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Article

Application the unified theory of acceptance and use of technology model to the use behavior of convenience store APP

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Abstract: With the popularity of smartphones, consumers' daily lives and consumption patterns have been changed by using multi-functional apps. Convenience store operators have developed membership apps as a platform to promote their brands to consumers to create the benefits of "membership economy". This study examined consumer behavior towards convenience store membership apps using UTAUT2. Consumers who have installed the convenience store membership apps were recruited as the target population. SPSS 23.0 was used to conduct item analysis and reliability analysis in the pretest questionnaires. The formal questionnaires were distributed online by convenience sampling method, with 375 valid questionnaires collected. Smart PLS 3.0 was conducted by analyzing the confirmatory factor analysis and structural equation model analysis. The results of the study, "performance expectancy", "social influence", "price value" and "habit" of convenience store member app users showed positive and significant effects on "behavioral intention". "Facilitating conditions", "habit" and "behavioral intention" have positive and significant effects on "actual use behavior". "Gender" affects "habit" to have a significant moderating effect on "use behavior". "Use experience" affects "habit" to have a significant moderating effect on "behavioral intention". Based on the study results, the further suggestions of marketing management implications and feasible recommendations are proposed for convenience store operators to refer to in the implementation of membership app marketing management.

Keywords: UTAUT2; convenience store membership apps; membership economy; behavioral intention; usage behavior

1. Introduction

With science and technology have dramatically improved, the consumption pattern has changed to demand-oriented. All services are designed to meet the customers' need and seize business opportunities. In the past, customers usually went to the supermarkets and wholesale stores (foodNEXT, 2020), but in order to satisfy customers' needs and attract consumers to actively enter convenience stores for consumption, supermarket and convenience store operators have launched their own digital membership APPs. Consumers can accumulate bonus points and electronic stickers by reporting their phone numbers at the convenience store checkout that also break the traditional paper recording of consumers' pre-ordered items. Nowadays, consumers can get the items across stores according their needs through the convenience store membership apps.

In Taiwan, convenience stores provide a variety of services, including bill

payment, freshly brewed coffee, daily necessities, delivery and pickup, cooked food, ATM deposits, etc. Certain convenience stores also provide specialized services, such as hot-pressed toast, laundry service, hand-cranked drinks, fresh draft beer, unmanned technology store. Convenience stores are highly convenient and open 24 h a day, all year round. The number of chain convenience stores in Taiwan totals 12,537 stores, including 7-ELEVEn, FamilyMart, Hi-Life, OK mart, and Million (Fair Trade Commission, 2021). Convenience store density is ranked 2nd in the world (Lee, 2020). Taiwan's convenience stores are in a red ocean, to compete in this market, "membership economy" must be another strategy that every supermarket will be used. In 2016, FamilyMart officially launched digital membership. By combining it with the application app, it successfully opened the membership app platform that offers members "one dollar one point" electronic collection and cross-store pickup. To date, the number of FamilyMart members has reached 14 million (FamilyMart, 2020), which equivalent to one in two Taiwanese is a FamilyMart member. 7-ELEVEn's OPEN POINT APP also featured exclusive membership promotion in 2020. It attracts customers to become members by offering 5%–10% discount at checkout. So far, the number of members has reached 13 million (7-ELEVEn, 2022). Therefore, the operation of membership apps provided by convenience stores has become one of the trends now.

Most of the relevant researches on convenience store membership apps explore the acceptance and the impacts of consumers using convenience store membership apps and the benefits of convenience store membership apps. However, the researches on consumers' use intentions and use behavior of convenience store membership apps are lack. Therefore, this research will explore the use intentions and actual use behaviors of convenience store membership apps as one of the motivations for this study.

In terms of apps, most previous studies have adopted the Technology Acceptance Mode (TAM) and the Unified Theory of Acceptance and Use of Technology 2, UTAUT2. In the previous research, TAM model dimensions of "perceived usefulness" and "perceived ease of use" on the app usage intention, it was found that the user's perceived ease of use and perceived usefulness have a positive impact on "use behavioral intention" (Kim, 2014).The extended Unified Theory of Acceptance and Use of Technology (UTAUT2) proposed by Venkatesh et al. (2012) includes performance expectancy, effort expectations, social influence, facilitating conditions, hedonic motivation, price value, habits, behavioral intentions and actual use behavior, which nine variables are a theoretical model extended by taking the consumer's environment into consideration. Chopdar et al. (2018) explored the risks of using mobile shopping applications by using the UTAUT2 model. Tak and Panwar (2017) used the UTAUT2 model to explore the factors of mobile shopping applications. The researches and technology discussed by UTAUT2 in the past are all related (Chang and Chen, 2014; Weng and Huang, 2017). Based on the previous researches, the UTAUT2 model is most suitable for explaining the use of new types of technology products and mobile applications. However, the UTAUT2 model has not been discussed on convenience store membership apps. Therefore, UTAUT2 is used in this research to explore the convenience store membership apps as the second research motivation.

Based on the above, this study will use the UTAUT2 to explore the impact of performance expectancy, effort expectations, social influence, facilitating conditions, hedonic motives and price value on convenience store consumers' use intentions and actual use behavior of convenience store membership apps, and also discuss whether users' use behavior on convenience store membership apps is supported by empirical evidence.

Based on the research background and motivation, the research purposes of this study are as follows:

1) Explore the impact of different dimensions on users' behavioral intentions to operate convenience store membership apps in the UTAUT2 model.
2) Explore whether adding adjustment variables to the UTAUT2 model makes a difference in users' behavioral intentions for operating convenience store membership apps.
3) Use the UTAUT2 model to verify the appropriateness of convenience store member app use behavior.

This study aims to understand the relationship between convenience store consumers' use intentions and actual use behavior of convenience store membership app. Based on the literature review, research purposes and research structure, the hypothesis of this study are proposed for verification. The following are the hypothesis concepts:

In the previous research on the usage intention of new technologies or new systems, such as the research on the mobile payment APP (Kim et al., 2010), the mobile banking adoption (Alalwan et al., 2017; Oliveira et al., 2014) have found that performance expectancy have a positive effect on users' willingness to use information systems. According to UTAUT2 and the literature above, it can be expected that the higher the user's performance expectations for the convenience store membership APP, the higher the user's behavioral intention for the convenience store APP. Based on this, the hypothesis of this study is established (H1):

H1: The performance expectancy of using convenience store membership app has positive effect on behavioral intention.

In previous studies, such as researches on the mobile banking adoption (Alalwan et al., 2017) and intention to use mobile money services (Penney et al., 2021) have found that effort expectancy has a positive effect on users' usage intentions. Effort expectancy is defined in this study as the user's belief that using the convenience store APP is simple and easy to learn. If it can be achieved without putting in too much effort, the higher behavioral intention will be. Based on this, the hypothesis of this study is established (H2):

H2: The effort expectancy of using convenience store membership app has positive effect on behavioral intention.

The researches on the usage intention of mobile TV (Wong et al., 2014) and Internet banking adoption (Rahi et al., 2019) have found that social influence has positive effect on the users' behavioral intentions. It is defined that before a user decides to use a convenience store membership APP, the higher support from important people, the higher the user's willingness to use it. Based on this, the hypothesis of this study is established (H3):

H3: The social influence of using convenience store membership app has positive effect on behavioral intention.

The researches on the acceptance of online games (Zeng, 2015) and the use behavior of house APP (Fan, 2021) have both found that facilitating conditions have positive effect on the users' behavioral intentions. Therefore, this study defines facilitating conditions as "the users of convenience store membership APP believe that the resources or infrastructure provided by the surrounding environment can support the use of convenience store membership APP". Based on this, the hypothesis of this study is established (H4) (H5):

H4: The facilitating conditions of using convenience store membership app has positive effect on behavioral intention.

H5: The facilitating conditions of using convenience store membership app has positive effect on use behavior.

In the previous researches, such as research on online purchase intention (Chang and Chen, 2014) and the adoption of mobile social network games (Baabdullah, 2018) have found that hedonic motivation has positive effect on the users' behavioral intentions. This study defines hedonic motivation as having fun or pleasure while using the convenience store membership APP. If the higher the users have fun, the higher their behavioral intention to use the convenience store membership APP. Based on this, the hypothesis of this study is established (H6):

H6: The hedonic motivation of using convenience store membership app has positive effect on behavioral intention.

Price value is considered as when the users believe the expenditure required for the use process is valuable or voluntary expenditure, it means that the users have higher influence on the price value of this technology product (Venkatesh et al., 2012). It defined as that the users have better consumption experience when operating the convenience store membership APPs. Based on this, the hypothesis of this study is established (H7):

H7: The price value of using convenience store membership app has positive effect on behavioral intention.

In the previous researches, the adoption of mobile social network games (Baabdullah, 2018) and accept mobile payment systems (Gupta and Arora, 2020) have found that habits have positive effect on users' behavioral intentions. This study defines it as the users have the habits of using convenience store membership APPs for a long time. Based on this, the hypothesis of this study is established (H8):

H8: The habit of using convenience store membership app has positive effect on behavioral intention.

Venkatesh et al. (2012) pointed out in the study of technology users on mobile networks found that users' operational habits will affect actual usage behavior, which means that when users' habits are more dependent, users are more concerned about convenience; the actual usage behavior of store membership APP will also increase. The researches of mobile wallet adoption in Indonesian (Megadewandanu, 2016) and accept mobile payment systems (Gupta and Arora, 2020) have found that habits have positive effect on the users' actual usage behavior. Based on this, the hypothesis of this study is established (H9):

H9: The habit of using convenience store membership app has positive effect on

use behavior.

The research on the use behavior of house app (Fan, 2021) and research on the use of centre apps (Barbosa et al., 2021) have found that behavior intention has positive effect on users' actual use behavior. Based on this, the hypothesis of this study is established (H10):

H10: The behavioral intention of using convenience store membership app has positive effect on use behavior.

Venkatesh et al. (2012) pointed out that when subjects used new technology products, the differences in male or female cognition and the length of actual use experience have moderating effects on facilitating conditions, hedonic motivation, price value and habits. For example, younger men have a higher tendency towards innovative technology products. However, as their actual usage experience increases, male users' attraction and novelty to technology products would significantly decrease. This shows that men have hedonic motives for new technology products. The degree of acceptance will be higher than that of female users, so hedonic motivation will be affected by the moderating effect of gender and use experience. Users of different genders and different use experiences have significant differences in the impact of "facilitating conditions" on "behavioral intention". In addition, Venkatesh et al. (2012) believes that the impact of the system's "price value" on "behavioral intention" will vary depending on users with different experience. Secondly, Venkatesh et al. (2012) believes that "habit" has an impact on "behavioral intention". "Intention" will be moderated by experience. Based on the literature above, the following hypothesis is developed:

H11-1: The genders of using convenience store membership app have significant moderating effect on H4.

H11-2: The genders of using convenience store membership app have significant moderating effect on H5.

H11-3: The genders of using convenience store membership app have significant moderating effect on H6.

H11-4: The genders of using convenience store membership app have significant moderating effect on H7.

H11-5: The genders of using convenience store membership app have significant moderating effect on H8.

H12-1: The experiences of using convenience store membership app have significant moderating effect on H4.

H12-2: The experiences of using convenience store membership app have significant moderating effect on H5.

H12-3: The experiences of using convenience store membership app have significant moderating effect on H7.

H12-4: The experiences of using convenience store membership app have significant moderating effect on H8.

H12-5: The experiences of using convenience store membership app have significant moderating effect on H9.

The diagram of this research model shown as **Figure 1**.

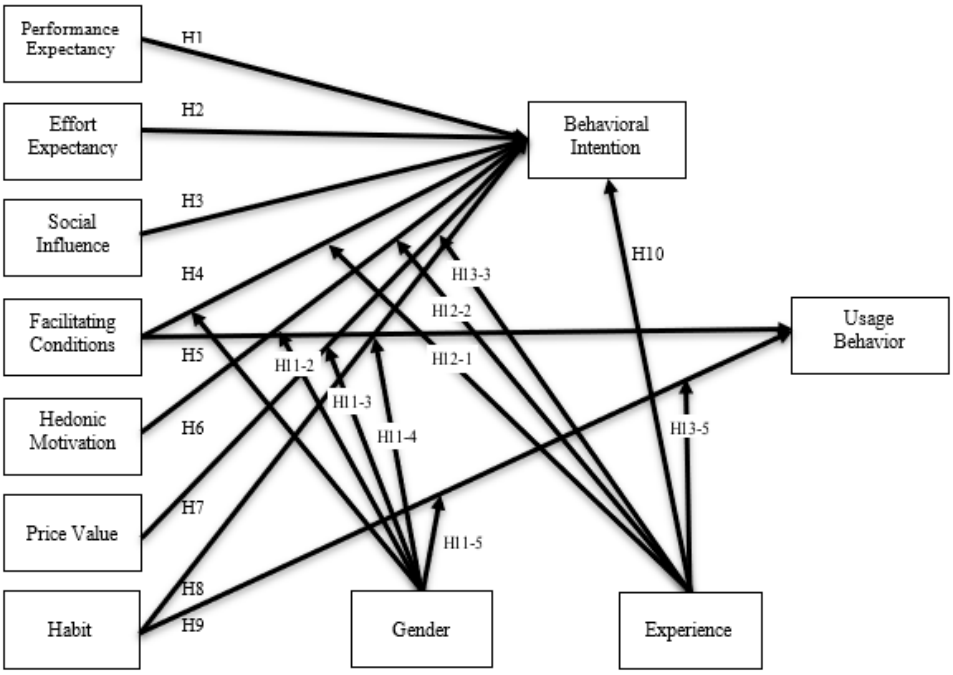

Figure 1. The diagram of this research model.

2. Materials and methods

2.1. Participants

The subjects of this study are users of convenience store membership apps provided by four major convenience stores in Taiwan, namely 7-ELEVEn's OPEN POINT, FamilyMart's membership APP, and Hi-Life VIP and OKmart APPs. Due to human resource, economic, and time constraints, online questionnaires were distributed to societies or groups on social software, such as convenience store whole-store product exchange groups on Facebook, and the Line VIP fan groups established by single stores in regional convenience stores. The estimated number of questionnaires to be filled in is 350. The research questionnaire administration is divided into pre-test and formal questionnaire distribution. The pre-test questionnaire was distributed from 31 March 2021 to 30 April 2021. A total of 50 copies, and 48 copies were effectively. The formal questionnaire was distributed from 20 January 2022 to 20 February 2022. A total of 395 formal questionnaires were collected, excluding 20 questionnaires with invalid answers, and a total of 375 valid questionnaires, effective response rate was 94%.

2.2. Measures

The research tool is based on the UTAUT2 proposed by Venkatesh et al. (2012) and refers to the dimension items from Venkatesh et al. (2012) to adapt the questionnaire items. The questionnaire was divided into ten parts. The first nine parts are the behavioral intentions of convenience store app users and influencing factors of use behavior, including performance expectancy, effort expectancy, social influence, facilitating conditions, hedonic motivation, price value, habits, behavioral intention and use behavior; Part 10 is personal background variables. Each scale in this study adopts a five-point Likert scale, ranging from 1 to 5, which are "strongly disagree",

"disagree", "normal", "agree" and "strongly agree". The following is an explanation of the definitions of the UTAUT2 model of factors.

2.2.1. Performance expectancy

This aspect is extended from the UTAUT model, which means that users can obtain more information about their expectations or benefits when using technological products, which in turn affects users' "behavioral intentions" (Ajzen, 1985; Davis et al., 1992; Fishbein and Ajzen, 1975). Previous research literature has pointed out that performance expectations are an important predictor of behavioral intentions, and that the higher the effectiveness of using technology products, the higher the degree of influence of performance expectations (Venkatesh et al., 2012).

2.2.2. Effort expectancy

This dimension is extended from the UTAUT model, and the past literature has pointed out that the effort is expected to be external factors and the user's ease of using the technology product. This is the "Perceived Behavioral Control" proposed by Ajzen (1985). Davis et al. (1989) proposed to define effort expectation as the belief that the user is laborious in evaluating the use of the technology before using it, and if the user evaluates a certain behavior as laborious, it will affect the subsequent willingness to use it, meaning that when the user uses the technology product, the ease of operation of the technology product, and the easier it is to operate, the higher the degree of effort expectation (Venkatrdh et al., 2012). Based on past research, it has been confirmed that effort expectations influence users' attitudes towards involuntary use and actual use in voluntary.

2.2.3. Social influence

This dimension is an extension of the UTAUT model, in which it has been pointed out that the user's beliefs and motivation to comply with a certain behavior affect the degree to which the user perceives the influence of others and then uses the technology product, which is called "subjective norm" (Fishbein and Ajzen, 1975). Venkatesh et al. (2012) defines social impact as the degree to which a user perceives that an important person (a relative or friend) believes that he or she should use a technology product.

2.2.4. Facilitating conditions

This dimension is extended from the UTAUT model, which means that users feel the convenience or convenience of existing infrastructure or equipment when using the technology product, and that the favorable conditions are an important factor influencing the user's willingness to use the technology product, and the higher the user's support for the convenience of using the technology product, the higher the degree of favorable conditions (Venkatesh et al., 2012).

2.2.5. Hedonic motivation

Venkatesh et al. (2012) pointed out that hedonic motivation will directly affect the acceptance or use of technological products, which is an important adoption determinant, and the higher the user's good pleasure or pleasure after using the technological product, the higher the user's hedonic motivation for the technological product.

2.2.6. Price value

It means that the user's perception of the monetary cost of using the technology product. Price value is a measure of the perceived value paid and received by users, and has also been shown to be an important indicator of repurchase intent for the overall evaluation of technology products (Petrick, 2002; Zeithaml, 1988).

2.2.7. Habit

Habit refers to the behavior of an individual in response to the use of an event or activity for a long time, which means that when a user has a long-term dependence on a technology product, it means that the user has a higher degree of habit (Venkatesh et al., 2012).

3. Results and discussion

3.1. Subsection analysis of UTAUT 2

IBM SPSS Statistics 23 and PLS 3.0 were used to analyze the results of the formal questionnaires. Before conducting formal model path analysis, confirmatory factor analysis was used to test the reliability and validity of each dimension. The measurement methods included the evaluation of the measurement model and testing of each discriminant validity.

The extent to which each variable can be explained by the potential variable can be tested by confirmatory factor analysis, CFA, and determined whether each test item falls within the set original variables. Each item in this study is greater than of 0.7 or above, which meets the standard above 0.7 recommended by Hair et al. (2009) that indicates that each dimension has good internal consistency. This study took 0.7 as the standard value and deleted items with factor loadings less than 0.7. The factor loadings of each item range from 0.754–0.932 indicates that each item has good reliability, shows as **Table 1**.

Table 1. The measurement model parameters.

Dimensions	Items	Factor loading	S.E.	*T* value	*P* value	CR value
Performance expectancy (PE)	PE1	0.873	0.016	53.086	0.894	0.679
	PE2	0.876	0.015	58.641		
	PE3	0.786	0.026	29.745		
	PE4	0.754	0.030	25.032		
Effort expectancy (EE)	EE1	0.830	0.018	45.357	0.920	0.697
	EE2	0.838	0.021	39.970		
	EE3	0.868	0.017	50.415		
	EE4	0.851	0.021	42.911		
	EE5	0.785	0.029	26.659		
Social influence (SI)	SI1	0.806	0.025	32.687	0.894	0.678
	SI2	0.852	0.018	47.408		
	SI3	0.841	0.019	43.826		
	SI4	0.792	0.027	29.092		

Table 1. (*Continued*).

Dimensions	Items	Factor loading	S.E.	*T* value	*P* value	CR value
Facilitating conditions	FC1	0.896	0.013	66.683	0.894	0.734
	FC2	0.871	0.017	51.070		
	FC3	0.896	0.013	67.707		
Hedonic motivation	HM1	0.928	0.010	97.467	0.937	0.832
	HM2	0.916	0.011	85.697		
	HM3	0.892	0.016	54.012		
Price value	PV1	0.903	0.013	66.904	0.926	0.807
	PV2	0.905	0.013	68.707		
	PV3	0.888	0.016	54.487		
Habit	HT1	0.932	0.008	111.499	0.94	0.840
	HT2	0.910	0.012	73.076		
	HT3	0.907	0.012	76.943		
Behavioral intention	BI1	0.894	0.013	68.853	0.928	0.811
	BI2	0.912	0.013	69.126		
	BI3	0.896	0.037	20.392		
Use behavior	UB1	0.871	0.013	67.964	0.911	0.807
	UB2	0.873	0.016	54.811		
	UB3	0.895	0.013	70.521		

The CR value of each dimension is between 0.754–0.928, which indicates that each item has good internal consistency (1998). AVE is commonly used to assess convergent validity and each variable ranges from 0.678 to 0.832, which meets the standard above recommended by Fornell and Larcker (1981).

3.2. The impacts of UTAUT2 on behavioral intention and use behavior

Based on the confirmatory factor analysis, CFA, each variable and each item have good reliability and validity, and the structural equation model can be tested. Smart PLS 3.0 was used to conduct research structure and research hypothesis verification. The significance *t* value of the path is >1.96, as the critical value, has a significant effect. According to the causal relationship estimation results of each potential variable in the research structure model, as shown in **Table 2**, performance expectancy have a direct positive impact on behavioral intention, with a coefficient value of 0.109 (t = 1.967; S.E. = 0.057); social influence has a direct positive impact on behavioral intention, with a coefficient value of 0.132 (t = 2.608; S.E. = 0.051); facilitating conditions have a direct positive impact on use behavior, with a coefficient value of 0.238 (t = 5.792; S.E. = 0.041); price value has a direct positive impact on behavioral intention, with a coefficient value of 0.124 (t = 2.178; S.E. = 0.057); habit has a direct positive impact on behavioral intention, with a coefficient value of 0.605 (t = 9.965; S.E. = 0.061); habit has a direct positive impact on usage behavior, with a coefficient value of 0.290 (t = 4.741; S.E. = 0.061); behavioral intention has a direct positive impact on use behavior, the coefficient value is 0.603 (t = 10.253; S.E. = 0.059).

Table 2. The path coefficient of dimensions.

Paths	Standardization coefficient	S.E.	*t* value	*p* value
Performance expectancy → Behavioral intention	0.109	0.056	1.963	0.047*
Effort expectancy → Behavioral intention	−0.380	0.046	−0.816	0.404
Social influence → Behavioral intention	0.132	0.047	2.608	0.006*
Facilitating conditions → Behavioral intention	0.003	0.057	0.044	0.965
Facilitating conditions → Use behavior	0.238	0.041	5.792	0.000*
Hedonic motivation → Behavioral intention	0.022	0.074	0.289	0.768
Price value → Behavioral intention	0.124	0.056	2.178	0.027*
Habit → Behavioral intention	0.605	0.059	9.965	0.000*
Habit → Use behavior	0.290	0.292	4.741	0.000*
Behavioral intention → Use behavior	0.603	0.059	10.253	0.000*

*$p < 0.05$.

The *t* value of each adjustment path is >1.96, as the critical value, shown as **Table 3**, which only the gender adjustment of habit to use behavior, the experience adjustment of habit to behavioral intention reach to a significant level *p* value < 0.05 and the adjustment coefficients are 0.146, 0.152. However, other adjustment paths are not significant.

Table 3. The path coefficient of adjustment variables.

Adjustment variables	Adjustment paths	Standardization coefficient	S.E.	*t* value	*p* value
Gender	Facilitating conditions → Behavioral intention	0.374	0.198	1.888	0.059
	Hedonic motivation → Behavioral intention	−0.264	0.152	−1.735	0.083
	Price value → Behavioral intention	−0.263	0.184	−1.430	0.153
	Habit →Behavioral intention	0.172	0.143	1.200	0.230
	Habit → Use behavior	0.146	0.065	2.186	0.024*
Experience	Facilitating conditions → Behavioral intention	−0.123	0.080	−1.537	0.124
	Hedonic motivation → Behavioral intention	0.045	0.073	0.616	0.538
	Habit → Behavioral intention	0.152	0.064	2.376	0.018*
	Habit → Use behavior	0.041	0.054	0.759	0.448
	Behavioral intention → Use behavior	-0.056	0.058	−0.980	0.327

*$p < 0.05$.

Behavioral intention has a mediating effect on the influence of habit on use behavior, with a coefficient value of 0.365 ($t = 7.849$; S.E. = 0.046). In order to confirm the influence of indirect effect, Iacobucci and Duhachek (2003) proposed a Variance Accounted For (VAF) value to confirm the degree of influence of the indirect effect relative to the total effect was calculated to be a VAF value of 34.31% (greater than 20% and less than 80%). The results show that some mediation effects existed (Hair et al., 2021), shown as **Table 4** and the diagram of the path model is shown as **Figure 2**.

Table 4. Direct influence between various dimensions.

	Behavioral intention	**Use behavior**		**Total effect**	**VAF**
	Direct	**Direct**	**Indirect**		
Performance expectancy	0.109* (t = 1.967; S.E. = 0.057)			0.109	
Effort expectancy					
Social influence	0.132* (t = 2.608; S.E. = 0.051)		0.018* (t = 2.376; S.E. = 0.034)	0.080	
Facilitating conditions		0.238 (t = 5.792; S.E. = 0.041)		0.238	34.31%
Hedonic motivation					
Price value	0.124* (t = 2.178; S.E. = 0.057)		0.039* (t = 2.065; S.E. = 0.036)	0.075	
Habit	0.605* (t = 9.965; S.E. = 0.061)	0.290* (t = 4.741; S.E. = 0.061)	0.365* (t = 7.849; S.E. = 0.046)	0.655	
Use intention		0.603* (t = 10.253; S.E. = 0.059)		0.603	

*p < 0.05.

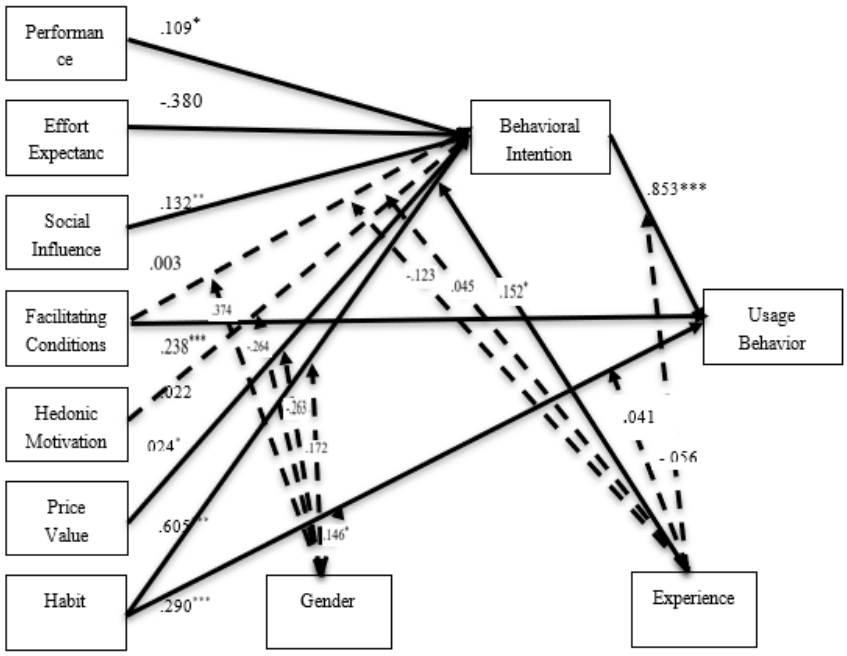

Figure 2. The path model diagram.

Notes: *t > 1.96, p < 0.05; **t > 2.58, p < 0.01; ***t > 3.29, p < 0.001.

Memon and Rahman (2013) pointed out that the purpose of research model adaptation is to measure whether the research structure is sufficient to explain the data obtained from actual exploration. Smart PLS 3.0 statistical software measures the model adaptation index with the GOF value (Goodness of Fit), and the value is judged as GOF small = 0.10, GOF medium = 0.25, GOF large = 0.36 (Akter et al., 2011). This value cannot be generated by Smart PSL and must be calculated by the researcher. The GOF calculation formula is =√ (average AVE × average R^2), if there is a good fit, it means that the research model has high substantial value and the estimated value is more representative. **Table 5** shows the GOF of this research model is 0.757, which is

a good fit; Cronbach's α values are higher than 0.8, which is good reliability; the R^2 values of behavioral intention and usage behavior are respectively 0.727 and 0.779, which represent the patterns with high explanatory power.

Table 5. Overall models fit.

Dimensions	AVE	Composite Reliability	R^2	Cronbach's Alpha	Redundancy	GOF
Performance expectancy	0.679	0.848		0.841		
Effort expectancy	0.697	0.920		0.892		
Social influence	0.678	0.894		0.841		
Facilitating conditions	0.734	0.892		0.819		
Hedonic motivation	0.832	0.937		0.899		0.757
Price value	0.807	0.926		0.881		
Habit	0.840	0.940		0.904		
Behavioral intention	0.811	0.928	0.727	0.884	0.624	
Use behavior	0.774	0.911	0.779	0.854	0.596	

The hypothesis and analysis results of this study are summarized in **Table 6**.

Table 6. The results of research hypothesis.

Research hypothesis	Results
H1: The performance expectancy of using convenience store membership App has positive effect on behavioral intention.	Established
H2: The effort expectancy of using convenience store membership App has positive effect on behavioral intention.	Non-Established
H3: The social influence of using convenience store membership App has positive effect on behavioral intention.	Established
H4: The facilitating conditions of using convenience store membership App has positive effect on behavioral intention.	Non-Established
H5: The facilitating conditions of using convenience store membership App has positive effect on use behavior.	Established
H6: The hedonic motivation of using convenience store membership App has positive effect on behavioral intention.	Non-Established
H6: The hedonic motivation of using convenience store membership App has positive effect on behavioral intention.	Established
H8: The habit of using convenience store membership App has positive effect on behavioral intention.	Established
H9: The habit of using convenience store membership App has positive effect on use behavior.	Established
H10: The behavioral intention of using convenience store membership App has positive effect on use behavior.	Established
Adding gender as an adjusting variable	
H11-1: The genders of using convenience store membership App have significant moderating effect on H4.	Non-Established
H11-2: The genders of using convenience store membership App have significant moderating effect on H6.	Non-Established
H11-3: The genders of using convenience store membership App have significant moderating effect on H7.	Non-Established
H11-4: The genders of using convenience store membership App have significant moderating effect on H8.	Non-Established
H11-5: The genders of using convenience store membership App have significant moderating effect on H9.	Established
Adding experience as an adjusting variable	
H12-1: The experiences of using convenience store membership App have significant moderating effect on H4.	Non-Established
H12-3: The experiences of using convenience store membership App have significant moderating effect on H6.	Non-Established
H12-1: The experiences of using convenience store membership App have significant moderating effect on H8.	Established
H12-4: The experiences of using convenience store membership App have significant moderating effect on H9.	Non-Established
H12-5: The experiences of using convenience store membership App have significant moderating effect on H10.	Non-Established

4. Conclusion and suggestions

4.1. Conclusion

The conclusions of this study are summarized based on the results of analysis and are explained in detail as follows:

a) Verification of extended technology acceptance model.

The performance expectancy, social influence, price value, and habit of the convenience store membership apps have significant positive impact on behavioral intentions; the facilitating conditions, habit and behavioral intention of the convenience store membership apps also have significant positive impact on actual use behavior.

b) The effects of adding adjustment variables to UTAUT2 to the convenience store membership APP.

In this research, it is found that under the influence of the moderating effect of gender, each dimension has no significant on convenience store membership apps, which indicates that for men or women, the facilitating conditions, price value, hedonic motivation, and habit have little differences. In the moderating effect on age, age will affect habit and have a significant adjustment effect on actual use behavior. In particular, especial for young people aged 21-30 are more accustomed to using convenience store membership apps than other age groups, which presents that young people have a relatively high degree of acceptance and reliance on apps, and are accustomed to including operating convenience store membership apps as part of their daily consumption. In the moderating effect on experience, use experience will affect the habit of operating convenience store membership apps and have a significant moderating effect on behavior intention. The user group with more than 1 year of use experience is higher than other groups with use experience.

c) UTAUT2 verifies the suitability of convenience store membership APP.

In this research, UTAUT2 is used as a framework to verify the convenience store membership apps. It found that the UTAUT2 model was used to verify the convenience store membership apps is well adapted that also verified the results of the study by Venkatesh et al. (2012) that UTAUT2 model has an explanatory power for technology product use behavior is as high as 70%. This result can verify the appropriateness of using UTAUT2 to explain the use behavior of convenience store membership app users.

This section is not mandatory but can be added to the manuscript if the discussion is unusually long or complex.

4.2. Suggestions

a) This study found that the first motivation for most consumers to download the apps is to accumulate electronic points from the entire stores. The second is to bind electronic mobile payments (mobile wallets), which shows that most app users have already formed a habit when they go to convenience stores to make purchases. The habit of reporting phone numbers or reading member barcodes to accumulate electronic points. Now, convenience store operators have eliminated the traditional sticker collection activities. In order to stimulating customers to spend the full amount

to redeem co-branded products purchased at increased prices, collecting points more quickly and conveniently has become a major marketing strategy for convenience stores. However, most customers still don't know how to redeem points for gifts on the mobile apps or purchase goods at additional purchase discount. When the store service staffs introduce the apps, they can introduce the current point collection activities and gift redemption methods to customers in order to increase sales. When the store service staffs introduces the apps, the customers can understand it at a glance. They can also use the push in the apps to send relevant information that convenience stores promote currently and provide the point redemption at any time, which is beneficial to the performance of the convenience store.

b) This study also found that convenience store membership apps also provide many thoughtful and diverse services, such as daily life functions, printing, pre-ordering, pickup and delivery, group buying products, electronic invoice logs, cross-brand cooperation discounts and immediate product discounts, and other functions, but most customers don't know that the apps provide such diverse and convenient services. Even a small number of customers only habitually report phone numbers and collection points "verbally" when they consume in the convenience stores. They don't even download and use the apps, resulting in a gap between the number of members and actual usages of apps. There is a significant gap in the number of convenience store membership apps. In addition to the marketing advertisements of the convenience store apps, customers who come into the convenience store were asked if they wanted to download the membership apps, and directly help customers download the apps in the stores, which allows customers to directly understand the activity information and usages on the apps, and more customers are willing to accept the advice of store staff, download and try to start using apps.

4.3. Limitations and directions for future research

The results of this study are based on an investigation of user behavior regarding the basic functions of membership apps across all chain convenience stores in Taiwan. However, the additional features and usage provided by the membership apps of different convenience stores in Taiwan vary and possess unique characteristics. Therefore, future researchers are suggested to focus on studying the membership app of a single chain brand convenience store to better understand the actual benefits of various convenience store apps to users.

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References

Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2017). Factors influencing adoption of mobile banking by Jordanian bank

customers: Extending UTAUT2 with trust. International Journal of Information Management, 37(3), 99-110.

Baabdullah, A. M. (2018). Consumer adoption of Mobile Social Network Games (M-SNGs) in Saudi Arabia: The role of social influence, hedonic motivation and trust. Technology in Society, 53, 91-102.

Barbosa, H. F., Garcia-Fernandez, J., Pedragosa, V., & Cepeda-Carrion, G. (2021). The use of fitness centre apps and its relation to customer satisfaction: a UTAUT2 perspective. International Journal of Sports Marketing and Sponsorship, 23(5), 966-985.

Chang, C. C., Chen, Y. H. (2014). Applying the UTAUT 2 model to investigating online purchasing intention: A Dual Media Perspective. Electronic Commerce Studies, 12(2), 143-168.

Chopdar, P. K., Korfiatis, N., Sivakumar. V. J., Lytras, M. D. (2018). Mobile shopping apps adoption and perceived risks: A cross-country perspective utilizing the Unified Theory of Acceptance and Use of Technology. Computers in Human Behavior, 86, 109-128.

Chiao, C. C., Chen, Y. H. (2014). Applying the UTAUT2 model to investigating online purchasing intention: A dual media perspective. Electronic Commerce Studies, 12(2), 143-168.

7-ELEVEn. (2022). Unification Group Salutes Fathers of the World. Available online: https://www.7-11.com.tw/ (accessed on 2 June 2023).

Fair Trade Commission. (2021). Conducted an industry survey on major convenience store chain operations in Taiwan in 2019 in order to understand market dynamics and the competition of convenience store chain. Available online: https://www.ftc.gov.tw/internet/main/doc/docDetail.aspx?uid=126&docid=16398 (accessed on 2 June 2023).

FamilyMart. (2022). Available online: https://www.family.com.tw/Marketing/ (accessed on 23 June 2023).

Fan, Y. Q. (2021). A study on the use behavior of house app based on the Unified Theory of Acceptance and use of technology [Master's thesis]. Chaoyang University of Technology.

foodNEXT. (2020). Let me see who you are! Convenience stores are fighting for members! Available online: https://www.foodnext.net/news/industry/paper/5111460111 (accessed on 2 June 2023).

Fornell, C., Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Gupta, K., & Arora, N. (2020). Investigating consumer intention to adopt mobile payment systems: an Indian perspective. International Journal of Technology Transfer and Commercialisation, 17(2-3), 115-134.

Hair, J. F., Anderson, R. E., Tatham, R. L., Black, W. C. (1998). Multivariate data analysis, 5th ed. New Jersey, NJ: Printice-Hall.

Hair, J. F., Anderson, R. E., Tatham, R. L., Black, W. C. (2009). Multivariate data analysis. Englewood Cliffs, NJ: Prentice Hall.

Iacobucci, D., Duhachek, A. (2003). Advancing alpha: Measuring reliability with confidence. Journal of Consumer Psychology, 13(4), 478-487.

Kim, C., Mirusmonov, M., & Lee, I. (2010). An empirical examination of factors influencing the intention to use mobile payment. Computers in Human Behavior, 26(3), 310-322.

Kim, S. H. (2014) A Study on Adoption Factors of Korean Smartphone Users: A Focus on TAM (Technology Acceptance Model) and UTAUT (Unified Theory of Acceptance and Use of Technology). Advanced Science and Technology Letters.

Lee, Y. W. (2020). Increase of 524 stores in a year, Taiwan's convenience store ranks second in the world. Available online: https://ec.ltn.com.tw/article/paper/1391712 (accessed on 2 June 2023).

Megadewandanu, S. (2016). Exploring mobile wallet adoption in Indonesia using UTAUT2: An approach from consumer perspective. In: Proceedings of the *2*016 2nd International Conference on Science and Technology-Computer (ICST).

Memon, A. H., Rahman, I. A. (2013). Analysis of cost overrun factors for small scale construction projects in Malaysia using PLS-SEM method. Modern applied science, 7(8), 78.

Oliveira, T., Faria, M., Thomas, M. A., & Popovič, A. (2014). Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM. International Journal of Information Management, 34(5), 689-703.

Penney, E. K., Agyei, J., Boadi, E. K., et al. (2021). Understanding factors that influence consumer intention to use mobile money services: An application of UTAUT2 with perceived risk and trust. Sage Open, 11(3).

Rahi, S., Ghani, M. A., & Ngah, A. H. (2019). Integration of unified theory of acceptance and use of technology in internet banking adoption setting: Evidence from Pakistan. Technology in Society, 58, 101120.

Tak, P., Panwar, S. (2017). Using UTAUT 2 model to predict mobile app based shopping: evidences from India. Journal of Indian Business Research, 9(3), 248-264.

Venkatesh, V., Thong, J. Y., Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157-178.

Weng, C. Y., Huang, H. P. (2017). A study on the use behavior of LINE TV based on the UTAUT2 and digital lifestyle scale. Journal of Cyber Culture and Information Society, 17-63. https://doi.org/10.29843/JCCIS.201707_(33).0002

Wong, C. H., Tan, G. W. H., Loke, S. P., & Ooi, K. B. (2014). Mobile TV: a new form of entertainment. Industrial Management & Data Systems.

Zeng, X. X. (2015). A research of the game acceptance of the league of legends players-based on UTAUT2 model [Master's thesis]. National Kaohsiung First University of Science and Technology.