Proceeding of International Bussiness and Economic Conference (IBEC) Vol. 4 No. 1, pp. 326-348, September, 2025

http://conference.eka-prasetya.ac.id/index.php/ibec

Determinants of Technology Acceptance among Older Adults in Malaysia

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ABSTRACT

This study examines elderly Malaysians' intention to use QR ordering through the Unified Theory of Acceptance and Use of Technology (UTAUT), focusing on ease of use, performance expectancy, and social influence. A survey of older adults was analysed using partial least squares structural equation modelling, with diagnostics confirming acceptable univariate normality and no major concerns regarding common method variance. The measurement model demonstrated strong reliability and validity, and the structural results showed that performance expectancy and ease of use significantly predict behavioural intention, while social influence was not a significant driver. The importance–performance map further identified performance expectancy as the most influential contributor to intention. Theoretically, this study extends UTAUT by demonstrating that, in the context of QR ordering, elderly users rely primarily on perceived usefulness and simplicity rather than social cues, suggesting an age-specific adoption pathway that differs from general adult populations. This contributes to UTAUT literature by clarifying how core constructs operate among older, digitally vulnerable users in everyday service settings. Practically, the findings indicate that providers should emphasise clear benefits, streamline the ordering journey, and offer simple guidance at point of use. Limitations include a single service context, cross-sectional design, and reliance on self-reported intention, indicating opportunities for future research on causal mechanisms and moderating factors such as education, recognition of benefits, and dining context.

Keywords : Behavior Intention; Ease of Use; Performance Expectancy; Social Influence

INTRODUCTION

The rapid advancement of digital technologies has transformed how individuals live, work, and connect, raising concerns about equitable access across age groups (Czaja & Lee, 2007; Ruzimatjon, 2024; Venkatesh, Thong, & Xu, 2012). In Malaysia, QR code ordering systems exemplify the shift toward seamless, contactless service models (Mazhar, Salleh, Usman, Dzia-Uddin, & Kamaruddin, 2024; Putit & Sahudin, 2023).

This shift has accelerated since the COVID-19 pandemic, making QR ordering increasingly common in restaurants and food courts, yet many elderly Malaysians struggle to adapt, turning what is meant to enhance convenience into a new barrier to participation (Sarbani et al., 2025). However, elderly populations often face distinct challenges in adopting such systems due to limited digital literacy and unfamiliarity with mobile interfaces (Peek et al., 2014). These barriers can lead to frustration, social exclusion, and diminished dining experiences if unaddressed (Czaja & Lee, 2007; Morrison, Nicholson, Wood, & Briggs, 2023; Peek et al., 2014). Conversely, successful adoption may enhance autonomy and streamline service access for seniors (Venkatesh et al., 2012). Investigating the behavioral intentions of Malaysia's elderly can reveal critical drivers such as perceived usefulness, ease of use, and social influence (Venkatesh et al., 2012). Contextual factors like prior technology experience, education level, and cultural attitudes also warrant exploration (Czaja & Lee, 2007). Research questions should examine how these factors interact with QR code systems to influence willingness to engage (Shin, Jung, & Chang, 2012).

Elderly individuals frequently struggle with modern digital tools such as smartphones, QR code systems and online services, resulting in a widening digital divide that excludes them from essential aspects of society (Kebede, Ozolins, Holst, & Galvin, 2022; Vaportzis, Giatsi Clausen, & Gow, 2017). This exclusion can worsen social isolation and diminish quality of life as older adults face barriers to using healthcare apps, digital payment platforms and everyday tasks like grocery shopping or appointment scheduling, leading to frustration, anxiety and increased dependence on caregivers (Arioz et al., 2024; Roupa et al., 2010). Age related declines in vision, fine motor skills and cognitive function further hamper interaction with poor interface design, fostering fear of errors and technological avoidance (Schroeder, Dodds, Georgiou, Gewald, & Siette, 2023; Vaportzis et al., 2017). Adoption of digital innovations depends on factors such as perceived usefulness, ease of use and social influence (Che Nawi, Mamun, Hayat, & Seduram, 2022; Venkatesh, Morris, Davis, & Davis, 2003). Without clear benefits such as convenience, speed and simplicity and support mechanisms like user friendly design, guided tutorials and accessible customer assistance, older adults remain reluctant to engage with these technologies (Khamaj & Ali, 2024; Ma, Chan, & Teh, 2021).

LITERATURE REVIEW

In the journey toward digital inclusion, behavioural intention in the unified theory of acceptance and use of technology (UTAUT) explains how perceived usefulness, ease of use, social encouragement and available support determine older adults' decisions to adopt new digital tools (Schroeder et al., 2023; Venkatesh et al., 2003). For instance, when they learn that a smartwatch can monitor heart rate and issue emergency alerts, they are more inclined to embrace it provided they perceive it as easy to use and receive encouragement from family and health care professionals (Gündüz, Zaim, & Erzurumlu, 2024). To reinforce ease of use, providers deliver tailored tutorials and design intuitive interfaces that alleviate anxiety and build confidence among older adults (Khamaj & Ali, 2024; Mitzner et al., 2010). Furthermore, accessible customer

support and clear guidance strengthen seniors' confidence, bridging the gap between mere awareness and active use of health apps (Cimperman, Brenčič, & Trkman, 2016; Daniels & Bonnechère, 2024; Peek et al., 2014).
Beyond health applications, behavioural intention also predicts adoption of everyday technologies such as QR code ordering, mobile banking and appointment scheduling apps (Rivas & Schulzetenberg, 2023; Tsai, Shillair, Cotten, Winstead, & Yost, 2015). When elderly people discover that scanning a QR code can reduce wait times at a cafe, their intention to try the system increases, especially when staff provide assistance and family members offer support (Mazhar et al., 2024). Similarly, perceiving that mobile banking and e-commerce platforms simplify transactions and deliver clear benefits encourages seniors to set aside security and complexity concerns and form a positive behavioural intention to use these services (Tsai et al., 2015; Wong, Teh, Lim, & Lee, 2025). Without user friendly design, clear instructions and adequate support, seniors may avoid technologies, reinforcing the digital divide (Peek et al., 2014; Venkatesh et al., 2012; Y. Zhao, Zhang, Dasgupta, & Xia, 2023). Understanding these dynamics in Malaysia is vital for developing inclusive policies, age friendly design standards and targeted training programs that bridge awareness and sustained usage among older adults (Chee, 2024; Md Fadzil et al., 2023).

In the journey toward digital inclusion, ease of use captures how much effort seniors expect to exert when using a technology (Davis, 1989; Venkatesh et al., 2003; Y. Wang, 2021). For older adults who may face vision impairment, reduced motor skills and slower information processing, simplicity in design is crucial (Barnard, Bradley, Hodgson, & Lloyd, 2013; Lee & Maher, 2021). By minimising complexity and reducing the number of steps required, designers make interfaces feel approachable rather than intimidating, enabling seniors to build confidence and view technologies as manageable tools (Basu, 2021; Hawthorn, 2006). Such confidence fosters the intention to try and adopt new digital tools (Morris & Venkatesh, 2000; S. Wang et al., 2019). User-friendly design and guidance further ease learning and reduce anxiety (S. Chen, 2024; Mitzner et al., 2010; B. Xie, Watkins, & Huang, 2011), while accessible customer support and clear guidance act as facilitating conditions that reinforce ease of use and bridge the gap between awareness and active use of digital services (Rachmad, Bakri, Nuraini, & Nurdiani, 2024) (Cimperman, Makovec Brenčič & Trkman, 2016). Without these considerations, elderly users may abandon technologies that appear too complex or prone to errors (An, Cheung, & Lo, 2024). In sum, prior research shows that ease of use is often the strongest predictor of behavioural intention among older adults (Li, Guo, Liu, Tu, & Tang, 2024).

Practical applications illustrate how ease of use shapes seniors' adoption of everyday digital services (Y. Xie, Wu, & Yow, 2021). For instance, when QR code ordering systems in restaurants minimise steps and offer clear visual prompts, older adults feel confident to try them, especially when assisted by staff or family support (Morrison et al., 2023; W. Zhao, Kelly, Rogerson, & Waycott, 2023). Similarly, mobile banking apps that provide custom made functionalities, such as large icons, guided workflows and built in security prompts, enable older adults to complete transactions with minimal effort and worry (Peral, Concepción, López-Samaniego, & Zarza, 2022; Tsai et al., 2015). Meanwhile, easy to use booking apps with simple menus and automatic reminders further reduce cognitive load and encourage older adults to engage with digital services (Bhowmick, 2024). In online shopping, e-commerce sites that streamline checkout processes and present clear instructions heighten perceived ease of use and promote repeat engagement (Barnard et al., 2013; Davis, 1989; Islam, 2024). Consequently, the robust link between ease of use and older adults' intention to adopt technology underscores the importance of prioritising intuitive, accessible design to foster sustained digital engagement. Across these contexts, service providers that prioritise clarity, simplicity and accessible support can convert initial curiosity into lasting adoption among older users.

Performance Expectancy (PE), defined as the belief that a technology will deliver clear, practical benefits, remains the strongest driver of adoption among older adults (Badowskaa, Zamojskab, & Rogalac, 2016; Guo et al., 2023; ~~Wu & Lim, 2024)~~. When QR code e payment systems in restaurants or retail outlets minimise steps, shorten wait times and preserve customer autonomy, seniors perceive a direct improvement in convenience and independence (Galavotti, 2023; Pee, Maksom, & Norizan, 2014; Renaud & Van Biljon, 2008). This perception is reinforced when interfaces are simplified and staff or family members provide initial support, signalling that the technology will enhance rather than complicate everyday tasks (Galavotti, 2023; Warpenius, Alasaarela, Sorvoja, & Kinnunen, 2015). Consequently, PE frames QR code transactions not merely as novel tools but as solutions that meaningfully elevate quality of life and self reliance for older users (Ansari, Caroline, Adiati, & Rosman, 2024).

Empirical findings consistently link higher PE to stronger behavioural intention in senior cohorts (Cimperman et al., 2016; Koo, Park, & Kang, 2023; Von Kalckreuth & Feufel, 2023; Wu & Lim, 2024). Studies on mobile health apps, smart home devices and QR ordering systems all report significant positive relationship (Cimperman et al., 2016; Venkatesh et al., 2012; Von Kalckreuth & Feufel, 2023). When older adults expect time savings, safety or health management benefits, they are markedly more willing to use the technology regularly (Chong, Man, Ding, & Cha, 2024; Heinz et al., 2013). In QR e payment contexts, perceived gains in speed and control translate into higher adoption intent, underscoring PE's cross domain robustness (Barnard et al., 2013). Taken together, the evidence shows that when seniors clearly see practical gains in convenience, safety and autonomy, performance expectancy becomes the key driver that turns their curiosity into steady, real world use of digital services, especially QR e payments.

Attuquayefio and Addo (2014) observe that, within the UTAUT framework, social influence boosts confidence by signalling that trusted people already use the system, making it a strong push for older adults when they face unfamiliar cashless tools such as QR code e payment, with a single coaching session from children or helpful staff, for example walking a parent through the first QR scan at the table, dissolves anxiety and sparks independent use on later visits (Boot, Boot, & Kalantari, 2024; Williams, 2014). A similar snowball effect appears in peer settings, where seniors who see neighbours tracking steps or blood pressure with a phone app quickly follow suit, showing how peer to peer support makes technology feel more familiar and widens participation (Pang et al., 2021; Tabira et al., 2024). Together, these day to day interactions reveal that social endorsement is often the missing link between curiosity and confident use of QR code e payment.

On the other hand, survey and modelling studies reinforce this pattern, with evidence from Slovenia showing that social influence has a strong positive path to behavioural intention for home telehealth among seniors ($\beta \approx .35$, $p < .001$; Cimperman et al. (2016) and extensions of UTAUT confirming that the effect grows with age (Venkatesh et al., 2012). Similar results emerge across domains, where subjective norms predicted gerontechnology uptake in Hong Kong (Datta & Jessup, 2013); encouragement from family and friends raised mobile-banking adoption in India (Gupta & Arora, 2017); and during COVID-19, perceived social endorsement significantly boosted intention to pay by QR code ($p < .001$; Tu et al. (2022). Collectively, these findings show that supportive social cues consistently translate into stronger behavioural intention, making social influence as critical as interface design for turning seniors' first try of QR e-payments into sustained digital engagement

Based on the Unified Theory of Acceptance and Use of Technology (UTAUT), this research model is theoretically focused in the core constructs that explain technology adoption behavior, particularly among elderly users. The independent variables namely Ease of Use, Performance Expectancy and Social Influence are derived directly from UTAUT (Venkatesh et al., 2003; Venkatesh et al., 2012) and are widely recognized as pivotal determinants of Behavioral Intention, the dependent variable. Performance Expectancy reflects the perceived benefits of technology, for example health or convenience gains, Effort Expectancy captures the perceived ease of interaction, and Social Influence accounts for the effect of opinions from family, friends or society. These constructs are especially relevant for elderly populations, as prior research has consistently demonstrated that ease of use, clear utility and social encouragement significantly enhance technology adoption in this demographic (Czaja & Lee, 2007; Yusif, Soar, & Hafeez-Baig, 2016). Thus, applying these UTAUT constructs offers a robust theoretical foundation for examining elderly users intentions to adopt QR code ordering systems, aligning with existing evidence that tailored, accessible design and supportive social contexts drive digital engagement among older adults.

The survey instrument for this study was designed to measure the key constructs of the research model, adapted from the validated scales of Venkatesh et al. (2003). It comprises two sections, the first section consists of demographic profiles including gender, age, and education level, while the second section employs a 5-point Likert scale to assess four core variables operationalized as follows: Ease of Use (Table 1), hypothesized to positively influence Behavioral Intention (H1), is measured through items covering ease of learning and application; Performance Expectancy (Table 2), hypothesized to positively influence Behavioral Intention (H2), encompasses efficiency and perceived value; Social Influence (Table 3), hypothesized to positively influence Behavioral Intention (H3), incorporates normative pressure and encouragement; and Behavioural Intention (Table 4) measures preference and pleasure. Each variable is operationalized through multiple items to ensure comprehensive and reliable measurement of factors influencing QR ordering system adoption among the elderly, consistent with the UTAUT framework (Venkatesh et al., 2003).

Table 1: Instrucment of Measurement - Ease of Use

Variable	Instrument	Survey Questions	Adopted / Adapted
Ease of Use	Easy to learn	Learning to operate the QR ordering system is easy for me.	(Venkatesh et al., 2003)
	Easy to apply	I find it easy to get the QR ordering system to do what I want to do.	
	User Friendly	My interaction with the QR ordering system is clear and understandable.	
	User Friendly	I find the QR ordering system to be flexible to interact with.	
	Easy to learn	It is easy for me to become skillful at using the QR ordering system.	
	Easy to use	I find the QR ordering system easy to use.	

Table 2: Instrucment of Measurement – Performance Expectation

Variable	Instrument	Survey Questions	Adopted / Adapted
Performance Expectation	Efficiency	Using the QR ordering system enables me to accomplish orders more quickly	(Venkatesh et al., 2003)
	Perceived value	I find the QR ordering system is useful in my order.	
	Usability	Using the QR ordering system makes it easier to place my order	
	Perceived value	I find QR ordering systems useful for me.	
	Effectiveness	Using the QR ordering system enhances my effectiveness in the order process.	

Table 3: Instrucment of Measurement – Social Influence

Variable	Instrument	Survey Questions	Adopted / Adapted
Social Influnce	Normative pressure	People who influence my behaviour think that I should use the QR ordering system.	(Venkatesh et al., 2003)
	Encouragement	People who are important to me think that I should use the QR ordering system.	
	Market norm	I use the QR ordering system because of the restaurants who use the system.	
	Encouragement	The restaurant's owner has been supportive in the use of the QR ordering systems.	
	Assistance	The restaurant's workers have been supportive in the use of the QR ordering systems.	
	Assistance	In general, the restaurant has been supportive in the use of the QR ordering system	

Table 4: Instrucment of Measurement - Behavioural Intention

Variable	Instrument	Survey Questions	Adopted / Adapted
Ease of Use	Preference	I like the idea of using the QR ordering system.	(Venkatesh et al., 2003)
	Pleasure	I find using the QR ordering system is enjoyable.	
	Satisfaction	The actual process of using the QR ordering system is pleasant.	
	Interest	The QR ordering system makes order more interesting.	
	Compatibilit	The QR ordering system is okay for some jobs, but not the kind of job I want.	
	Preference	I like ordering with the QR ordering system.	

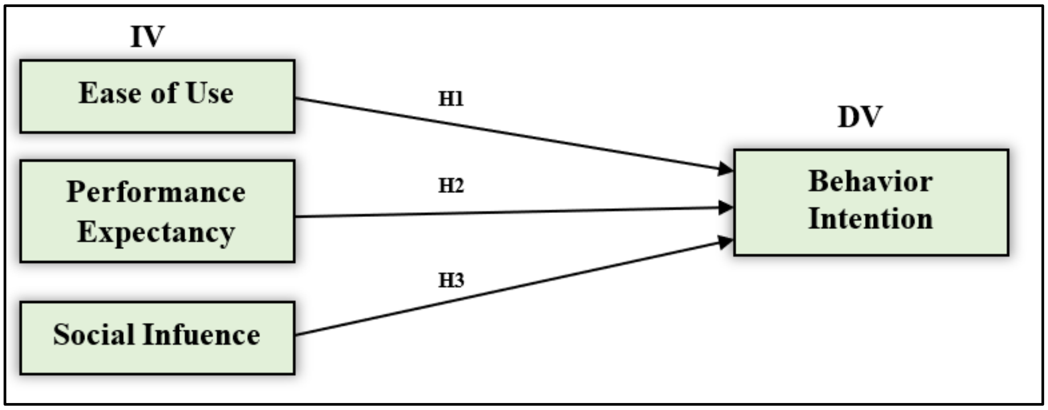

Figure 1: Theoretical Research Framework

METHODOLOGY AND RESULTS

Normality analysis on N = 170 showed that univariate skewness and kurtosis (Kim, 2021) for Behavioral Intention, Ease of Use, Performance Expectancy and Social Influence were within acceptable ranges (skewness $|z| < 3$, kurtosis $|z| < 8$), indicating approximate univariate normality. However, Mardia tests indicated significant multivariate skewness ($z = 49.83$, $p < .001$) and non significant multivariate kurtosis ($z = 0.52$, $p = .60$), pointing to multivariate non normality (K. Wang, Karling, Arellano-Valle, & Genton, 2024). To ensure robust estimation under these conditions, the structural model was analysed using PLS SEM (Guenther, Guenther, Ringle, Zaefarian, & Cartwright, 2023) with bootstrapping (Kostanek, Karolczak, Kuliczkowski, & Watala, 2024)rather than CB SEM (Usakli & Rasoolimanesh, 2023) with maximum likelihood.

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Sample size:  170
Number of variables:  4

Univariate skewness and kurtosis
                       Skewness SE_skew Z_skew Kurtosis SE_kurt Z_kurt
Behavior Intention        0.017   0.186  0.093   -1.001    0.37 -2.702
Ease of Use               0.262   0.186  1.409    0.100    0.37  0.270
Performance Expectancy   -0.001   0.186 -0.007   -0.160    0.37 -0.433
Social Influence         -0.043   0.186 -0.233   -1.140    0.37 -3.078

Mardia's multivariate skewness and kurtosis
                 b          z      p-value
Skewness  1.758578 49.8263793 0.0002345089
Kurtosis 24.557337  0.5244354 0.5999757336
```

Figure 2: Mardia's Multivariate Skewness and Kurtosis Analysis

Based on the results of the Principal Component Analysis presented in Table 5, the unrotated factor solution was examined to assess common method variance (CMV) (Baumgartner, Weijters, & Pieters, 2021) using Harman's single-factor test (Howard, Boudreaux, & Oglesby, 2024). The total variance explained by the first component is 29.692%, which falls below the recommended threshold of 50%. This indicates that no single factor accounts for the majority of the variance in the data. Furthermore, the cumulative variance explained by the first four component, each with eigenvalues greater than 1, reaches 71.906%, suggesting that the variance is distributed across multiple constructs rather than dominated by a single methodological factor (Saxena, Bagga, Gupta, & Kaushik, 2024). These results provide evidence that common method bias is not a significant concern in this study, as the variance explained by the first factor is insufficient to indicate substantial CMV.

Table 5: Total Variance Explained

Component				Extraction Sums of Squared Loadings		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	6.829	29.692	29.692	6.829	29.692	29.692
2	4.158	18.077	47.769	4.158	18.077	47.769
3	3.463	15.056	62.825	3.463	15.056	62.825
4	2.089	9.081	71.906	2.089	9.081	71.906
5	1.64	7.129	79.035			
6	0.781	3.394	82.428			
7	0.55	2.390	84.819			
8	0.474	2.062	86.881			
9	0.422	1.836	88.717			
10	0.404	1.758	90.475			
11	0.323	1.406	91.881			
12	0.276	1.200	93.081			
13	0.262	1.140	94.221			
14	0.223	0.971	95.192			
15	0.18	0.784	95.975			
16	0.162	0.703	96.679			
17	0.144	0.625	97.304			
18	0.143	0.620	97.924			
19	0.12	0.522	98.446			

20	0.111	0.483	98.929			
21	0.095	0.412	99.340			
22	0.083	0.361	99.701			
23	0.069	0.299	100.00			

Extraction Method: Principal Component Analysis

The Table 6 and 7 shows the model demonstrates strong reliability and validity. Wherein all constructs exhibit excellent internal consistency reliability (Rose, Wass, Jankowski, & Djukic, 2021), with Cronbach's Alpha and Composite Reliability (Haji-Othman & Yusuff, 2022) values exceeding the threshold of 0.70, ranging from 0.866 to 0.971. Convergent validity (Chin & Yao, 2024) is confirmed, as all outer loadings exceed 0.70 and Average Variance Extracted (AVE) (dos Santos & Cirillo, 2023) values surpass 0.50 (ranging from 0.666 to 0.871). Furthermore, all Outer Variance Inflation Factor (VIF) values remain below 7.0, indicating no significant collinearity concerns. Discriminant validity, assessed using the Heterotrait-Monotrait (HTMT) ratio, is firmly established, with all values well below the 0.90 threshold (the highest being 0.526). This confirms that the constructs are empirically distinct. Overall, the results affirm the robustness, reliability, and validity of the measurement model for subsequent analysis.

Table 6: Result of measurement model

Latent Variable	Item	Convergent Validity	Internal Consistency Reliability				Outer VIF
		Loadings	**McDonald's Omega**	**Cronbach's Alpha**	**Composite Reliability**	**AVE**	
		>0.6	**>0.7**	**>0.8**	**0.60-0.90**	**0.60-0.90**	**< 7.0**
Behavior Intention	BI1	0.940	0.963	0.963	0.971	0.871	5.837
	BI2	0.929					5.399
	BI3	0.920					4.732
	BI4	0.935					5.543
	BI5	0.943					6.242
Ease of Use	EOU1	0.811	0.869	0.873	0.908	0.666	2.046
	EOU2	0.721					1.599
	EOU3	0.786					2.284
	EOU4	0.887				0.713	3.811
	EOU5	0.865					2.847
Performance Expectancy	PE1	0.854	0.866	0.866	0.909		2.073
	PE2	0.841					2.091
	PE3	0.853					2.293

	PE4	0.830					1.976
Social Influence	SI1	0.900	0.917	0.912	0.932	0.774	2.897
	SI2	0.844					3.229
	SI3	0.867					3.102
	SI5	0.907					2.295

Table 7 : Discriminant validity of measurement model - HTMT (n=170)

Behavior Intention (1)	(1)	(2)	(3)	(4)
Ease of Use (2)	0.481			
Performance Expectancy (3)	0.526	0.444		
Social Influence (4)	0.037	0.049	0.097	

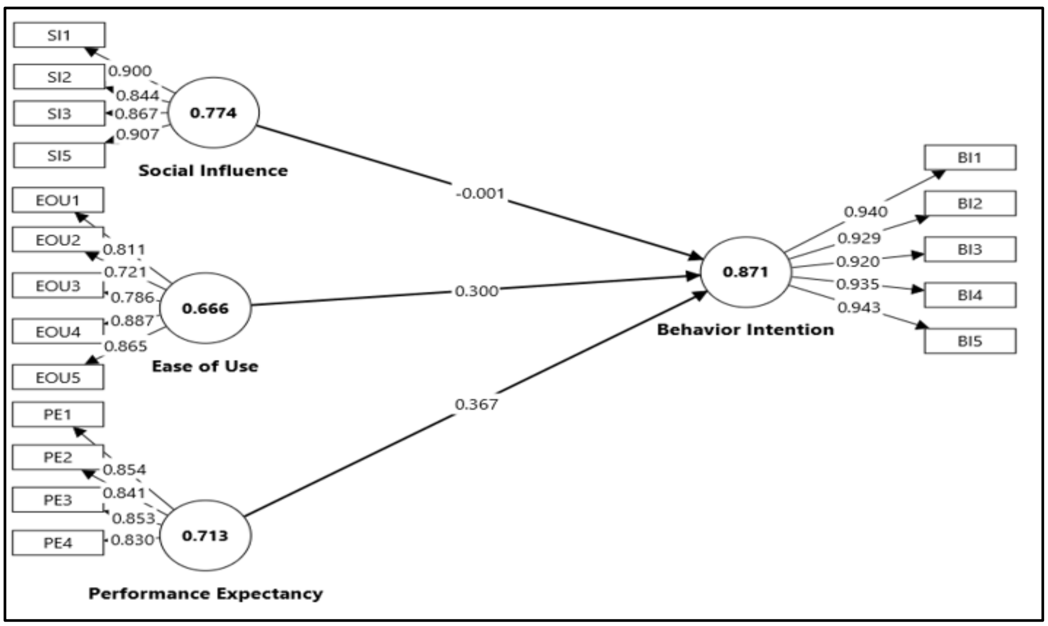

Figure. 3: Algorithm Path

The path coefficients (Hair Jr et al., 2021) and predictive validity (Lin & Yao, 2024) of the structural model (Table 8 and 9) shows that the Ease of Use ($\beta = 0.300$, $t = 4.508$, $p < 0.001$) and Performance Expectancy ($\beta = 0.367$, $t = 4.918$, $p < 0.001$) significantly positively influence Behavioral Intention, supporting H1 and H2. Both constructs demonstrated meaningful effect sizes, $f^2 = 0.111$ and 0.164 respectively, exhibited no multicollinearity (Kyriazos & Poga, 2023) issues with the VIF < 3.3. In contrast, Social Influence ($\beta = -0.001$, $t = 0.013$, $p = 0.495$) had no significant effect on Behavioral Intention, leading to the rejection of H3. The model explains a substantial proportion of the variance in Behavioral Intention ($R^2 = 0.311$). Furthermore, as shown in Table 9, the predictive validity of the model was confirmed through PLS-Predict, with all Q^2predict values (Rizky, Lestari, & Wihadanto, 2024) above zero (ranging from 0.205 to 0.269) and the PLS-SEM RMSE values lower than those of the linear model

(LM) for all indicators of behavioral intention (BI1–BI5), demonstrating the model's high predictive relevance.

Table 8: PLS-Path Analysis

Hypothesis	B value	SE	t-value	P-value	f^2	VIF	R2	Confidence Interval		Decision
								LL	**UL**	
H1: Ease of Use -> Behavior Intention	0.300	0.067	4.508	0.000	0.111	1.181	0.311	0.192	0.411	Supported
H2: Performance Expectancy -> Behavior Intention	0.367	0.075	4.918	0.000	0.164	1.189		0.236	0.483	Supported
H3: Social Influence -> Behavior Intention	-0.001	0.079	0.013	0.495	0.000	1.008		-0.133	0.117	Not Supported

Table 9: PLS Predict

	Q²predict	PLS-SEM_RMSE	LM_RMSE	PLS-LM
BI1	0.269	0.904	1.172	-0.268
BI2	0.216	0.895	1.194	-0.299
BI3	0.263	0.892	1.171	-0.279
BI4	0.205	0.817	1.106	-0.289
BI5	0.26	0.848	1.164	-0.316

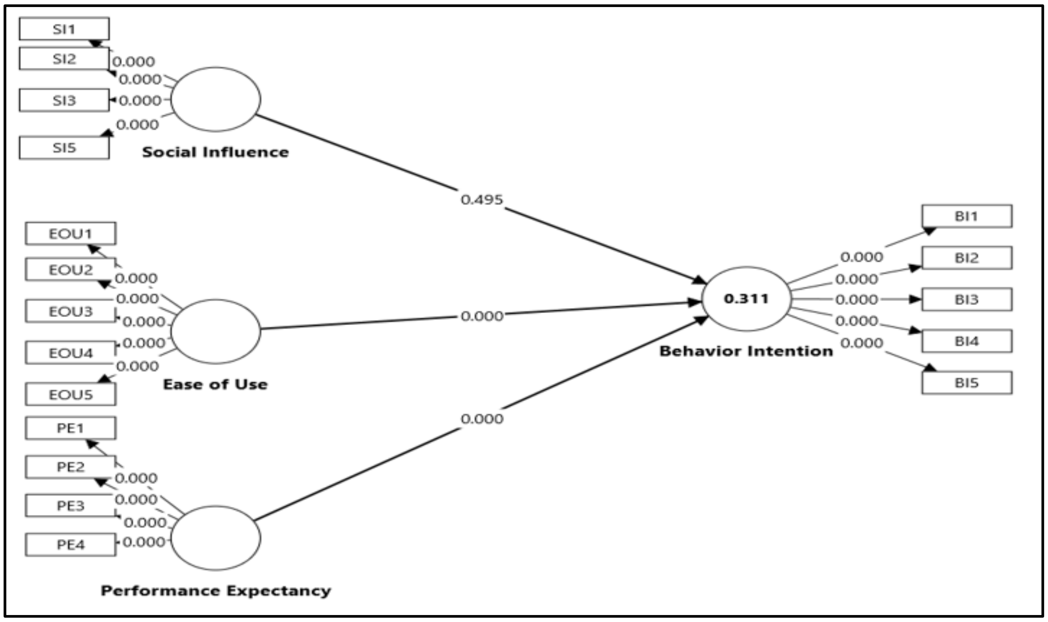

Figure 4: Path Coeffiecient

Based on the Importance-Performance Map Analysis (IPMA), Figure 4 reveals that Performance Expectancy exhibits the highest importance among the latent constructs, followed by Ease of Use, while Social Influence demonstrates limited effect, aligning with earlier nonsignificant path findings. All constructs show moderately high performance levels, which suggests that participants generally hold positive views toward these factors. At the item level in Figure 5, specific indicators such as PE1, PE3, and EOU5 emerge as particularly influential, whereas others like EOU4 and PE4 reflect strong performance. The analysis underscores that interventions aimed at enhancing behavioral intention should prioritize improving Performance Expectancy and Ease of Use, as these constructs are not only critically important but also hold potential for further performance optimization, while Social Influence requires minimal strategic attention due to its low importance and limited explanatory power.

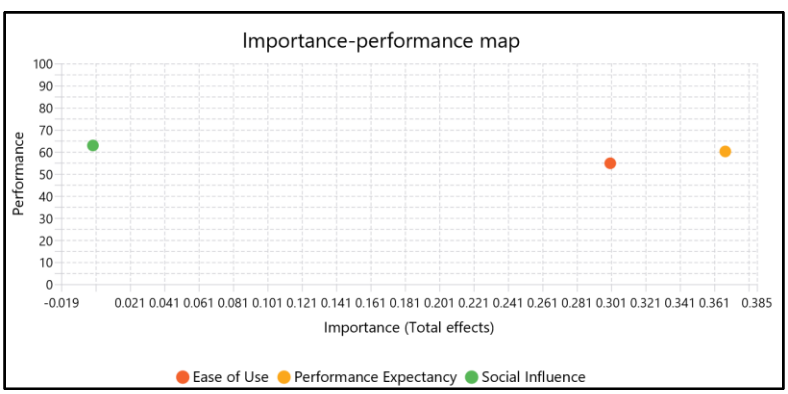

Figure 5: Important-Performance Map – Independent Variable

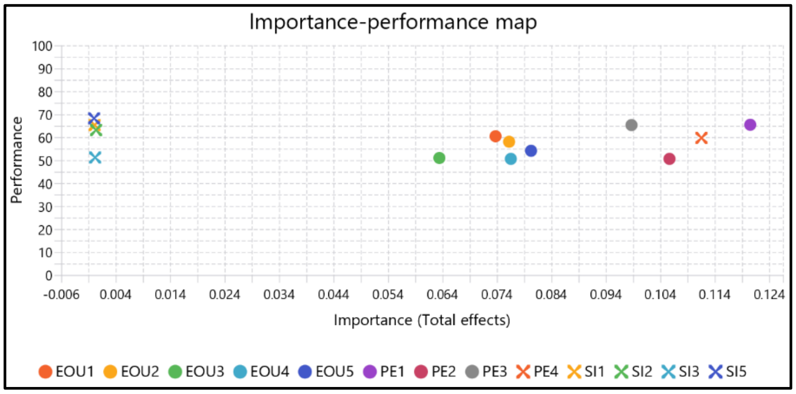

Figure 6: Important-Performance Map – Items

DISCUSSION

As QR ordering rapidly becomes a standard practice across Malaysian eateries following nationwide digitalization trends, understanding elderly users' ability to navigate these systems is increasingly important for ensuring digital inclusion and preventing unintentional marginalization (BAKAR & JELIUS, 2025; Idris, Tosin, & Hong, 2025). The hypothesis that EOU positively influences BI is confirmed, demonstrating that elderly users' intention to adopt technology increases substantially when they perceive it as simpler to interact with. This finding is critically justified by the IPMA in Figure 4, where Ease of Use is positioned as the second most important driver of Behavioral Intention. Its high performance score further indicates that current implementations are already perceived favorably, suggesting this is a key area of strength that can be leveraged to boost adoption. To further enhance this relationship, EOU should be strengthened through designs prioritizing intuitive and adaptive features tailored to elderly users' usability needs, such as implementing interactive guided tutorials and skill building prompts aligned with high performing items like easy to become skillful to rapidly build confidence (X. Chen et al., 2017; DeCosse, 2023; Han, Xu, & Ma, 2024), alongside clear navigation using large, high contrast buttons, minimalistic menus, and error forgiving actions like unmistakable back or undo options to enhance flexibility, reduce cognitive effort, and ultimately elevate perceived ease of use (Freeble, 2023; IMANI, 2013; McLaughlin & Pak, 2020).

The hypothesis that PE positively influences BI is strongly supported and emerges as the most important driver of intention among the tested constructs, indicating a critical role in technology adoption for older adults. This pattern is consistent across domains, as shown in studies on mobile health apps (Von Kalckreuth & Feufel, 2023), smart home environments (Venkatesh et al., 2012) and QR ordering systems (Cimperman et al., 2016), and it points to the motivating power of clear, tangible benefits such as time savings, convenience, health monitoring and enhanced safety that align with daily needs (Ashrafi, Iskender, & Shahid, 2025; Gurung, 2024). At the item level, the IPMA in Figure 5 suggests that indicators like enables me to accomplish orders more quickly (PE1) and makes it easier to place my order (PE3) are both important and well performing, highlighting the value of efficiency and task simplification (Santoro, 2024). Importantly, these results extend UTAUT by showing that performance expectancy functions as the dominant mechanism driving intention among elderly Malaysians in everyday service settings, refining theoretical understanding of how ageing moderates core UTAUT relationships. However, the relationship between PE and BI depends on the user's ability to recognize and trust these benefits (Le, 2022). For example, even if a QR system objectively saves time, elderly users may not perceive this advantage if the process feels unfamiliar or cognitively demanding (K. Chen & Chan, 2014; Czaja et al., 2006). Therefore, ensuring that benefits are not only genuine but also effectively communicated and perceivable remains a critical challenge, requiring further investigation to optimize PE's impact on adoption intentions.

Although the literature review consistently highlights SI as a significant predictor of technology adoption among elderly users in areas such as healthcare, mobile banking, and smart home systems (K. Chen & Chan, 2014; Cimperman et al., 2016; Gupta & Arora, 2017), the statistical results from this study show a nonsignificant path coefficient (p equal to 0.495) and low importance in the IPMA, as shown in Figure 4. This suggests that SI did not play a decisive role in the specific context of QR code ordering systems. This inconsistency may be due to contextual factors such as the nature of the technology, for example, QR ordering may be seen as a personal or useful instrument rather than a socially visible activity, or cultural and environmental differences, such as dining alone versus with family, or varying levels of peer encouragement (K. Chen & Chan, 2014; Venkatesh et al., 2012). From a theoretical standpoint, SI may also weaken when technologies lack social visibility or when usage decisions occur privately, reducing the salience of normative pressure and aligning with perspectives that highlight the moderating influence of social visibility and culturally shaped expectations of collective behaviour (Miao, 2024; Yeo, Mi, & Kwok, 2022). The item level IPMA in Figure 5 shows that SI indicators, such as SI1, SI2, and SI3, had low importance scores, indicating that opinions from family, friends, or restaurant staff did not strongly influence elderly users' intentions. Taken together, these patterns imply that while SI is generally important in the literature, its effect here may operate indirectly through situational relevance and individual perceptions of social norms rather than directly influencing BI.

Despite the nonsignificant statistical outcome, SI should not be entirely neglected. Its strong foundation in existing research suggests it remains a latent factor that could become active under suitable conditions, such as in contexts where technology use is socially visible like group dining (Morrison et al., 2023) or when endorsed by trusted figures like healthcare providers (Han et al., 2024). To leverage this potential, it is recommended to create environments where social interactions naturally encourage technology adoption (Haan, Brankaert, Kenning, & Lu, 2021), for instance, by training restaurant staff to positively reinforce QR system usage during group visits or implementing features that enable users to share positive experiences within their social circles such as referral incentives (Iskender, Sirakaya-Turk, Cardenas, & Hikmet, 2024). Additionally, showcasing testimonials from relatable peers, such as videos of elderly individuals confidently using the system, can reduce perceived social risks, build trust, and ultimately foster greater acceptance and use of QR systems among elderly populations (Azhar, 2021; Karp, Silesky, Janzen, & Bonnevie, 2023).

CONCLUSION

This study examined elderly Malaysians' intention to use QR ordering through the UTAUT lens and found that perceived benefits and simplicity are the main levers of adoption. The measurement model showed strong reliability and validity, and the structural model using PLS SEM explained a meaningful share of variance in Behavioural Intention. Ease of Use and Performance Expectancy had positive and significant paths to intention, while Social Influence did not. The importance performance map reinforced these results by placing Performance Expectancy as the most important driver and Ease of Use as the next most important, with Social Influence showing limited effect. Together, the evidence shows that older adults form intention when the system clearly helps them and is easy to operate.

These findings point to clear actions for practice and research. Providers should make benefits obvious and immediate, for example faster ordering, fewer errors and more control, while simplifying the journey with larger buttons, plain labels, minimal steps, and visible help. Social cues can still assist first time use, but design clarity and benefit communication should take priority. The study is limited by its cross sectional design, a single service context, and self reported intention rather than observed behaviour. Future work can test causality with longitudinal or experimental designs, examine whether recognition of benefits mediates the link between perceived usefulness and intention, and explore moderators such as education, prior experience, and whether patrons dine alone or with family.

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