THE INTENTION TO USE CONTACTLESS ORDERING SYSTEMS FOR RESTAURANTS OF THAI CUSTOMERS

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Abstract

This research was developed to investigate the factors that influence Thai customers' acceptance and use of Restaurant Contactless Ordering Systems (RCOS), to understand their familiarity with the technology as well as their potential reluctance to adopt the system. Furthermore, it is intended to propose the RCOS that meets customers' requirements by testing its prototype based on the Technology Acceptance Model (TAM) related to perceiving its value and ease of use. The research integrated the mixed method, using quantitative survey method to understand the user experience and design science method to propose the RCOS prototype. For the survey, data was collected from 408 Thai restaurant customers through online questionnaires using a self-selected sampling method. The results showed that users' top priorities include ordering convenience, payment security and system reliability, with a particular emphasis on fast ordering and real-time updates, and highlighting the need for efficient, up-to-date systems. These findings highlighted the importance of intuitive interfaces and robust security measures to improve the dining experience and ensure the reliability of RCOS. The RCOS prototype was evaluated through online questionnaires with 410 Thai restaurant customers using a self-selected sampling method. The results indicated that demographic factors such as gender, age and education, although the level did not significantly influence RCOS usage or preference, but rather influenced customer requirements for system security and customization.

Keywords : Restaurant Contactless Ordering System, Customer Acceptance, Technology Acceptance Model

1. Introduction

The restaurant industry in Thailand is undergoing a significant digital transformation, rapidly adapting to changes in consumer behavior and technological advances. Dining out is a deeply embedded social tradition in Thailand, which enriches its vibrant culinary culture and continues to draw both locals and tourists (Alt, 2021). This affinity for dining out has driven growth in the sector, with full-service restaurants which were expected to generate revenues of approximately $3.8 billion in 2022, a significant increase noted by the USDA (2022). While local patronage contributes to this growth, tourism also plays a crucial role.

The evolution of the industry has been particularly marked by the adoption of digital innovations such as the Restaurant Contactless Ordering System (RCOS), which has become an integral part of the modern dining experience by allowing customers to order and pay via smartphones. This shift towards digital solutions was accelerated by the COVID-19 pandemic, which pushed restaurants to adopt contactless technologies to ensure security and improve operational efficiency (Intal *et al.*, 2020).

Recent studies, including studies by Khare and Alkonda, (2023), highlighted the growing use of e-menus, reflecting a wider trend towards contactless service systems that increase customer satisfaction and loyalty. Despite some consumer reservations about using complex applications, the general response to self-service technologies has been positive (Inthong *et al*., 2022; Lee *et al*., 2018). However, research on the specific application of these technologies in the dine-in setting remains limited, which represents a novel area for in-depth

analysis.

This study employed the Technology Acceptance Model (TAM) to assess the acceptance of new technologies in Thai dine-in restaurants, with the aim of understanding customers' attitudes and expectations towards digital ordering systems. Through targeted surveys and data analysis, this research aims to provide actionable insights to optimize and promote these digital services within the Thai restaurant landscape.

2. Objective

1) To identify users' experiences and expectations related to Restaurant Contactless Ordering System (RCOS)
2) To design a plausible Restaurant Contactless Ordering System (RCOS) to achieve customer acceptance
3) To evaluate the acceptance of Restaurant Contactless Ordering System (RCOS) on the Thai restaurant industry

3. Literature Review

Restaurant Contactless Ordering System

Restaurant Contactless Ordering Systems (RCOS) have revolutionized customer service strategies within the restaurant industry, significantly improving both operational efficiency and customer experience. These system’s leverage advanced technologies to enable digital interactions between the service provider and the customers, facilitating a seamless transaction process. RCOS reduces physical contact and potential errors by automating the ordering and payment processes, which are especially valuable in high-demand scenarios such as peak dining times (Zhou, 2015). Furthermore, these systems facilitate dynamic menu adjustments and real-time feedback, thereby enhancing the ability to respond promptly to customer preferences and kitchen capabilities (Gohil, 2018; Goli, 2023).

Moreover, the integration of analytics capabilities in RCOS allows restaurant managers to track ordering patterns, inventory needs, and customer preferences, leading to more informed decision-making (Khandwani *et al*., 2023). These systems also support marketing initiatives, such as personalized offers and loyalty programs, directly through the ordering interface, thereby increasing customer engagement and retention.

Self-Service Technologies

Self-Service Technologies (SST) in the restaurant industry encompass a broad range of tools that empower customers to manage their dining experience independently. This technology spectrum includes digital kiosks, mobile apps, and interactive menus that customers can use to explore menu options, place orders, and make payments without waiter assistance. The proliferation of SSTs has been driven by the increasing consumer preferences for quick and personalized service delivery (Meuter *et al.*, 2000). These technologies significantly reduce the burden on restaurant staff, allowing them to focus on higher-value tasks such as enhancing customer service and improving food quality. The deployment of SSTs can drastically reduce wait times and improve the accuracy of orders, thereby enhancing customer satisfaction and streamlining kitchen operations (Fitzsimmons, 2003; Orel and Kara, 2014). The customization features that are available in many SST platforms allow customers to tailor their meals precisely to their preferences, which enhances their dining experience and can lead to higher customer satisfaction rates. Additionally, the adoption of SSTs often leads to cost savings for businesses by reducing labor costs and improving table turnover rates, which are critical metrics in the hospitality industry.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), remains one of the most influential theories for understanding how users come to accept and use a

technology. According to TAM, perceived usefulness and perceived ease of use are primary predictors of technology adoption. Marangunić and Granić, (2015) applied TAM to the study of RCOS in restaurants, demonstrating that ease of use significantly impacts a customer's decision to avail of such systems. Additionally, Venkatesh and Bala, (2008) expanded TAM to include additional factors like social influence and facilitative conditions, which they found to also significantly influence technology acceptance and user satisfaction

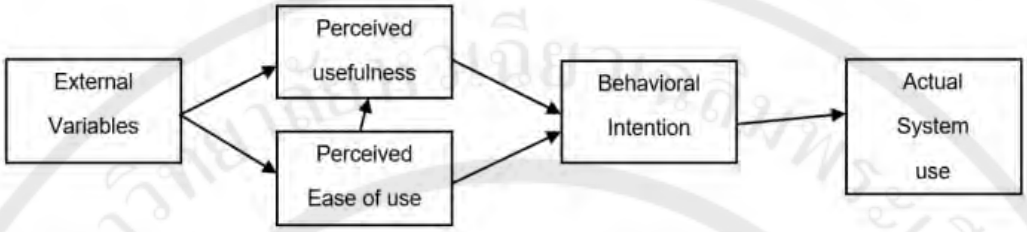

Figure 1 Technology Acceptance Models

Demographic Characteristics

The role of demographic factors such as age, gender, and education in the acceptance and use of RCOS is an area of active research. Since Tarhini *et al.* (2016) has explored these influences within the extended TAM framework and found that while these factors can affect perceptions of usability and usefulness, their impact is often moderated by individual attitudes and experiences. This suggests that while demographic factors are important, they do not solely dictate the acceptance of new technologies. These findings thus advocate for the design of RCOS systems that are accessible and appealing to a broad demographic spectrum.

Theoretical Frameworks

Integrating various theoretical frameworks help provide a comprehensive understanding of the factors that influence consumer interactions with RCOS. By combining the Technology Acceptance Model (TAM) with the Theory of Planned Behavior (TPB), are able to examine the influence of social norms (Ajzen, 1991; Taylor and Todd, 1995), perceived control, and attitudinal factors on technology use. These studies highlight the complex interplay of personal, social, and technological factors that influence the adoption and effective use of RCOS in the restaurant industry.

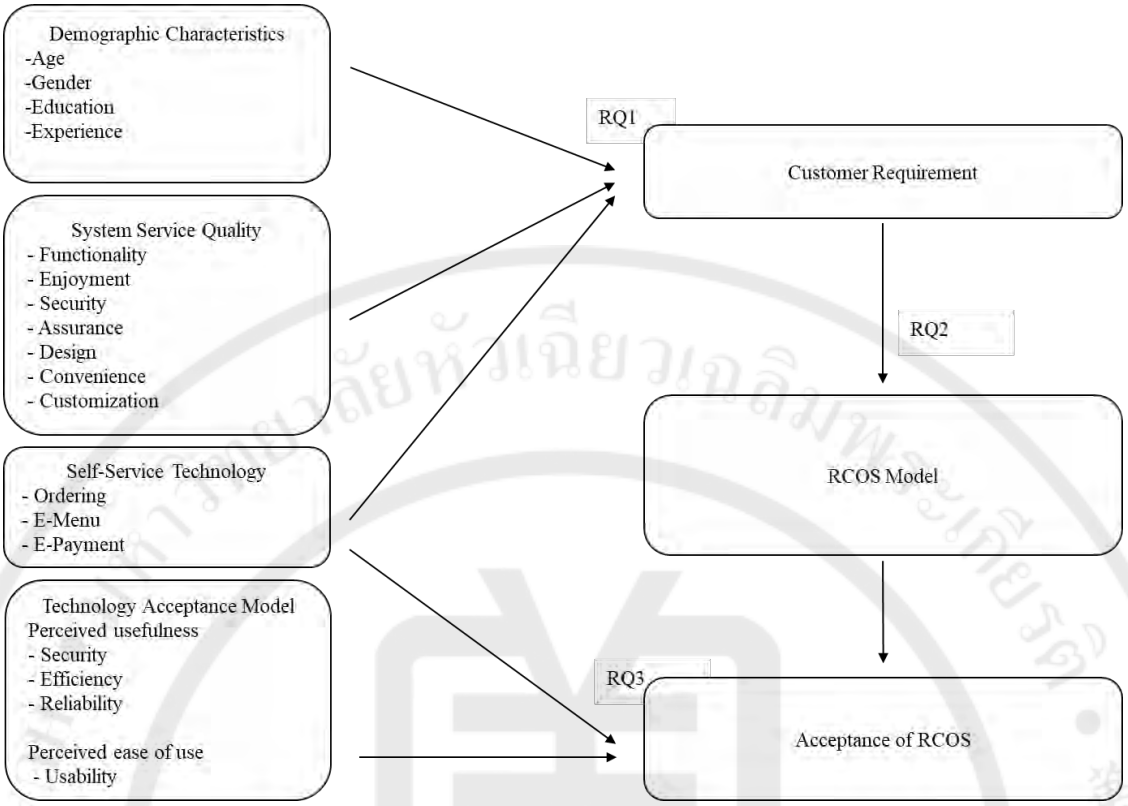

Figure 2 Theoretical framework

Research Questions

1. What are the experiences of Thai customers with RCOS?
2. What are the concerns and factors that discourage Thai customers from adopting RCOS?
3. What is the acceptability of adopting RCOS for Thai customers?

4. Research Methodology

This study incorporated a mixed-method research methodology, integrating both qualitative and quantitative approaches to provide a comprehensive analysis of Thai customers' acceptance of the Restaurant Contactless Ordering Systems (RCOS). The Researcher utilized a literature analysis method in the qualitative analysis and a questionnaire method in the quantitative analysis. The respondents to this study were Thai local residents and international visitors who frequently patronize dine-in-centric restaurants. The Researcher employed the 95% confidence interval and a 5% margin of error to determine the requisite sample size (Yamane, 1967). According to this criterion, the necessary sample size was determined to be 400, representing a minimum sample size that would guarantee the reliability of the study at an established level of confidence and margin of error.

5. Results

System Type Usage Habits

The analysis explored the various types of Restaurant Contactless Ordering Systems (RCOS) and identified user habits and preferences. An online survey of 408 restaurant customers provided a data set for analysis, covering preferences for touch screens, mobile applications, HTML menus, QR codes, and self-service terminals. The survey revealed a clear preference for HTML menus, chosen by 39.1% of the respondents, followed by mobile applications preferred by 20.6%. These systems were primarily used 4-8 times per month by most users. Details are provided in Table 1.

Table 1 Type of System

Item	Responses		N
	N	Percentage	
Touch-screen menu	103	11.4	408
Mobile application menu	186	20.6	
HTML menu	352	39.1	
QR code menus	102	11.3	
Self-service kiosks	158	17.5	
Total	901	100	

System Functionality

This analysis of a Restaurant Contactless Ordering System (RCOS) revealed a general satisfaction across key operational areas including ordering, electronic menus, and payment processes, as detailed in Table 2. Customers appreciate the system's efficiency and clarity, particularly in ordering and payment execution. However, despite the positive reception, there is a noticeable room for improvement, especially in enhancing the functionality of the electronic menu and expanding the diversity of payment options.

Table 2 Preferences for System function

Factor	Item	Mean	Standard Deviation
Ordering	Quickly order	3.77	1.194
	Modify order preferences	3.78	1.238
	Understand waiting time	3.76	1.226
E-menu	Ease of Ordering	3.63	1.239
	Intelligent suggestions	3.64	1.258
	Real-time Updates	3.61	1.272

Table 2 (Continued)

E-Payment	Clear payment process	3.85	1.173
	Speed up payment process	3.81	1.177
	Multiple payment options	3.74	1.235

RCOS Service Quality

The results of the analysis are presented in Table 3, and detailed in Table 3, indicate that customers hold a generally positive perception of the system across multiple dimensions, including functionality, enjoyment, security, assurance, design, convenience, and customization. The system's ease of use, enhancement of the dining experience, and security features that protect personal information and ensure transaction safety are all aspects that

customers appreciate. The system's design, which features intuitive interfaces and clear menus, plays a significant role in user satisfaction. Furthermore, the RCOS is regarded as convenient, with time-saving features and straightforward access to menu options. Additionally, it is valued for its ability to meet individual needs through customization.

Table 3 RCOS Service Quality

Factor	Item	Mean	Standard Deviation
Functionality	Easy to use features	3.81	1.207
	Easier to complete ordering	3.8	1.204
	Reservation	3.78	1.231
Enjoyment	Enhances dining experience	3.84	1.203
	Ordering process	3.85	1.197
	Entertainment features	3.83	1.176
Security	Protects personal information	3.78	1.197
	Payment security is reliable	3.75	1.207
	Trustworthy system security measures	3.76	1.225
Assurance	Ensures accurate order handling	3.68	1.215
	Clear communication of order details	3.71	1.248
	System reliability provides confidence	3.75	1.184
Design	Simple and intuitive interface	3.85	1.133
	Clear and understandable menu	3.73	1.165

Table 3 (Continued)

	Attractive interface design	3.82	1.127
Convenience	Time-saving functionality	3.66	1.288
	Short learning curve for system use.	3.68	1.268
	Quick dish selection facilitated	3.67	1.252
Customization	Provision of personalized choices	3.83	1.142
	Customization features	3.8	1.2
	Encouragement of trying new dishes	3.79	1.211

The analysis revealed the necessity for RCOS providers to prioritize the creation of versatile, user-friendly systems that ensure a seamless and secure ordering experience for all users. In light of these insights, the subsequent phase of the project entailed the development of a prototype tailored to the identified customer needs. The prototype concentrated on simplifying the interface design, enhancing system responsiveness, improving security features, and incorporating personalized service options. Further, refinements were made to the system through ongoing testing and the gathering of user feedback. This ensured that the system remains aligned with the evolving preferences and expectations of restaurant patrons.

Conceptual Design

The analysis of Thailand's restaurant contactless ordering systems (RCOS) revealed a pronounced emphasis on functional efficiency, exemplified by the use of QR code menus, which are aligned to global trends in mobile payments and streamlined ordering processes. In contrast to other countries that prioritize interactive e-menu designs for enhanced user experience, Thailand places greater emphasis on practicality. This focus is evidenced by the frequent use of QR Code menus, in addition to a strong preference for HTML menus within the Thai market. This highlights the global relevance of these formats. Furthermore, the development of RCOS prototypes that blend both locally preferred and internationally

recognized menu formats is underway. The key customer demands include simplicity in ordering, robust reservation functionality, data security, and clear menu presentation. This points towards the need for an interface that offers both enhanced security and personalized service options.

The RCOS platform employs HTML and QR code technology. Users register and log in using their mobile numbers or other platform accounts, thereby ensuring the protection of their privacy. The homepage offers personalized welcome, promotions, and navigation services, including recommendations for dining and reservations. The e-menu and ordering process are both streamlined and convenient, offering personalized suggestions and real-time updates. The e-payment system is efficient and supports a multitude of payment methods and savings preferences. Additionally, users are able to manage their membership details (Table 4).

Table 4 Functional Design Concepts.

Factor	Item	Conceptual design
Ordering	Quickly order	Optimize the ordering process
	Modify order preferences	Provides customization options
	Understand waiting time	Real-time update of order status
E-menu	Ease of Ordering:	Simple and intuitive interface
	Intelligent suggestions	Personalized recommendations
	Real-time Updates	Real-time updates on dish availability status
E-payment	Clear payment process	Intuitively designed payment interface
	Speed up payment process	Record customer payment preferences
	Multiple payment options	Offers a variety of payment methods

The Contactless Ordering System enables user registration via website, QR code, or website, offering a main interface segregated into ordering, reservation, recommendations, cart, orders, and profile sections. The interface includes sections for ordering, reservations, dish recommendations, cart, orders, and profile. Users select pickup options, browse and add dishes, proceed to payment with multiple options, and track order status in real-time. Reservation features allow flexible booking and cancellation.

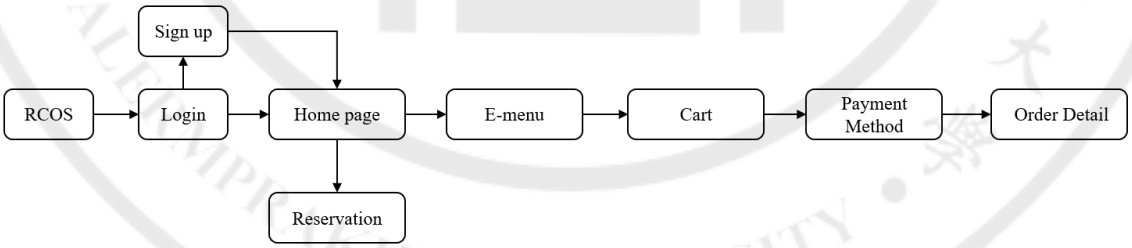

Figure 3 Workflow of Contactless Ordering System use

Prototyping

Following the conceptual design, the prototyping phase involves developing the initial prototype of the RCOS. This includes detailed development of software functionalities, which were highlighted as preferred features by users. The prototype's user interface is designed to be simple and intuitive, facilitating ease of ordering and minimizing the learning curve for new users.

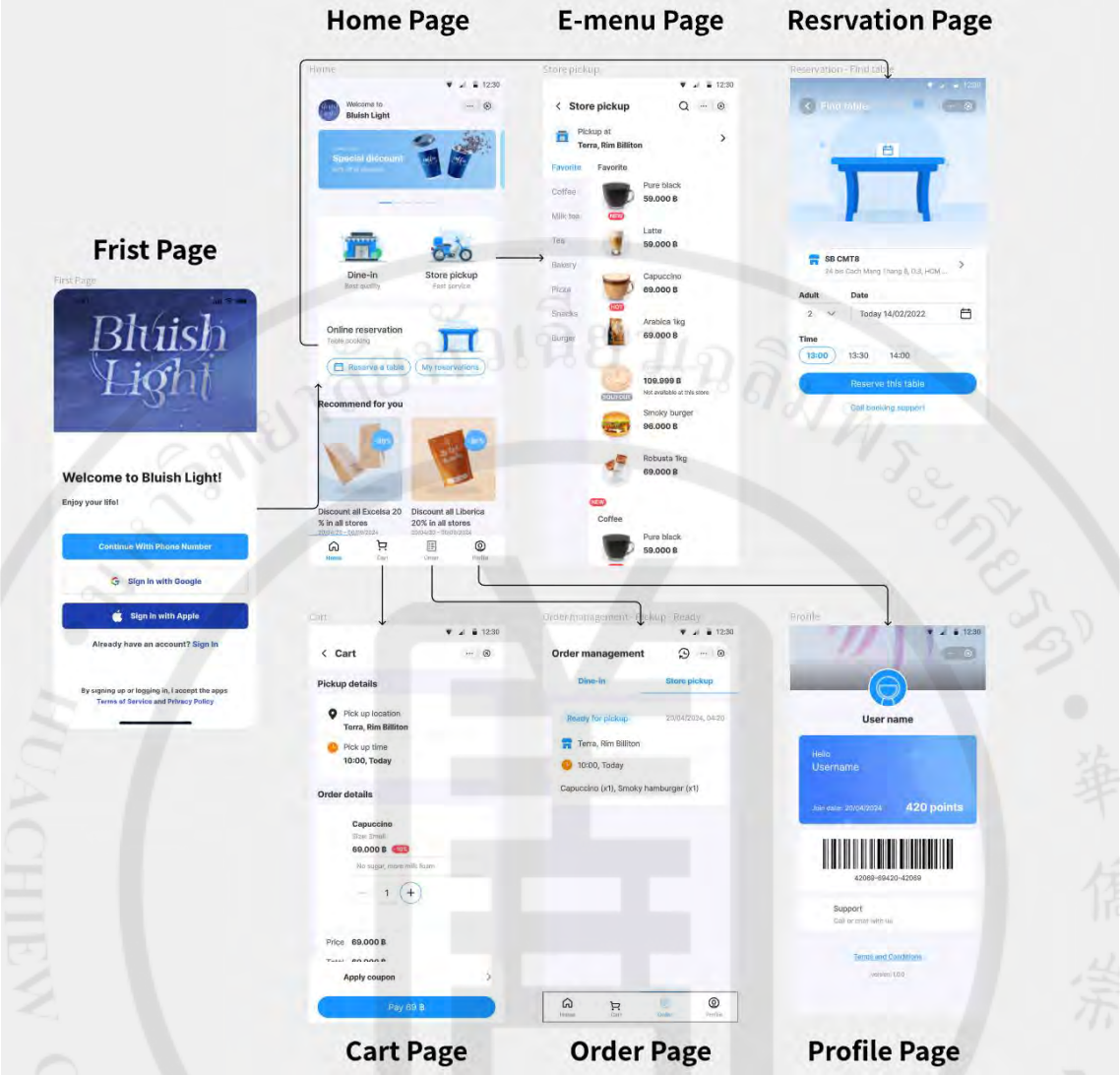

Figure 4 RCOS Prototype

Evaluation

- Evaluation of service quality

The analysis of customer questionnaires revealed a high level of satisfaction with the Contactless Ordering System, particularly in areas such as order customization, payment processing, and user interface design. Furthermore, customers expressed satisfaction with the ability of the system to modify orders, handle payments efficiently, and provide clear communication about order details. The design elements, including an intuitive interface and an aesthetically pleasing layout, along with robust personalization features, were particularly well-received.

Table 5 Evaluation of service quality

Factor	Item	Mean	Standard Deviation
Functionality	Easy to use features	3.349	0.886
	Easier to complete ordering	3.332	0.883
	Reservation	3.378	0.857
Enjoyment	Enhances dining experience	3.346	0.924
	Ordering process	3.354	0.881
	Entertainment features	3.271	0.902
Security	Protects personal information	3.285	0.911
	Payment security is reliable	3.712	1.288
	Trustworthy system security measures	3.846	1.266
Assurance	Ensures accurate order handling	3.8	1.304
	Clear communication of order details	3.832	1.308
	System reliability provides confidence	3.776	1.324
Design	Simple and intuitive interface	3.737	1.317
	Clear and understandable menu	3.771	1.331
	Attractive interface design	3.907	1.259
Convenience	Time-saving functionality	3.924	1.218
	Short learning curve for system use.	3.907	1.259
	Quick dish selection facilitated	3.902	1.247
Customization	Provision of personalized choices	3.817	1.272
	Customization features	3.815	1.31
	Recommended to try new dishes	3.766	1.297

- Evaluation of Perceived Usefulness

The analysis indicates that all factors within the Efficiency category of the Restaurant Contactless Ordering System (RCOS) have a positive effect on user perceptions, thereby demonstrating the system's capacity to enhance the user experience. The efficiency aspects of the system, including the speed of the ordering process and the overall smoothness of the ordering experience, contribute significantly to the ease of use perceived by users. The overall positive feedback on efficiency aligned with favorable perceptions of the system's reliability and security, as shown in Table 6.

Table 6 Evaluation of Perceived Usefulness

Factor	Item	Mean	Standard Deviation
Efficiency	Quick ordering	4.183	1.266
	Requires minimal effort to use	3.778	1.126
	Smooth ordering process	3.644	1.191
Reliability	Clear and understandable	3.61	0.884
	Stable functionality	3.427	0.741
	Practical features	3.617	0.968
Security	Good privacy protection	3.732	0.967
	Protects personal property	3.751	0.967
	Excellent technical support	3.676	0.981

- Evaluation of perceived ease of use

The analysis of the Usability category for the RCOS indicates that each factor

significantly enhances the system's perceived usefulness. The convenience and ease of use of the system are greatly enhanced by a number of factors, including interactive experience, clear menu layout, and intuitive interface design. The findings in Table 7 confirmed the effectiveness of the system in meeting user expectations and facilitating a user-friendly experience.

Table 7 Evaluation of Perceived Ease of Use

Factor	Item	Mean	Standard Deviation
Usability	Interactive Experience	3.71	0.957
	Clear Menu Layout	3.773	0.966
	Intuitive Interface Design	3.734	0.972

The results of customer surveys on the usefulness and ease of use of RCOS prototypes indicated that a number of factors significantly influenced user intentions as shown in Table 8. These included quick ordering, clear and understandable interfaces, stable functionality, and practical features. This suggests that users prefer to use systems that meet their needs quickly and accurately, while providing a clear and understandable interface and stable functionality. The significance of these factors is that they directly influence user satisfaction and trust in the system, which, in turn, affects their intention to use the system.

Table 8 Demographics that Influence Intention Usage

Factor	Item	t	P
Efficiency	Quick ordering	7.421	0.000*
	Requires minimal effort to use	1.062	0.289
	Smooth ordering process	-1.277	0.202
Reliability	Clear and understandable	-2.502	0.013*
	Stable functionality	-7.989	0.000*
	Practical features	-2.133	0.034*
Security	Good privacy protection	0.266	0.79
	Protects personal property	0.675	0.5
	Excellent technical support	-0.895	0.371
Usability	Interactive Experience	-0.196	0.845
	Clear Menu Layout	1.135	0.257
	Intuitive Interface Design	0.316	0.752

6. Discussion

This comprehensive study aimed to gain insight into Thai customers' perceptions and usage of Contactless Ordering Systems (RCOS) in restaurants and to identify the factors that influence their adoption and satisfaction. The study utilized a mixed-method approach, integrating qualitative literature analysis with a quantitative survey, and gathered data from 408 participants to customize and evaluate a prototype of RCOS designed specifically for the Thai market.

The study's key findings indicated that Thai customers appreciate the efficiency and ease of use offered by RCOS, particularly the system's fast ordering and clear waiting times. However, it has a potential to further enhance the user experience through improved menu customization and personalization features, which have been shown to be significant in increasing customer satisfaction (Pai, 2022). Security concerns and differences in trust of

payment data may have likewise acted as impediments to the adoption of RCOS. These issues did not seem prevalent across different demographic groups, which aligns with Shim *et al.* (2020). In their study, the authors highlight the importance of security and the potential for lack of security to cause consumer uneasiness.

The study concluded that although RCOS is popular, the adoption of RCOS can be better facilitated by addressing user-specific issues and enhancing features that cater to individual preferences. This finding is consistent with previous research (Junsawang *et al.,* 2020). The study revealed that the system is generally and highly acceptable, especially among younger and middle-aged populations, who use it frequently. This suggests that there are targeted opportunities for improvement.

For future research and restaurant strategies, the study recommended focusing on expanding the appeal and functionality of RCOS rather than focusing on the needs of specific populations. This could enhance overall customer satisfaction and operational efficiency, thereby contributing to the long-term success of RCOS within the Thai restaurant industry.

7. Conclusion

This study responded to the established research questions, through questionnaires to determine customer needs, and then developed a new RCOS software. In addition, by collecting user feedback, this study provided specific suggestions for the restaurant industry to improve software design and promotion strategy.

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