self-efficacy to understand users' continuous use behavior and continued adoption of technology. Furthermore, integrating technology self-efficacy as a moderating effect strengthens the relationship between perceived value and continuous RMS usage. Hashim et al. (2023) indicated that technology self-efficacy is a significant predictor of continued use of the self-service ordering kiosk. Past research also indicates that technology self-efficacy significantly influences the perceived usefulness and ease of adopting mobile wallets in the restaurant industry (Lew et al., 2020).

A review of the literature that has used technology self-efficacy as a moderator posits that it is expected to strengthen the association between perceived value and the intention to continue using. SME restaurant operators who are confident in their ability to operate RMS can better capitalize on its benefits and perceive it as valuable. They will be more likely to translate that positive evaluation into a strong intention to continue using it. Conversely, SME restaurant operators with lower technology self-efficacy may be less able to utilize the RMS value, thus weakening the effect of perceived value on their continuance intention. Therefore, higher technology self-efficacy is associated with a stronger positive relationship between perceived value and the intention to use RMS continuously among SME restaurant operators. This research may provide valuable insights, as few studies have integrated technology self-efficacy as a moderator, especially in the foodservice sector. For that reason, this study suggests that:

H8. Technology self-efficacy will be a significant positive moderator, strengthening the positive effects of perceived value and continuous usage intention for RMS.

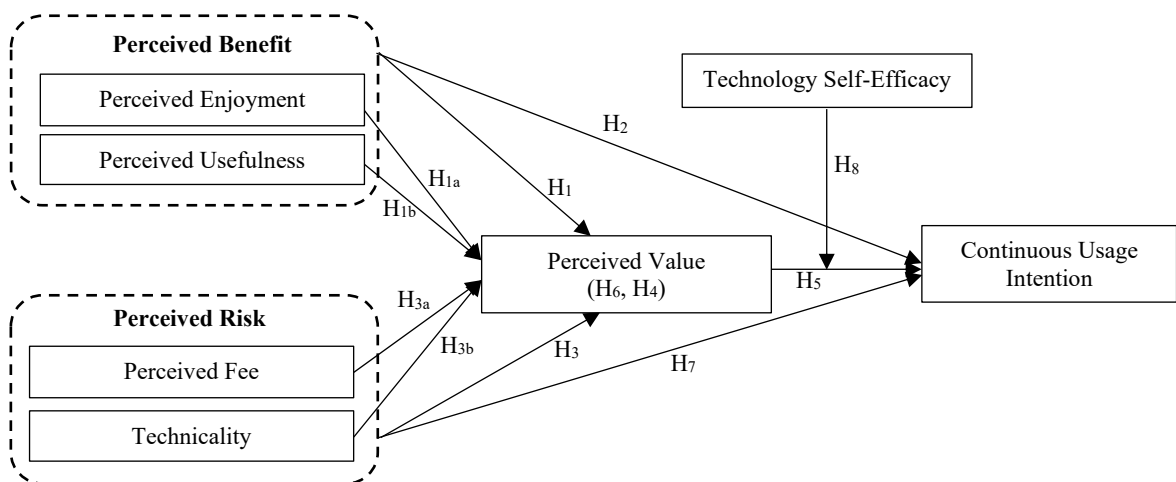


Fig. 1. Research Model

3. METHODOLOGY

3.1 Measurement Scales

An online questionnaire was developed from previously established studies. Using the back-translation procedure, the scales were first translated into Bahasa Malaysia, and five experts were invited to review and validate the translation to ensure accuracy. All items were measured using a five-point Likert-type

scale, where 1 = strongly disagree and 5 = strongly agree. Continuous usage intention was measured using five items adopted from Venkatesh et al. (2003). Perceived benefit was measured using 11 items (five for perceived enjoyment and six for perceived usefulness) from Agarwal and Karahana (2000) and Davis (1989). Perceived risk was measured using 10 items (five for perceived fee and five for technicality) from Kim et al. (2007) and Davis (1989). Perceived value was measured using five items from Kim et al. (2007), while technology self-efficacy was measured using five items from Sideshmukh et al. (2002) and Kiili et al. (2016). The questionnaire design followed procedural controls suggested by Kock et al. (2021) by providing clear instructions and ensuring anonymity. The instrument was pilot tested with 30 SME restaurant operators to assess reliability. The questionnaire has been approved by the Research Ethics Committee at the institution [REC/10/2023(PG/MR/384)].

3.2 Study Sample

This study sampled all SME restaurant operators in Kuala Lumpur, Malaysia, using a purposive sampling approach. Of the 168,000 registered SME restaurant establishments in Malaysia, 18,143 are in Kuala Lumpur. The SME restaurants' eligibility criteria include (a) sales not exceeding RM20 million per year, (b) operating independently or individually, (c) located in Kuala Lumpur, and (d) currently using RMS throughout their operation. Data was collected using the BeepIt application, a mobile app for restaurants that includes all RMS features. BeepIt was launched in response to the first movement control order in Malaysia in March 2020. From the application, the researchers personally contacted potential respondents via their restaurant BeepIt profile and distributed the survey link through the application or the contact information available in their profile. Data collection began on October 9th, 2023, and ended on November 9th, 2023, yielding 393 responses. This study used the Statistical Package for the Social Sciences (SPSS) version 28 to conduct descriptive statistics. After data-cleaning procedures, a total of 352 usable samples were used in the analysis.

4. DATA ANALYSIS AND RESULTS

4.1 Demographic Analysis

Of the 352 respondents, 59.4% were male, and 40.6% were female. The largest age group was 26 to 30 years old (43.8%), and most respondents held a bachelor's degree (44.6%). Many of the SME restaurant operators have two to three years of working experience with the current company (46.9%). Most SME restaurants have between 10 and 20 employees (52.3%), and most earn between RM50,001 and RM100,000 in monthly restaurant revenue (41.2%). Details are presented in Table 1.

Table 1. Respondents' demographic profile ($n=352$).

Profile	Characteristics	Frequency (n)	Percentage (%)
Sex	Male	209	59.4
	Female	143	40.6
Age	18 – 25	36	10.2
	26 – 30	154	43.8
	31 – 40	147	41.8
	41 – 50	15	4.3
Highest education	Certificate	67	19.0
	Diploma	126	35.8
	Bachelor's Degree	157	44.6

Industry working experience (year)	Master's Degree	2	0.6
	Less than 1 year	13	3.7
	1 year	22	6.3
	2 – 3	143	40.6
	4 – 5	104	29.5
Working experience with the current company	5 years and above	70	19.9
	Less than 1 year	47	13.4
	1 year	63	17.9
	2 – 3	165	46.9
	4 – 5	50	14.2
Total number of employees	5 years and above	27	7.7
	Less than 10	155	44.0
	10 – 20	184	52.3
	Above 20	13	3.7
Monthly restaurant revenue (RM)	Less than RM10,000	19	5.4
	RM10,000 – RM50,000	90	25.6
	RM50,001 – RM100,000	145	41.2
	Above RM100,000	98	27.8

4.2 The Measurement Model

SmartPLS version 4 was used for measurement model assessment to examine the validity and reliability of each construct, as it provides an in-depth insight into the convergent validity, discriminant validity, composite reliability, average variance extracted, and factor loadings, which are helpful to analyze the relationship between latent variables in a large dataset (Dash & Paul, 2021). The reliability and validity of the constructs are necessary for establishing the measurement model, which indicates the consistency and accuracy of each construct (Urbach & Ahlemann, 2010). Table 2 shows that all items achieved satisfactory factor loadings, with Cronbach's Alpha (CA) and Composite Reliability (CR) exceeding 0.70 (Hair et al., 2016). The CA values range from 0.742 to 0.878, and the CR values range from 0.830 to 0.924, indicating internal reliability. The Average Variance Extracted (AVE) values are greater than 0.50, indicating high convergent validity (0.581 to 0.710) (Hair et al., 2016). For the factor loadings reported in Table 2, all exceed the acceptable threshold of 0.50 recommended by Hair et al. (2016); hence, no items were removed in this study. To assess discriminant validity, the researchers used the Fornell-Larcker criterion and cross-loadings (Fornell & Larcker, 1981). The square roots of the AVE scores are above the latent variable correlations (see Table 3). Altogether, the constructs are valid and reliable. Using exploratory factor analysis, Harman's single-factor test is used to assess the potential threat of common method bias, as one of the statistical controls recommended by Kock et al. (2021). All measurement items were tested using unrotated principal axis factor analysis with extraction of a single fixed factor. The first factor's result is 35.562% (less than 50%), indicating no issues with common method bias.

Table 2. Reliability and convergent validity.

Variable	Item	Loading	CA	CR	AVE
Perceived enjoyment (PE)	PE1	0.795	0.859	0.898	0.638
	PE2	0.785			
	PE3	0.796			
	PE4	0.845			
	PE5	0.772			

Perceived usefulness (PU)	PU1	0.719	0.856	0.893	0.581
	PU2	0.753			
	PU3	0.789			
	PU4	0.793			
	PU5	0.768			
	PU6	0.749			
Perceived fee (PF)	PF1	0.563	0.742	0.830	0.528
	PF2	0.787			
	PF3	0.777			
	PF4	0.844			
	PF5	0.822			
Technicality (TE)	TE1	0.770	0.848	0.892	0.623
	TE2	0.747			
	TE3	0.814			
	TE4	0.835			
	TE5	0.777			
Perceived value (PV)	PV1	0.756	0.833	0.882	0.600
	PV2	0.796			
	PV3	0.760			
	PV4	0.788			
	PV5	0.771			
Technology self-efficacy (TSE)	TSE1	0.807	0.898	0.924	0.710
	TSE2	0.801			
	TSE3	0.862			
	TSE4	0.875			
	TSE5	0.866			
Continuous usage intention (CUI)	CUI1	0.785	0.878	0.911	0.672
	CUI2	0.812			
	CUI3	0.832			
	CUI4	0.836			
	CUI5	0.836			

Table 3. Discriminant validity

Construct	CUI	PE	PF	PU	PV	TE	TSE
CUI	0.820						
PE	0.463	0.799					
PF	0.372	0.443	0.727				
PU	0.567	0.552	0.368	0.762			
PV	0.649	0.540	0.418	0.623	0.774		
TE	0.574	0.537	0.423	0.602	0.668	0.789	
TSE	0.644	0.443	0.372	0.495	0.652	0.593	0.843

4.3 Structural Model

Validating Higher-Order Construct

The researchers validated the higher-order formative construct by assessing multicollinearity using the Variance Inflation Factor (VIF). PB and PR are higher-order formative-reflective constructs based on the two lower-order constructs, PB (PE and PU) and PR (PF and TE), which need to be validated first. There are no multicollinearity issues if the VIF is less than or equal to five (Hair et al., 2021). Based on the results

in Table 4, the collinearity did not pose any threat. The outer weights and loadings of the measured constructs were significant, thereby validating the higher-order constructs of perceived benefit and perceived risk.

Table 4. Construct validation of perceived benefit and perceived risk.

Construct	VIF	Outer weights	t-statistics	p-value	Outer loadings	p-value
PE	1.437	0.397	4.249	0.000**	0.797	0.000**
PU	1.437	0.725	9.233	0.000**	0.944	0.000**
PF	1.217	0.253	3.370	0.000**	0.619	0.000**
TE	1.217	0.867	17.016	0.000**	0.973	0.000**

Explanatory Power

In Table 5, R^2 indicates the proportion of variance in the endogenous variable explained by the exogenous variables. The R^2 measures how much the independent variables explain the variation in the dependent variable. The R^2 ranged from 0 to 1, with higher values indicating greater explanatory power. Based on the analysis, the R^2 for the dependent variable (CUI) is 0.486, indicating that 48.6% of the variation in CUI is explained by the independent variables (PB and PR), thereby achieving substantial explanatory power. The effect size (f^2) is used to assess the influence of each independent variable on the dependent variable. Results show that the value of f^2 ranges from 0.001 (negligible) to 0.131 (weak) (Cohen, 1988), indicating that removing the independent variables (PB and PR) would not significantly affect the dependent variable (CUI). The Q^2 value for the endogenous variable is 0.552, which is greater than 0; hence, predictive relevance was established.

Table 5. Result of explanatory power (R-square, F-square, Q-square).

Predictor	R-square (R^2)	F-square (f^2)	Q-square (Q^2)
CUI	0.486	0.131	0.552
PB		0.001	
PR		0.001	
PV	0.547	0.048	
TSE	0.592	0.105	

Hypotheses Testing

Partial least squares-based structural equation modeling (PLS-SEM) is used to test the complex relationships among the variables depicted in Figure 1 (Dash et al., 2021). Moreover, PLS-SEM is the most used data analysis technique for studying continuous usage intention in technology (Veronika et al., 2025). Structural model assessment was used to investigate direct relationships among variables, and hypothesis testing was used to determine whether the developed hypotheses were supported. Figure 2 presents the direct relationships between variables. Perceived benefit ($\beta = 0.374$, $p = 0.000$), as well as the antecedents of perceived benefit, which are perceived enjoyment and perceived usefulness, positively influenced perceived value (PE, $\beta = 0.137$, $p = 0.014$; PU, $\beta = 0.281$, $p = 0.000$); hence, H1, H1a, and H1b were supported. These results supported previous studies that also found a positive association between perceived benefit and perceived value for m-commerce (Kim et al., 2007; Kim et al., 2017) and for e-wallet (Jingnan et al., 2023; Lew et al., 2020). Our results aligned with Liao et al. (2022), who found that both perceived enjoyment and perceived usefulness positively influenced perceived benefit for the e-learning application.

Similarly, other studies also found a positive and significant association between perceived usefulness and perceived value (Harjati et al., 2025; Jingnan et al., 2023). Moreover, this study found that perceived benefit positively influenced continuous usage intention ($\beta = 0.128, p = 0.007$), supporting H2. This result aligns with Nurlaily et al. (2021), who found that perceived benefit significantly affected the intention to use FinTech services continuously.

Perceived risk was found to positively influence perceived value ($\beta = 0.432, p = 0.000$), supporting H3. Several studies also found a positive influence of perceived risk and perceived value (Lin et al., 2012; Kim et al., 2017; Xie et al., 2021). However, this study found that perceived fee had no significant effect on perceived value ($\beta = 0.091, p = 0.053$), thus H3a was not supported. Liao et al. (2022) also found that perceived fee has no significant effect on perceived value of using the e-learning application. We found that technicality positively influenced perceived value ($\beta = 0.386, p = 0.000$), supporting H3b but contradicting Jingnan et al. (2023), who found no significant association between technicality and perceived value in a cashless payment application. Next, this study found that perceived risk had no significant effect on continuous usage intention ($\beta = 0.014, p = 0.404$); hence, H4 was not supported. This result corroborates Nurlaily et al. (2021), who also found no significant effect of perceived risk on continuous usage intention for FinTech services. Perceived value was found to positively influence continuous usage intention ($\beta = 0.224, p = 0.000$), supporting H5. Past research has reported similar results regarding the relationship between perceived value and continuous usage intention for food delivery applications (Aslam et al., 2021) and m-government applications (Wang et al., 2020).

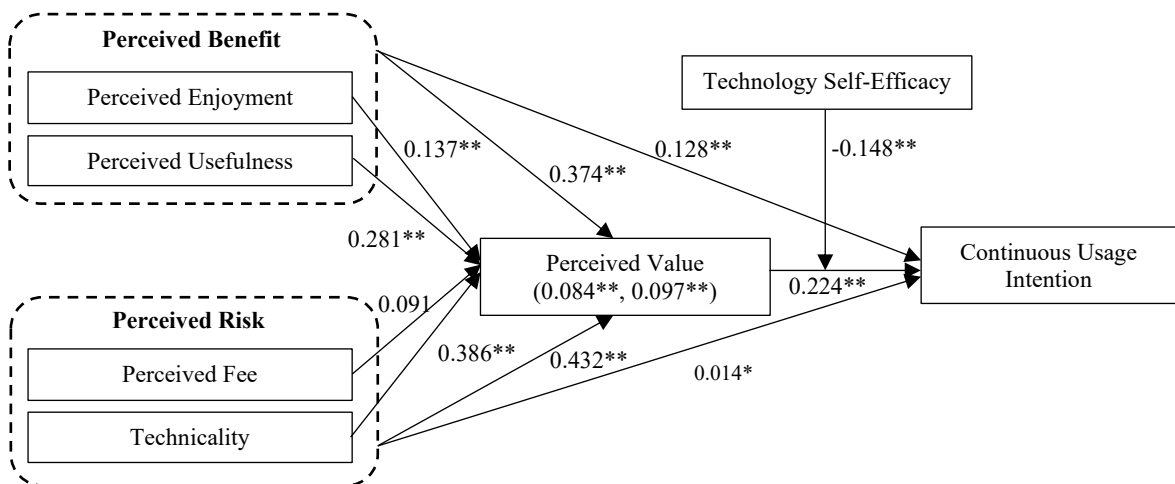


Fig. 2. The Structural Model

Mediation and Moderation Analysis

As earlier seen in Table 5, excluding the mediating effects (PB→CUI and PR→CUI), the R^2 value for continuous usage intention is 0.486, indicating that 48.6% of the variance in continuous usage intention is explained by the independent variables (perceived benefit and perceived risk). Nonetheless, with the inclusion of the mediating effect, the R^2 increased to 54.7%. This reflects a 4.5% increase in the variance

explained by the CUI, attributable to PV's mediating effect. The result for Q^2 was greater than 0 (0.552), indicating that the value is well reconstructed and that the model is predictive. Table 6a shows that perceived benefit has a significant indirect effect on continuous usage intention through perceived value (H6, $\beta = 0.084$, $t = 3.277$, $p = 0.001$). The total effect of perceived benefit on continuous usage intention was significant ($\beta = 0.224$, $t = 4.215$, $p = 0.000$). With the inclusion of the mediator, the effect of perceived benefit on continuous usage intention remained significant ($\beta = 0.128$, $t = 2.462$, $p = 0.007$). Such results show a complementary partial mediating role of perceived value in the association between perceived benefit and continuous usage intention; hence, H6 is supported. Additionally, there is a significant indirect effect of perceived risk on continuous usage intention through perceived value (H7, $\beta = 0.097$, $t = 3.463$, $p = 0.000$). The total effect of perceived risk on continuous usage intention was significant ($\beta = 0.110$, $t = 1.847$, $p = 0.032$). With the inclusion of the mediator, the effects of perceived risk and continuous usage intention remained significant ($\beta = 0.014$, $t = 0.242$, $p = 0.404$). This shows a complementary partial mediating role of perceived value in the association between perceived risk and continuous usage intention; hence, H7 is supported. The novelty of this study lies in exploring the mediating role of perceived value in the relationships between perceived benefit and perceived risk, in the context of continuous usage intention in RMS. Results from this study supported findings from previous studies on information technology and systems (Kim et al., 2007; Wang et al., 2023).

Table 6a. Mediation analysis result.

Direct Effect				Specific Indirect Effects				
β	<i>t</i> -statistic	<i>p</i> -value	Hypothesis	β	<i>t</i> -statistic	<i>p</i> -value	95% C.I.	
							Lower	Upper
0.128	2.464	0.007**	PB→PV→CUI	0.084	3.277	0.001**	0.044	0.127
0.014	0.242	0.404	PR→PV→CUI	0.097	3.463	0.000**	0.052	0.144

The moderating role of technology self-efficacy was assessed in its influence on the association between perceived value and continuous usage intention. Without the inclusion of the moderating effect (PV→CUI), the R^2 value for continuous usage intention was 0.547, indicating that perceived value accounts for 54.7% of the change in continuous usage intention. With the inclusion of the moderation interaction term, R^2 increased to 59.2% — an increase of 4.5% in the variance explained by the continuous usage intention, due to the mediation. The f^2 effect size is 0.131, indicating a negative, medium-sized moderation effect (Cohen, 1988), suggesting that technology self-efficacy weakens the relationship between perceived value and continuous usage intention ($\beta = -0.148$, $t = 5.697$, $p = 0.000$), supporting H8. As the value of technology self-efficacy increases, the positive relationship between perceived value and continuous usage intention weakens, or the negative relationship strengthens. The moderation analysis results are tabulated in Table 6b and Figure 3.

Table 6b. Moderation analysis result.

Relationship	β	<i>t</i> -statistic	<i>p</i> -value	f^2
PV→CUI	0.224	3.961	0.000**	0.048
TSE →CUI	0.288	5.222	0.000**	0.105
TSE x PV → CUI	-0.148	5.697	0.000**	0.131

The slope analysis in Figure 3 shows that the line for low technology self-efficacy is much steeper, indicating that a low level of technology self-efficacy has a stronger impact on the perceived value's effect

on continuous usage intention than a high level of technology self-efficacy. At higher levels of technology self-efficacy, the line tends to straighten, indicating that higher levels of technology self-efficacy weaken the impact of perceived value on continuous usage intention. The slope analysis supported the claim that TSE has a negative, significant moderating effect on the relationship between perceived value and continuous usage intention.

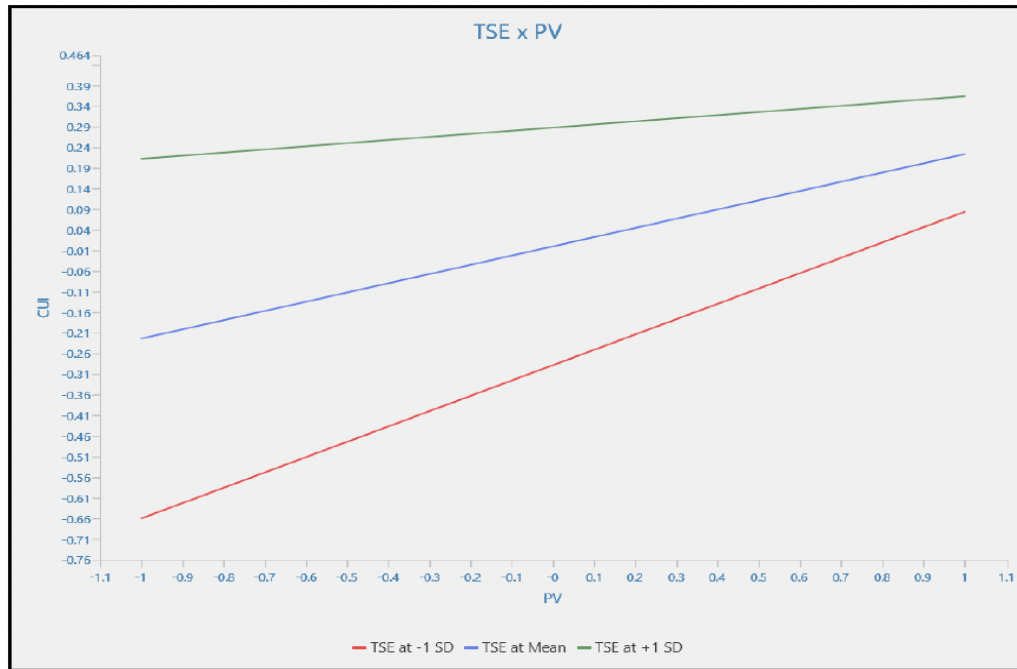


Fig. 3. Slope Analysis

Table 7. Summary of the hypothesis testing.

Hypothesis	Paths	Beta	t-statistic	p-value	Decision
H1	PB → PV	0.374	6.427	0.000**	Supported
H1a	PE → PV	0.137	2.471	0.014**	Supported
H1b	PU → PV	0.281	4.831	0.000**	Supported
H2	PB → CUI	0.128	2.464	0.007**	Supported
H3	PR → PV	0.432	7.511	0.000**	Supported
H3a	PF → PV	0.091	1.932	0.053	Not supported
H3b	TE → PV	0.386	7.118	0.000**	Supported
H4	PR → CUI	0.014	0.242	0.404	Not supported
H5	PV → CUI	0.224	3.961	0.000**	Supported
H6	PB → PV → CUI	0.084	3.277	0.001**	Supported
H7	PR → PV → CUI	0.097	3.463	0.000**	Supported
H8	TSE X PV → CUI	-0.148	5.697	0.000**	Supported

Notes: ** $p < 0.01$ * $p < 0.05$.

5. DISCUSSION AND CONCLUSIONS

5.1 Summary of Findings

This study uses the VAM to investigate the effects of perceived benefit, perceived risk, perceived value, and technology self-efficacy on SME restaurant operators' intention to continue using RMS. Furthermore, this study examines the mediating role of perceived value and the moderating role of technology self-efficacy in influencing the association between perceived benefit, perceived risk, and continuous usage intention. Findings indicated that 10 of the 12 proposed hypotheses were supported by significant results (see Table 7). First, perceived benefit and its antecedents (i.e., perceived enjoyment and perceived usefulness) positively influence perceived value and continuous usage intention. The enjoyment and usefulness of RMS are essential aspects that SME restaurant operators seek when adopting the system and continue using it for online ordering, inventory management, online payments, and food delivery, which can help them manage their restaurants. Ideally, the RMS is beneficial and time-saving, enabling users to accomplish tasks more quickly. Features such as inventory and online ordering management have helped users to work more productively (Asrihapsari & Setiawan, 2020; Panneerselvam et al., 2022).

Second, perceived risk and one of its antecedents (i.e., technicality) positively influenced perceived value, except for perceived fee. However, perceived risk did not significantly influence continuous usage intention. This is probably because SME restaurant operators have a strong reluctance due to perceived fees and the involvement of monetary terms, which influence their decision to continue using RMS. The perceived fee could be a hindrance to SME restaurant operators, especially those with limited financial resources. SME restaurant operators are known for their limited capital resources (Verreynne et al., 2019). Nonetheless, SME restaurant operators need to consider the return on investment when investing in technology such as an RMS, which provides an automated data system, online ordering, and inventory management that simplify and ease employees' tasks. Also, in this digital era, technology transformation has become unavoidable and vital to be competitive with other businesses.

This study found that perceived value positively influenced the intention to continue using. Moreover, this study successfully assessed the mediating role of perceived value in the relationships between perceived benefit and perceived risk, and between perceived benefit and continuous usage intention. Perceived value was found to partially mediate these associations. In other words, increases in perceived benefit and perceived risk have a direct positive effect on the intention to continue using RMS. It also increases perceived value, which, in turn, increases the intention to continue using RMS. Finally, this study evaluated the moderating role of technology self-efficacy and found that it weakens the relationship between perceived value and continuous usage intention. As the value of technology self-efficacy increases, the positive relationship between perceived value and continuous usage intention weakens, or the negative relationship strengthens. When technology self-efficacy is high, SME restaurant operators continue to use RMS because they are confident in their ability to use it; thus, perceived value becomes less important in influencing their decision. Meanwhile, when technology self-efficacy is low, SME restaurant operators rely more on perceived value to determine whether to continue using the RMS. Unlike earlier studies that treated technology self-efficacy as an antecedent variable (Hashim et al., 2023; Lew et al., 2020), to the best of our knowledge, this is the first study to find that technology self-efficacy negatively moderates the association between perceived value and continuous usage intention.

5.2 Theoretical Implications

This study contributes to the VAM literature by proposing that perceived benefit, perceived risk, perceived value, and technology self-efficacy influence SME restaurant operators' intention to continue using RMS. The analysis reveals the potential of digital innovations in SME restaurants. Findings extend understanding of the push factor for technology user continuance intention, including perceived enjoyment, perceived usefulness, technicality, and perceived value. This study empirically demonstrates the importance of VAM in bridging the gap between perceived value and continuous usage intention. Furthermore, this study expands the VAM by testing the moderating role of technology self-efficacy and finds that high technology self-efficacy weakens the association between perceived value and the intention to continue using it. SME restaurant operators who are highly confident in their ability to use RMS are less dependent on perceived value when deciding whether to continue using RMS. In another way, for SME restaurant operators with high technology self-efficacy, their confidence and ability to navigate RMS may already lead them to continue using RMS, even if they do not strongly perceive its value, which helps explain why the effect of perceived value on continuous usage intention weakens. Such novel findings expand the application of VAM, with technology self-efficacy acting as a moderator that influences the importance of perceived value in determining continuous usage intention. The SME restaurant operators' confidence in operating the RMS itself reduces barriers to technology use, making perceived value a less dominant factor in determining continuance intention. To the best of our knowledge, this study is one of the first empirical studies to explore restaurant operators' technology adoption behavior in the SME context. Specifically, the research model advances the VAM literature and contributes to understanding the intention to continuously use RMS among SME restaurant operators.

5.3 Practical Implications

This study has significant implications for the restaurant industry, particularly for SME restaurant operators. First, our results suggest that the association between perceived risk and continuous usage intention is mediated by perceived value. SME restaurant operators evaluated the value of RMS by comparing the benefits they received to the sacrifices they made, such as effort, time, and cost. Given that cost and financial considerations are always the primary concern among SME restaurant operators, the government could support them by offering grants, in cash or in kind, or other forms of assistance to help them digitize their businesses. For instance, Small Medium Enterprise Development Bank Malaysia Berhad allocated RM211 million to support SME growth through various initiatives, including promoting digitalization among SMEs (Bernama, 2025). Various financial and non-financial incentives are offered to foster the adoption of technology innovation among SMEs in Malaysia, such as through strategic partnerships with established organizations (e.g., banks, government agencies) (Institute for Capital Market Research Malaysia, 2025). Second, our study tested the mediating role of perceived value and found that increases in perceived benefit and perceived risk increase perceived value, which, in turn, increases SME restaurant operators' continuous usage intention. With that, SME restaurant operators should continuously embrace and engage with the RMS when they see the value it offers in managing their inventory and online ordering. The application of RMS may assist SME restaurant operators in improving customer service and tailoring their offerings to customer expectations, ultimately increasing customer loyalty. Therefore, despite the cost, SME restaurant operators need to consider the long-term investment in the RMS application.

5.4 Limitations and Future Research

Although the study results contribute to the body of knowledge on the restaurant industry, particularly the SME restaurant sector, the researchers acknowledge some limitations and recommend future research initiatives. First, this study uses a self-reported questionnaire to investigate continuous usage behavior, which may introduce social desirability bias. Nonetheless, the researchers reduced social desirability bias by following procedural controls recommended by Kock et al. (2021), ensuring respondents' anonymity and the confidentiality of their responses, and conducting a pilot test with a small sample. Future research may investigate continuous usage behavior using different approaches, such as interviewing SME restaurant operators. Using a qualitative approach could help develop an in-depth understanding of SME restaurant operators' continuous intention to use the RMS application.

Second, our study has limitations in generalizability, as the population was restricted to SME restaurant operators in Malaysia. Using purposive sampling, the sample was limited to those located in Kuala Lumpur, and the questionnaire link was distributed via the BeepIt application. For that reason, the findings could not be generalized to other states or countries. Also, the findings cannot be generalized to non-SME restaurants. With that, future researchers can conduct cross-cultural studies using respondents from different countries to explore the influence of perceived benefits, perceived risk, perceived value, and continuous usage intention of RMS, and how technology self-efficacy moderates these associations. Another possible area for future research is to investigate additional determinants that could serve as moderators and strengthen the relationship between the variables, such as effort expectancy, which refers to the perceived ease of using technology (Venkatesh et al., 2003).

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7. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

8. AUTHORS' CONTRIBUTIONS

Asiyatul Nabilah Rosnan: Conceptualization, methodology, formal analysis, investigation and writing-original draft; **Nur Hidayah Che Ahmat:** Conceptualization, methodology, supervision, writing, reviewing, and editing; **Norfezah Md Nor:** Conceptualization, supervision, and validation.

9. DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation of this work, the authors used Grammarly Premium to proofread the entire manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

10. DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

The datasets used and/or analyzed for the current study are available from the corresponding author upon reasonable request.

11. ETHICS STATEMENT

The study was reviewed and approved by the Institutional Ethics Committee of Universiti Teknologi MARA (Approval No: REC/10/2023/MR/384). All procedures involving human participants subjects were conducted in accordance with the ethical standards of the 1964 Helsinki Declaration. Informed consent was obtained from all participants, and data anonymity was strictly maintained throughout the study.

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