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Determinants of Consumer Intention to Continue Using Table-Top Tablet Ordering Systems in Restaurant Businesses

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Abstract

As restaurant businesses adopt new table-top ordering system (TTOS), the management would want to measure the success of their technology investment. One good indicator is whether returning customers will choose to continue using TTOS after their initial experience. Founded on the Expectation-Confirmation Model (ECM), this study answers the question by investigating customers' continuance intention to use TTOS. Survey data from 140 regular restaurant customers who have prior experience with TTOS shows that satisfaction and perceived usefulness significantly affect continuance intention to use. Perceived usefulness, perceived enjoyment, and user interface significantly influence satisfaction while confirmation significantly affects perceived usefulness, perceived enjoyment, and user interface. Self-efficacy has significant impact on user interface; confirmation does not have significant impact on satisfaction. The findings have valuable implications for restaurant businesses and IT companies on how they should design or update their TTOS in the future.

Keywords: *Table-top tablet ordering systems, expectation-confirmation model, perceived usability, continuance intention to use, satisfaction*

1. Introduction

The Internet of Things (IoT) is a major transformational technological concept that sees connectivity of all things to enable communication among objects and completion of tasks without any human involvement [1]. It focuses on the concept of "smartness". Riding on the wave of the IoT, many restaurant businesses recently adopt table-top tablet ordering system (TTOS). Using TTOS, consumers can browse through the menu, place orders, and even make payments from their sitting tables directly without needing the help of waiters [2]. Implementing TTOS adds value to restaurants. It provides more detailed and rich description of the dishes to customers, eliminates order errors by waiters, and quickens services [3]. Consequently, restaurants are able to cut cost [2]. Customer satisfaction also improves because they feel more involved with the dining process and they can see readily what would be on their plates via the interactive pictorial depiction of the dishes in TTOS [3].

However, TTOS is expensive, making it affordable only for large restaurant chains such as Applebee's and Chili's. Another weak point of a TTOS is that some customers prefer human contact to enhance their dining experience, rather than a machine-facilitated dining process [4]. Therefore, to reap the benefits from TTOS investments, restaurants have to ensure that customers welcome the technology and will continue using it. Previous literature [5] contends that user continuance use is a means to measure technology success. By understanding the factors that contribute to users' intention to continue using a technology, organizations will be able to better plan their strategy and allocate resources more efficiently and effectively to increase the success rate.

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Furthermore, in selecting and using restaurant services, customers usually behave like inspectors where they examine and search for all the information related a restaurant and its services prior to visiting. Based on the information, they will organize their belief, and form their attitude and behavior toward the restaurant [6]. This kind of searching behavior is called clues of service [4]. Berry, Wall and Carbone [6] introduce three types of clues of service in customer service experience: functional clues, mechanic clues, and humanic clues. Among the three, humanic clues which consist of the behaviors of restaurant employees such as the managers and the waiters are the most important clues to service quality [4]. Therefore, in general, customers want to interact with restaurant employees and want to be served by them when dining-out [6]. However, TTOS is just a device and hence does not provide any social interaction. It will be interesting to find out how consumers feel toward TTOS. Since TTOS is relatively new in the market, there is a lack of empirical research that studies the technology.

To address the two issues identified above, this study will examine customers' continuance intention to use TTOS. We based our theoretical model on the expectation-confirmation model and survey the factors that contribute to customers' continuance intention to use TTOS. This study is noble as it fills the research gap and contributes to existing literature in IT and restaurant management.

2. Literature Review

2.1 Expectation Confirmation Model (ECM)

Expectation confirmation model (ECM) is popular in IT acceptance research to explain user satisfaction and IS continuance intention to use [7-10]. ECM is an extension of the Expectation Confirmation Theory (ECT) to explain IT adoption behaviors [8].

The ECT posits that post-purchase satisfaction is a function of expectations, perceived performance, and (dis)confirmation of beliefs [11]. Consumers follow a process sequence to reach repurchase intention. It begins with consumers forming an initial expectation of the product or service prior to purchase. Following the initial consumption period, they form perceptions about the performance of the product or service and compare it with their original expectation [10]. The level at which the expectation meets their perceived performance will determine their level of satisfaction. Satisfied customers form a repurchase intention while dissatisfied customers discontinue subsequent use.

Users' decision to continue using a technology is similar to consumers' repurchase decision [8]. Both follow the sequences of (1) making initial acceptance or purchase decision, (2) experiencing initial use of the product or service, (3) making ex-post decision of continue use or reversal of the initial decision. The ECM posits that perceived post-acceptance usefulness and user satisfaction lead to continuance intention to use. Perceived usefulness along with confirmation of expectations from prior use leads to user satisfaction. Confirmation also influences perceived usefulness.

2.2 An Expectation-Confirmation Model of Continuance TTOS Use

Table-top tablet ordering system (TTOS) describes a table-bounded ordering system implemented using devices such as iPads and Samsung Galaxy Tabs. Using TTOS, customers are able to browse through the menu, read descriptive and see pictorial depiction of the dishes, make orders, and even make payments at the sitting table directly without the help of waiters [2, 12]. TTOS is still relatively new in the market where only large restaurant chains beginning to adopt the technology [12]. Despite it being new, just like any other technology introduction, customers have formed certain expectation prior to accessing TTOS. This expectation, coupled with their actual experience with the system, will affect their overall satisfaction and will influence their continuance intention to use TTOS.

Satisfaction

User satisfaction is "the affective attitude towards a particular computer application by an end user who interacts with the application directly" [13]. Satisfaction influences IS use [8], system success [14, 15], attitude toward a technology [16], and technology acceptance [15]. It is also a key determinant in post-adoption behavior [8, 17].

When visiting restaurants, customers can choose between requesting traditional human-manned services (*i.e.,* calling a waiter) and using the new human-less TTOS. Since the alternative of TTOS is readily available and easily accessible at no apparent monetary cost, customers can easily abandon the technology and opt for traditional waiter-focused services if they are dissatisfaction with TTOS. Only satisfied customers will choose to continue using TTOS. Therefore, satisfaction is salient to customers' decision to continue using TTOS [18]. The more satisfied they are, the higher the likelihood that they will continue using TTOS.

H1: Satisfaction has a positive effect on continuance intention to use

Perceived Usability

Perceived usability is "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" [19]. Previous research (*e.g.,* Roca, Chiu and Martínez [20] has measured perceived usability in three dimensions. Roca, Chiu and Martínez [20] use the dimensions of perceived usefulness, cognitive absorption, and perceived ease of use to measure Internet-based learning while Oghuma, Libaque-Saenz, Wong and Chang [21] use the corresponding dimensions of perceived usefulness, perceived enjoyment, and user interface to measure mobile instant messaging. Considering the type of technology involved and the degree of cognitive requirement in the use, we follow Oghuma, Libaque-Saenz, Wong and Chang [21] instead of Roca, Chiu and Martínez [20] to measure the perceived usefulness, perceived enjoyment, and user interface of TTOS. Oghuma, Libaque-Saenz, Wong and Chang [21] have argued on the logic of replacing cognitive absorption and perceived ease of use with perceived enjoyment and user interface.

Perceived Usefulness

Perceived usefulness is "users' perceptions of the expected benefits of using an IS" [22]. It measures the performance aspect of IS use [7, 16]. Previous research shows that perceived usefulness has consistent and positive influence on adoption intention [23-25], continuance use intention [8, 16, 26], satisfaction [8, 17] and attitude [27]. In ECM, (ex-post) perceived usefulness captures one's post-consumption expectation.

TTOS is useful to customers. With the technology, customers are able to browse through the menu at their own pace and make orders at their convenience without having to alert and wait for table waiting services. Furthermore, TTOS provides consistent and more detailed description and depiction of the dishes which give customers a better idea of their orders. With self-payment services at the table, customers can check the monetary amount of their orders anytime during their dining. They can also make payments directly from their table [12]. This saves time and reduces the hassle of having to wait for the waiters to bring the bills, accept the payments, and produce the receipts. In some restaurants where customers have to queue up to make payments, TTOS eliminates the long queue, which in turn enhances the overall dining experience. Therefore, the more benefits customers expect to gain from TTOS, the more satisfy they are and the higher the likelihood that they will continue using TTOS.

H2: Perceived usefulness has a positive effect on continuance intention to use

H3: Perceived usefulness has a positive effect on satisfaction

Perceived Enjoyment

Perceived enjoyment refers to "the fun and pleasure derived from using IT" [28]. It captures the hedonic motivation of using a technology [24, 29]. Indeed, seeking pleasure and joyful experiences is a basic personal value [30]. In technology use and acceptance,

previous research found that perceived enjoyment increases user satisfaction [28]. In the same way, customers who use TTOS expect to get some sort of joy out of their experience. To address this enjoyment factor, Chili's, for example, offers unlimited games on the tablets for $0.99 [3] with the goal of enticing customers to stay longer and ordering more food. This enjoyment factor will increase customer satisfaction. The higher the level of perceived enjoyment, the stronger the feeling of satisfaction.

H4: Perceived enjoyment has a positive effect on satisfaction

User Interface

User interface refers to the ease of interaction with systems that are user-friendly, pleasurable, aesthetic, and easy to navigate and use [31, 32]. TTOS is built with a single, core objective of facilitating ordering and payment processes. It has minimal functions which often make the technology easy to use. While many TTOS resembles the paper menus, having more interactive design incorporated with clear structure and good usability is important. A technology with good user interface enhances the total user experience [31-34], and increases user satisfaction [32, 35, 36]. We argue the same for TTOS.

H5: User interface has a positive effect on satisfaction

Confirmation

Confirmation is the extent to which the actual use experience confirms one's initial expectation. The ECT and ECM posit that confirmation is positively related to satisfaction [7, 8, 16, 24]. When the actual use experience matches or exceeds the initial expectation, confirmation exists to lead to user satisfaction because the expected benefits of IS use is realized. In contrast, if the actual use experience falls below the initial expectation, dissatisfaction takes place because it fails to achieve the expectation. The same relationship should apply to TTOS use. Consumers who have use TTOS will compare their actual experience with their initial expectation. If their expectation is confirmed, they will feel satisfy with TTOS.

H6: Confirmation has a positive effect on satisfaction.

According to Cognitive Dissonance Theory [8, 37], users may experience cognitive dissonance if their pre-acceptance usefulness is disconfirmed during the actual use. To reduce this dissonance, TTOS users may try to adjust their usefulness perception so that it is more consistent with the reality. Confirmation will increase the perception of usefulness while disconfirmation will reduce the perception [9, 20, 24]. The same cognitive dissonance may apply to TTOS use-related beliefs (i.e., perceived enjoyment, and user interface) where users of TTOS will continuously adjust their expectation to meet the reality.

H7: Confirmation has a positive effect on perceived usefulness

H8: Confirmation has a positive effect on perceived enjoyment

H9: Confirmation has a positive effect on user interface

2.3 Self-efficacy

Self-efficacy refers to "people's judgment of their capabilities to organize and execute courses of action required to attain designated types of performances" [38]. Internet and computer self-efficacy refers how good people think they in using the Internet and computers respectively [39-41]. Internet and computer self-efficacy have positive influence on intention to use IT. In the Theory of Planned Behavior, self-efficacy is a key component of perceived behavioral control which influences behavioral intention [42]. Similarly, in Self-Evaluation Theory, self-efficacy is a crucial factor that affects behavioral intention [43]. In using TTOS, we propose that individuals who are high on self-efficacy will have better knowledge and are more skillful in IT use. This leads them to have higher perception toward how easy it is to interact with TTOS (i.e., user interface). On the contrary, those who have lower self-efficacy are less skillful with IT

and have less confidence in operating IT [44], and hence the TTOS. This leads them to have lower perception to the user interface of the TTOS.

H10: Self-efficacy has a positive effect on user interface.

Figure 1 shows the research model.

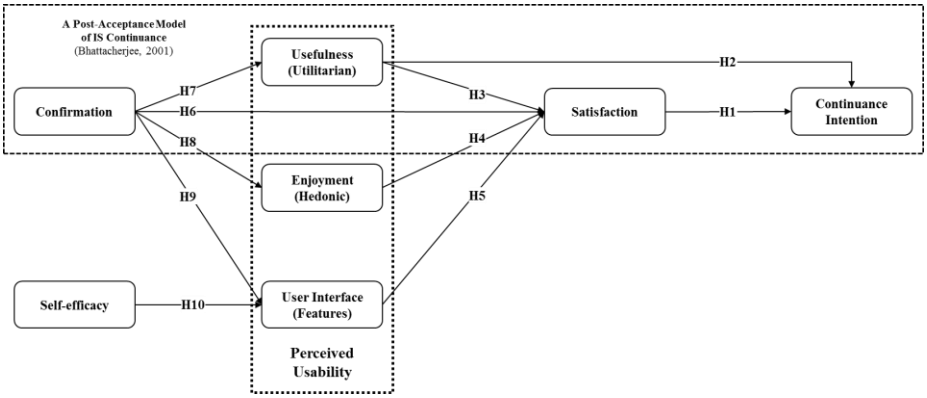

Figure 1. Research Model

3. Research Methodology

3.1 Measurement Development

The measurement items for survey were adopted from previous literature and were modified to fit our research context. The items for confirmation, satisfaction, and continuance intention to use were adapted from Bhattacherjee [8], and Lin and Bhattacherjee [45]. The items for perceived enjoyment were adapted from Thong, Hong and Tam [24] and Lin and Bhattacherjee [45] while the items for perceived usefulness came from Davis [22] and Thong, Hong and Tam [24]. Items for user interface were revised from Flavián, Guinalíu and Gurrea [34] and Zviran, Glezer and Avni [32]. Items for self-efficacy were adapted from Bhattacherjee [46].

3.2 Data Collection

Data from 140 regular customers of restaurants that have implemented TTOS were collected using online survey. After removing 21 surveys which were either incomplete or have invalid responses, a total of 119 valid survey were used for data analysis. The sample consisted of 49% (58 respondents) males and 51% (61 respondents) females.

4. Results

We used partial least squares (PLS) for the data analysis. PLS is a powerful second-generation multivariate technique that assesses both the measurement and structural models simultaneously in an optimal fashion [47]. The technique also has minimum restrictions on measurement scales, sample size, and residual distributions [47]. The analysis was carried out using SmartPLS 2.0 [48]. We started with the analysis of the measurement model and then proceeded with the analysis of the structural model.

Table 1. Reliability and Convergent Validity

Construct	Item	Loading	AVE	Composite Reliability	Alpha
CON	CON1	0.98	0.96	0.98	0.96

	CON2	0.98			
ENJ	ENJ1	0.95	0.92	0.97	0.96
	ENJ2	0.97			
	ENJ3	0.96			
INT	INT1	0.97	0.95	0.98	0.98
	INT2	0.97			
	INT3	0.98			
SAT	SAT1	0.98	0.93	0.99	0.98
	SAT2	0.97			
	SAT3	0.97			
	SAT4	0.97			
	SAT5	0.94			
SEF	SEF1	0.96	0.89	0.97	0.96
	SEF2	0.96			
	SEF3	0.93			
	SEF4	0.93			
UI	UI1	0.89	0.76	0.96	0.95
	UI2	0.90			
	UI3	0.91			
	UI4	0.82			
	UI5	0.89			
	UI6	0.81			
	UI7	0.87			
USE	USE1	0.93	0.88	0.97	0.96
	USE2	0.95			
	USE3	0.96			
	USE4	0.92			

4.1 Reliability and Validity

To ascertain the reliability and validity of the measurement model, we conducted the tests of reliability, convergent validity, and discriminant validity. As shown in Table 1, the item loadings were all higher than the value of 0.7 threshold [47, 49, 50]. All values for composite reliability and Cronbach's alpha exceeded the recommended cutoff of 0.7 [47, 49]. The AVE values were also over the recommended threshold of 0.5 [47, 49]. From these results, we concluded that the measurement model achieves good reliability and convergent validity.

Furthermore, as shown in Table 2, the square root of the AVEs are all greater than the correlations among other variables [47]. The loading of each measurement item on its assigned latent variable is larger than its loading on any other variable. Meeting these two requirements, we concluded that the measurement achieves good discriminant validity.

We also checked to ensure that none of the correlations among constructs (Table 2) is higher than the suggested threshold of 0.85 [51] which allows us to conclude that our model is robust against multicollinearity problem.

Table 2. Item Loading and Discriminant Validity

Construct	CON	ENJ	INT	SAT	SEF	UI	USE
CON	**0.98**						
ENJ	0.83	**0.96**					
INT	0.79	0.85	**0.98**				
SAT	0.86	0.79	0.83	**0.97**			
SEF	0.73	0.61	0.66	0.72	**0.94**		
UI	0.85	0.76	0.73	0.81	0.78	**0.87**	
USE	0.85	0.83	0.80	0.82	0.71	0.78	**0.94**

Note: The numbers in bold represent the square root of the AVEs.

4.2 Structural Model

Figure 2 shows the results of the structural model. We analyzed the R^2 values to assess the explanatory power of the structural model. Overall, the model accounts for 88%, 90.4%, 72.9%, 69.5%, and 77.5% of the variance in continuance intention to use, satisfaction, perceived usefulness, perceived enjoyment, and user interface respectively. Satisfaction and perceived usefulness significantly affect continuance intention to use. Perceived usefulness, perceived enjoyment, and user interface significantly influence satisfaction while confirmation significantly influences perceived usefulness, perceived enjoyment, and user interface. Self-efficacy significantly affects user interface, but confirmation does not have significant effect on satisfaction.

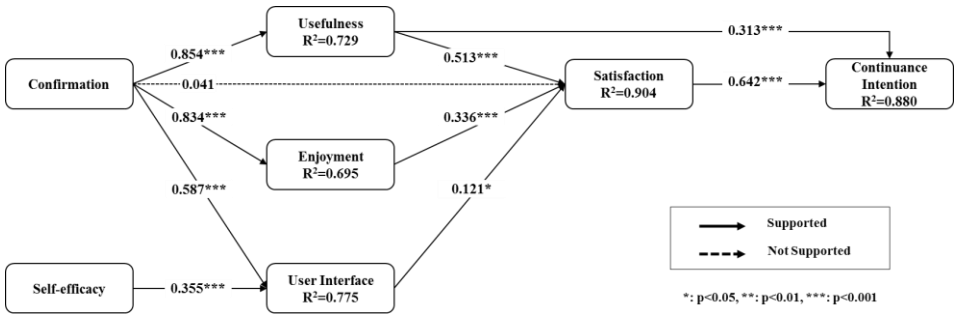

Figure2. Path Analysis

5. Discussion and Implications

This study contributes to the literature in IT adoption and restaurant management. It tested an expectation-confirmation model of users' continuance intention to use TTOS. The PLS analysis shows that all of the hypotheses, with the exception of one, were supported with significant variance explained. The results provide evidence that the model is a useful tool to analyze user decision to continue using TTOS.

The only non-significant relationship is between confirmation and satisfaction. This is contrary to our hypothesis and to previous literature. A plausible explanation is that a readily available alternative to TTOS (*i.e.*, human-based waiting service) is available to customers without any additional cost or switching cost. This nullifies the relationship between the confirmation of previous experience and satisfaction, which means regardless of the previous experience, customers' satisfaction toward TTOS does not change.

Overall, the validated research model describes a set of factors that restaurants and IT practitioners might manipulate to increase continuous adoption and use of TTOS. It suggests that restaurants should pay attention to initial customer use experience because positive confirmation affects user satisfaction and their subsequent intention to use TTOS. Particularly, the results suggest that they should pay attention to all three dimensions of perceived usability which are perceived usefulness, perceived enjoyment, and user interface. These capture the major values of using a technology which are the utilitarian and the hedonic values.

The finding on the significant relationship between user interface and satisfaction sends important message to the applications developers. It suggests that development effort should concentrate not only on how useful a system is, but also how attractive, interactive, and user friendly it is. For example, a cluttered menu with too many options may be confusing to customers. Also, a TTOS that requires customers to scroll through too many pages to reach a dish selection can be frustrating. Furthermore, elements of fun should be added to the development of TTOS. For example, search and selection of dishes can follow a game-like component where customers can answer several quick questions to reach dish suggestion.

6. Limitations and Future Research

This study has limitations. First, it does not take into consideration the purpose of customer visit which may have influenced on how they perceive TTOS. For example, a customer who comes for a quick lunch may favor the quick service of a TTOS while a customer who comes for social gathering may prefer human-facilitated service. Second, the study does not take into consideration the age differences among customers. It is possible that younger customers who are more technology savvy and on the rush will prefer TTOS while older and retired customers who have free time to spare and less technology savvy will prefer face-to-face services from restaurant employees.

Future research could examine the features of TTOS and identify the designs or entities that attract user interest using knowledge from the human-computer interaction field. For example, how to make the menu structure and navigation more intuitive so that users can access the dishes and ordering menu easily? This information can be incorporated into the development of TTOS. In addition, research could investigate if TTOS is suitable for all types of restaurant business and class. For example, would customers of a high-end restaurant welcome TTOS or would they prefer human contact services? Also, would TTOS more suitable for a fast-food oriented environment or a fine-dining environment? Does TTOS need to be customized based on the restaurant type?

7. Conclusion

This study represented a systematic approach to understand and predict users' continuance intention to use TTOS. It based its research model on two established theories: ECM and ECT. The results reaffirmed the role of perceived usefulness and satisfaction on continuance intention to use TTOS. The findings underscore the importance of designing interactive and easy to use TTOS that incorporates the element of fun and adds value to customers' dining experience. This study enriches our understanding of post-adoption use of TTOS.

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