科技部補助專題研究計畫成果報告
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行動遊戲化設計之應用程式實作與使用成效評估(第2年)

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中 文 摘 要 ：「遊戲化(Gamification)」的目標不是直接增加非遊戲場合的樂趣，而是在進行的過程中感到有趣，促使人們達到一定的目標。遊戲設計與一般遊戲(Game-based)的差別在於前者是為了達成某種目的所設計出來的遊戲，這樣的設計除了可以幫助使用者解決生活上的問題，若將遊戲設計的元素應用在產品服務中，也可以正向提升使用者經驗。

本計畫主要使用遊戲設計(Gamification)的概念，設計出適合行銷目的之擴增實境行動遊戲應用程式(APP)。此遊戲設計結合了擴增實境以及全球定位系統等技術，以探討使用者體驗行動遊戲後所產生的顧客價值與品牌忠誠度之影響。首先，本研究定義了行動遊戲設計的八大元素，包含了投入性、幻想性、娛樂性、社交性、全能性、競爭性、技巧性、和適地性。再者，本研究模式的適地性視為一個二階形成性構面，子構面包括無所不在性以及定位性；顧客價值也是一個二階形成性構面，子構面包括實用價值、享樂價值與社交價值；品牌忠誠度亦為二階構面，子構面包括品牌的口碑和持續使用意圖。本研究採取準實驗法以驗證模式，期望本研究結果能提供行動商務管理者制訂行銷策略之參考依據，以達成其目標。

中 文 關 鍵 詞 ：遊戲化設計、行動服務、使用成效、品牌忠誠度、準實驗法

英 文 摘 要 ：Gamification is defined as using game design elements, characteristic for games, in non-game contexts, and it is a process of using game mechanics to engage users and achieve a specific goal. In order to build effective gamification apps (applications) for effective user performance, the objectives of this project is to develop strategic elements for mobile gaming design in providing innovative services. The purpose of this study is mainly to use the Gamification concept to design a mobile gaming app for contextual marketing, and we integrate digital game design technologies, such as mobile augmented reality (MAR) and global positioning system (GPS). This study focuses on associated consumer value and brand loyalty created by the users after experiencing the mobile game. Accordingly, we define the eight elements of a mobile gamification design, including coping-escape, fantasy, recreation, social, omnipotence, competition, skill development, and location-based. This research model treats "location-based" as a formative second-order construct driven by ubiquitous connectivity and contextual offer. Consumer value is also a formative second-order construct driven by utilitarian value, hedonic value and social value. Brand loyalty is a reflective second-order construct driven by continuance intention and word-of-mouth. This study conducts a quasi-experimental research to verify our model. It is hoped that service managers can benefit from the insights discovered from this study and implement more effective management strategies for effective performance.

Implementation and Evaluation of Mobile Gamification Design for Effective Performance (2/2)

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Introduction

With the gradual development of mobile communications technology, mobile commerce possesses great potential in becoming another new industry, post e-commerce. ETC Digital (2011). reports that the value of global mobile commerce is increasing at an annual rate of 42%, with an estimated 617 billion dollars in market value from 2011 to 2016. The NIKE+, for example, is a mobile service that combines a mobile application, social functions, and the user's running shoes. Inside that, NIKE+ Coach provides personalized training lessons from which users may choose. The user may also use NIKE+ to record his daily jogging distance and speed, and share his jogging data with friends by uploading them to social media platforms. In addition, NIKE+ lets users add their personal records (e.g. the furthest distance, completed challenges, etc.) on NIKE's official website. This sort of design effectively improved user experience and consumer value. Therefore, through appropriately designed apps, mobile commerce can create positive consumer value.

Gamification is a process of using game thinking and game mechanics in non-game contexts to increase users' self contributions. "Gamification" is different from "game-based" concept, since a "gamified" artefact is a game designed to achieve a specific goal through a process fun. Not only can such a design help users solve problems in daily life, it can also positively enhance user experience if its

elements are used for a product or service. Thus, gamification is increasingly being applied to many industries, including electronic commerce, to create fun and engaging experiences, converting users into loyal players.

Past research has proven that gamification can effectively complete many objectives: learning performance (Menezes Jr, Gusmão, & Machiavelli, 2013), job performance (Deterding, Dixon, Khaled, & Nacke, 2011; Hamari & Lehdonvirta, 2010; Huotari & Hamari, 2012) . However, few research probes into brand loyalty in mobile commerce from a gamification design point of view. Combining the above, the goal of the study is to develop a mobile app to investigate the effects of mobile gamification elements on consumer value which in turn affects users' brand loyalty.

Theoretical foundation and hypotheses

Deterding et al. (2011) defined *gamification* as the element of gaming in a non-gaming situation. (Huotari & Hamari, 2012), on the other hand, gamification was defined as a process that helps the user create an overall value through a gaming experience. The goal of gamification is not purely to have fun; it is done mainly in hopes of achieving a particular objective through the addition of the gaming element (e.g. to increase sales by attracting people through a fun game design, or to increase a student's learning performance).Subsequently, (Demetrovics et al., 2011) proposed the 7 major elements of gamification: coping-escape, fantasy, recreation, social, omnipotence, competition, and skill development.

For many corporations the focus of mobile gamification design and development goes beyond making them fun—it extends to achieving consumer value and sales goals. Referring to consumer utilitarian value, (Rieber, 1996) proposed that a game is a continuing process, and the user may learn useful things during that process. As for consumer hedonic value, because the user experiences a feeling of "flow" while fully immersed inside a game, the user will feel more positive

emotions while inside, ignore the environment outside, and therefore desire to remain within the game (Hamari & Koivisto, 2013). Referring to consumer social value, (Buckingham, Thompson, Carr, & Burn, 2006) mentioned that within the gaming interaction process, the user corresponds with other players and completes gaming missions together, thereby creating a positive social experience (Chen, 2009; Ducheneaut & Moore, 2005; Jakobsson & Taylor, 2003). Putting these together, a game design that does selling well not only allows the user to learn useful things through gaming (utilitarian value) and can be immersed in joy (hedonic value), but more over allow the user to make positive interactions with friends (social value). Therefore, this study proposes the following hypotheses:

H1: Mobile gamification design has a positive influence on consumer value

As per inference H1, we presume hypothetically that the 8 elements of game design affect consumer value, and then further that presumption by analyzing 13 case studies as follows. First, the level of coping-escape achieved by the game design shows that the game has attraction, letting the user escape reality and solve problems in the game world (Demetrovics et al., 2011). In our multiple-case analysis, games that qualify as coping-escape include Dota Legend, Tower of Saviors, Summers War: Sky Arena, Clash of Clans, Ridge Racers 3D, Minecraft, LINE Pokopoko, Cat-Mouse, Super-Legend, Subway Surfers, and Bubble Witch 2 Saga. Dota Legend, as an example, has a sign-in mechanism for its Daily Mission function, where different prizes are awarded depending on how many times users log in. This increases the user's willingness to get in the game every day, and cultivating the user's resolve to continue and never give up (utilitarian value). Also, the mission award changes every day, so that the user enters the game feeling there's something to look forward to (hedonic value). Finally, users share their feelings of accomplishment from their daily missions (social value). Therefore, this study postulates that the more a game design can induce a user to have coping-escape, the more consumer value the user derives.

H1a: The design element of "Coping-escape" in mobile gamification has a positive effect on consumer value

The fantasy element of game design means that the game functions to create fantasy, letting the user experience things he can't do in real life (Demetrovics et al., 2011). In our multiple-case analysis, games that possess the fantasy element include Tower of Savior, Summoners War: Sky Arena, Clash of Clans, Ridge Racers 3D, Minecraft, LINE Pokopoko, Cat-Mouse, Super-Legend, and Subway Surfers. Minecraft, for example, mainly helps the user create his own castle, thereby enhancing the user's imagination in real life (utilitarian value). Also, the user can imagine himself to be the master of the game, where he can accomplish the creation of a unique house, just the way he likes it (hedonic value). Finally, multiple users can actually work together and make an ideal castle through cooperation (social value). Therefore, this study postulates that the more a game design can induce a user to have fantasies about the game, the more consumer value the user derives.

H1b: *The design element of "*Fantasy*" in mobile gamification* has a positive effect on consumer value

The recreation element of a game design refers to the game's ability to make the user feel enjoyment and relaxation while engaging in this activity (Demetrovics et al., 2011). In our multiple-case analysis, all the samples qualify as recreation. All gaming apps should allow the user to feel relaxation while experiencing the game. Take Candy Crush, for example, this game design involves combining vibrantly colored candies with light hearted music, helping the user relieve pressure in real life (utilitarian value). Also, simply play mechanics allows the user to relax and just enjoy the game (hedonic value). Finally, the user can sync his Candy Crush progress between his smart phone and computer, and happily discuss each other's game progress with his/her Facebook friends (social value).

Therefore, this study postulates that when a game design allows the user to feel relaxed during the game, it positively affects consumer value.

H1c: The design element of "Recreation" in mobile gamification has a positive effect on consumer value

The social element of game design refers to the game's ability to allow interaction among many users, enhancing relationship between a user and his/her friends. (Demetrovics et al., 2011) . In our multiple-case analysis, games that qualify as social include Dota Legend, Tower of Saviors, Summoners War: Sky Arena, Candy Crush, Clash of Titans, LINE STAGE, Minecraft, LINE Pokopoko, Super-Legend, Subway Surfers, and Bubble Witch 2 Saga. LINE Pokopoko and Bubble Witch 2 Saga, for example, allow the user the post his scores to his LINE or Facebook News Feeds, giving the user and his friends more to talk about through gaming, helping the user keep in touch and expand his circle of friends (utilitarian value). Also, aside from sharing scores the user can also ask friends for help, making the game that much more fun (hedonic value). Finally, LINE Pokopoko allows the user, through connecting to external apps, contact his LINE friends, thus promoting discussion on gaming techniques; in the same way, Bubble Witch 2 Saga allows players to see his Facebook friends' gaming progress in the "Game Hall", again allowing more discussion and interaction (social value). Therefore, this study postulates that the more interaction a game enables among users, the more consumer value the user derives.

H1d: The design element of "Social" in mobile gamification has a positive effect on consumer value

The omnipotence element of game design means that the user has a certain degree of control and understanding with respect to how the game is played (Demetrovics et al., 2011). In our multiple-case analysis, games that possess the omnipotence element include Dota Legend, Tower of Saviors, Summoners War: Sky Arena, Clash of Clans, Ridge Racers 3D, LINE STAGE, Minecraft, LINE

Pokopoko, Cat-Mouse, Super Legend, Subway Surfers, and Bubble Witch 2 Saga. Subway Surfers, for example, requires the virtual protagonist to avoid hitting obstacles via having the user slide up, down, left and right. This may enhance the user's reflex in real life (utilitarian value). Also, due to the control scheme is easy to use and learn, the users can easily derive a feeling of joy during play (hedonic value). Finally, the user has the ability, via connecting to external networks, to promote this game to other social platforms and entice more people to join the game (social value). Therefore, this study postulates that the greater the degree of control a user has through game design, the more consumer value the user derives.

> H1e: The design element of "Omnipotence" in mobile gamification has a
>   positive effect on consumer value

The competition element of game design refers to the users' ability to compete with each other within the game, producing a sense of accomplishment through winning while gaming (Demetrovics et al., 2011). In our multiple-case analysis, competitive samples include Dota Legend, Tower of Saviors, Summoners War: Sky Arena, Candy Crush, Clash of Clans, Ridge Racers 3D, LINE STAGE, Minecraft, LINE Pokopoko, Super-Legend, Subway Surfers, and Bubble Witch 2 Saga. LINE STAGE, for example, has a PK (Penalty Kick) function that allows users to directly compete for higher scores, cultivating real life competitiveness within the user (utilitarian value). Also, the PK function creates excitement for the users through battling each other (hedonic value). Finally, when the PK is done, users have something in common to talk about and share each other's gaming techniques (social value). Therefore, this study postulates that the more a game design can induce user competitiveness, the more consumer value the user derives.

> H1f: The design element of "Competition" in mobile gamification has a
>   positive effect on consumer value

Skill development in game design refers to the game having a level of difficulty, allowing the user to improve coordination and concentration through game play

(Demetrovics et al., 2011). In our multiple-case analysis, games involving skill development include Tower of Saviors, Candy Crush, Clash of Titans, LINE STAGE, Minecraft, LINE Pokopoko, Cat-Mouse, Subway Surfers, and Bubble Witch 2 Saga. Tower of Saviors, for example, requires that the user flip beads within a set time to pass a stage, training the user's ability to concentrate and think logically in real life (utilitarian value). Also, the user can derive more positive energy through passing stage after stage (hedonic value). Finally, users are able to talk about the skills required to win inside the game (social value). Therefore, this study postulates that the more skill development a game design allows, the more consumer value the user derives.

> H1g: The design element of "Skill Development" in mobile gamification has a positive effect on consumer value

The location-based element of game design refers to the user's ability to receive the latest information, anytime, anywhere, such that the user, when at a certain spot, may receive the latest information particular to that location. All apps in our case analysis qualify as location-based, and have a positive influence on consumer value. All apps require that the user be online to play. For example in Tower of Saviors the user must be connected to the Internet to receive his daily bonus, so the player continuously seeks locations that provide Internet (utilitarian value). Also, the user will feel joy upon receiving the bonus (hedonic value). Finally, the user can communicate with other users through instant messaging (social value). Therefore, this study postulates that the more location-based a game design is, the more consumer value the user derives.

> H1h: The design element of "Location-Based" in mobile gamification has a positive effect on consumer value

Past researches defined brand loyalty in one dimension, as consumers' inclination to repurchase products based on their satisfaction and accumulated experiences of the brand (Assael, 1993; Jacoby & Chestnut, 1978). According to

(Jacoby & Olson, 1970), who took a psychological approach to brand loyalty, brand loyalty is the result of non-random, long-lasting behavioral responses that shape a mental purchase process comprising certain decision units. From attitude and behavioral loyalty, that consumer value affects a consumer's loyalty to a certain brand. If one can provide a product or service that suits the users' needs, such that they feel a certain brand's product/service is useful (utilitarian value), their loyalty for that brand can increase. Moreover, effective social interaction that improves a user's mood (hedonic value) or satisfies his social needs (social value) over the course of brand contact also have a positive effect on brand loyalty. In summary, this research, under the presumption that consumer value (utilitarian value, hedonic value, social value) can raise brand loyalty, states the following hypothesis:

H2: Consumer value has a positive effect on brand loyalty

H2a: Utilitarian value has a positive effect on brand loyalty

H2b: Hedonic value has a positive effect on brand loyalty

H2c: Social value has a positive effect on brand loyalty

Research methodology

Research model

The purpose of this study is to gain insights into the ways in which design elements of mobile gamification may affect consumer value, which in turn influences brand loyalty for successful consumer-brand relationship. In the research model, we define the eight elements of a mobile gamification design, including coping-escape, fantasy, recreation, social, omnipotence, competition, skill development, and location-based.　This research model treats "location-based" as a formative second-order construct driven by ubiquitous connectivity and contextual offer, as well as "consumer value" as another second-order construct driven by utilitarian value, hedonic value, and social value. Moreover, brand loyalty is also a second-order construct driven by word-of-mouth and continuance intention. The research model is shown in Figure 1.
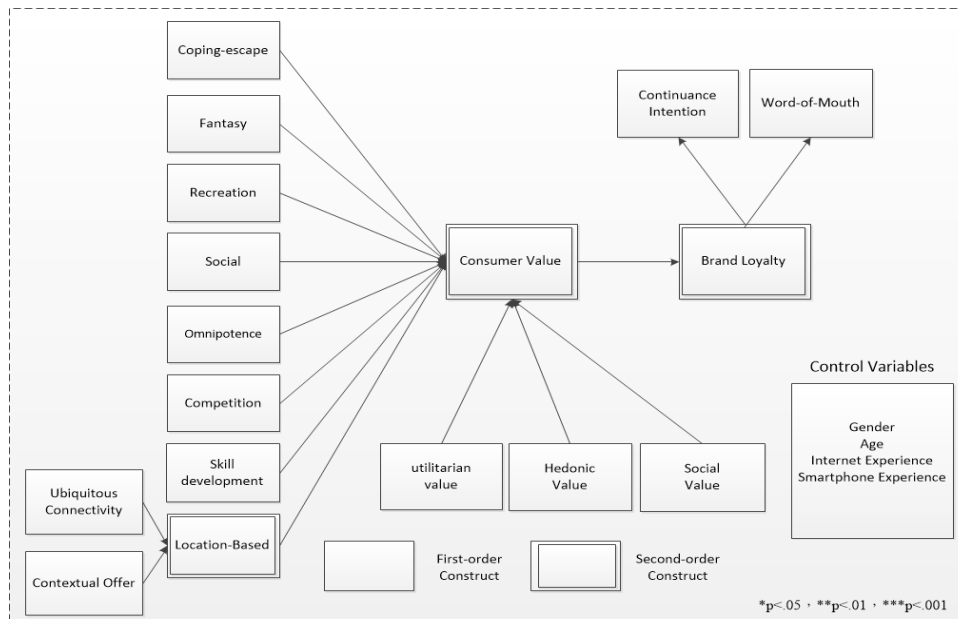
Figure 1：Research model

TKU APP

TKU APP was designed to enhance users' loyalty and brand preference, Tamkang University (TKU), while playing this game. The designed idea of the TKU adventure APP was combined Mobile Augmented Reality (MAR) technology and Global Positioning System (GPS), redesigned the campus geographical environment in the gamification through the mobile devices. Players need to arrive the specific locations to trigger several missions. It is the mobile gamification program to enable players enjoying in the TKU campus and having a new impression about TKU (see Figure 2).
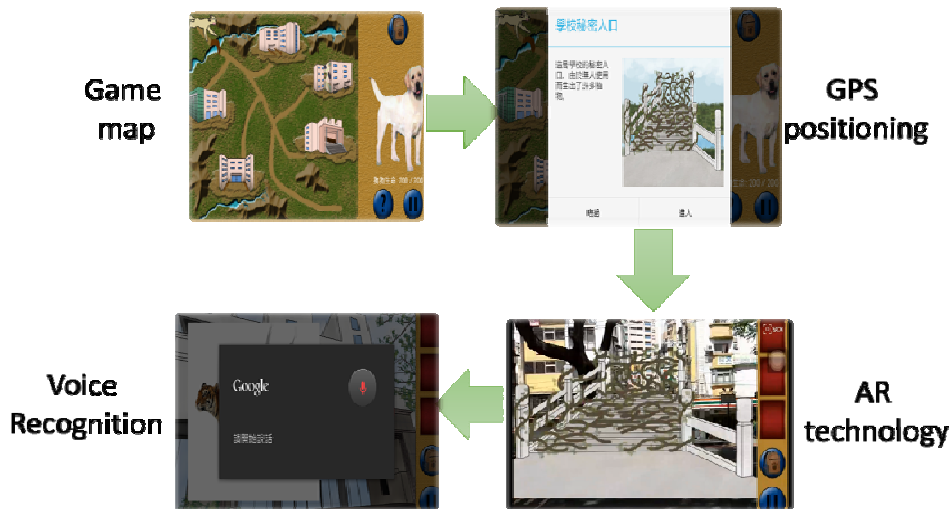
Figure 2：One of TKU adventure processes

Measurement development

The measurement items were adapted from the literature. The questionnaire was originally developed in English and then translated into Chinese. A pre-test of the questionnaire was conducted to assess its logical consistency. Before release official survey, this study asked 6 information management specialists to a pre-test on our survey and join a discussion. Then, a large-scale pilot test with 100 users to

confirm the measurement properties of the final items. The results indicate that the measurement model fulfils the criteria for the reliability, convergent validity, and discriminant validity, with composite reliability values ranging from 0.8340 to 0.9285, average variance extracted (AVE) values ranging from 0.5674 to 0.8125, and factor loadings ranging from 0.7 to 0.937. This study was to discover any major problems with our survey and provide our survey with content validity. The items and their sources are listed in Appendix. All of the measurement items use a seven-point Likert scale, anchored from strongly disagree(1) to strongly agree(7).

Survey administration

The participants are focus on high school students and university students. The ideal participants for our survey are high school students (mainly those who have completed their university entrance exams and are about to choose their universities). Because high school students do not generally have a high degree of understanding for Tamkang University (as a brand), a goal of this research is to provide a more favorable impression of Tamkang University (as a brand) through experiencing the research app, thereby increasing their loyal to Tamkang University (as a brand). This research collects data using the methods: the research team posts experiment information to Facebook (FB), Bulletin Board Systems (BBS's), chat rooms and virtual communities. In addition, we physically visited various high schools to promote this research event, and used a monetary reward system (US $10) to attract more test subjects to our event. Data collection spanned a period of two months and resulted in 342 surveys. Filtering out invalid samples (e.g. incomplete surveys), 332 valid surveys were retained, which about 97% ratio. Table 1 lists the demographic information of our survey.

Table 1：Demographic information of Respondents (N=332)

	ITEM	FREQUENCY	PERCENTAGE
Gender	Male	154	46.39%
	Female	178	53.61%
Age	15-17	39	11.75%
	18-20	146	43.97%
	More than21	147	44.28%
Education	High school	69	20.78%
	University	263	79.22%
Use APP(a week)	Within 10	9	2.71%
	11~30	50	15.06%
	31~50	65	19.58%
	51~100	85	25.60%
	Above101	123	37.05%
Internet Surfing	Within 1	15	4.52%
	1~2	56	16.87%
	2~3	63	18.97%
	3~4	67	20.18%
	4~5	41	12.35%
	5~6	23	6.93%
	Above6	67	20.18%

Data Analysis

A two-step approach, recommended by (Anderson & Gerbing, 1988), was adopted for the data analysis. The first step involves the analysis of the measurement model while the second step tests the structural relationships among the latent constructs. The aim of the two-step approach is to establish the reliability and validity of the measures before assessing the structural relationship of the model. SmartPLS2.0 was allows latent constructs to be modelled as formative or reflective indicators. SmartPLS2.0 places minimal restrictions on the measurement scales, sample size and residual distribution (Chin & Newsted, 1999).

Measurement Model

The adequacy of the measurement model was evaluated based on the criteria of reliability, convergent validity, and discriminant validity. Reliability was examined based on the composite reliability values. Table 2 shows that all of the value are above 0.7, satisfying the commonly acceptable level. The convergent validity of the scale was using by two criteria (Fornell & Larcker, 1981): (1) all indicator loading should be significant and exceed 0.7 and (2) the average variance extracted (AVE) should exceed 0.5.

Table 4 shows that all of the items exhibit a loading higher than 0.7 on their respective constructs, and Table 2 shows that all of the AVEs range from 0.639 to 0.828, thus satisfying both criteria for convergent validity.

The discriminant validity was examined using the following three tests. First, the cross-factor loadings (Table 4) indicate that there is exists good discriminant validity because the loading of each item on its assign latent variable is larger than its loading on any other construct (Chin & Newsted, 1999). Second, the correlations among the constructs (Table 3) are all below the 0.75 threshold (Kline, 1998). Third, the square root of the AVE form the construct is much larger than the correlation shared between the construct and the other constructs in the model (Table 3) (Fornell & Larcker, 1981).

Table 2：Descriptive Statistics for the Constructs

	ITEM	AVE	Composite Reliability	R Square	Cronbach's Alpha
COP	4	0.750	0.923	0	0.889
FAN	3	0.639	0.841	0	0.720
RE	3	0.735	0.893	0	0.819
SOC	3	0.794	0.920	0	0.870
OMN	3	0.663	0.855	0	0.749
COM	3	0.710	0.880	0	0.797
SD	3	0.732	0.891	0	0.816
UC	3	0.701	0.875	0	0.783
CO	4	0.798	0.940	0	0.915
FV	4	0.759	0.926	0	0.894
HV	3	0.828	0.935	0	0.896
SV	4	0.826	0.950	0	0.930
CI	3	0.764	0.907	0.816	0.844
WOM	3	0.770	0.909	0.828	0.850

Table 3：Correlations among constructs and the square root of the AVE

	CI	CO	COM	COP	FAN	FV	HV	OMN	RE	SD	SOC	SV	UC	WOM
CI	**0.874**													
CO	0.316	**0.893**												
COM	0.382	0.357	**0.843**											
COP	0.300	0.284	0.509	**0.866**										
FAN	0.405	0.372	0.589	0.572	**0.799**									
FV	0.422	0.329	0.476	0.396	0.519	**0.871**								
HV	0.444	0.377	0.594	0.533	0.619	0.532	**0.910**							
OMN	0.388	0.437	0.610	0.511	0.573	0.452	0.546	**0.814**						
RE	0.447	0.308	0.586	0.612	0.618	0.580	0.741	0.544	**0.857**					
SD	0.388	0.314	0.567	0.538	0.502	0.431	0.471	0.493	0.485	**0.86**				
SOC	0.384	0.246	0.439	0.400	0.398	0.390	0.411	0.370	0.398	0.43	**0.891**			
SV	0.395	0.259	0.592	0.460	0.429	0.428	0.455	0.517	0.466	0.58	0.571	**0.909**		
UC	0.317	0.661	0.434	0.318	0.447	0.416	0.441	0.437	0.386	0.37	0.251	0.323	**0.837**	
WOM	0.644	0.401	0.501	0.364	0.512	0.516	0.507	0.448	0.511	0.40	0.350	0.409	0.508	**0.878**

Note: The diagonal elements (in bold) are the square root of the AVE.

Structural model

After analysing the data and using T statistics to calculate the P value, the Figure 3 shows that Fantasy, Recreation, Social, Omnipotence, competition, skill development, and Location-Based elements can positively affect consumer value. Otherwise, consumer value can positively affect brand loyalty. In our study, the "Coping-escape" is not positively affect consumer value. One of the reasons is that our game is a combination of mobile augmented reality (MAR) technology and Location-based service (LBS). Although the MAR technology of smart mobile devices is very attractive, it still integrates digital information with the user's environment in real time while playing the game. Thus, these players cannot completely immerse in the virtual objects of the game. By two-Sample t-test for

paired data (Table 5), it shows that the subjects' brand loyalty towards TKU is different after they experienced the TKU APP.
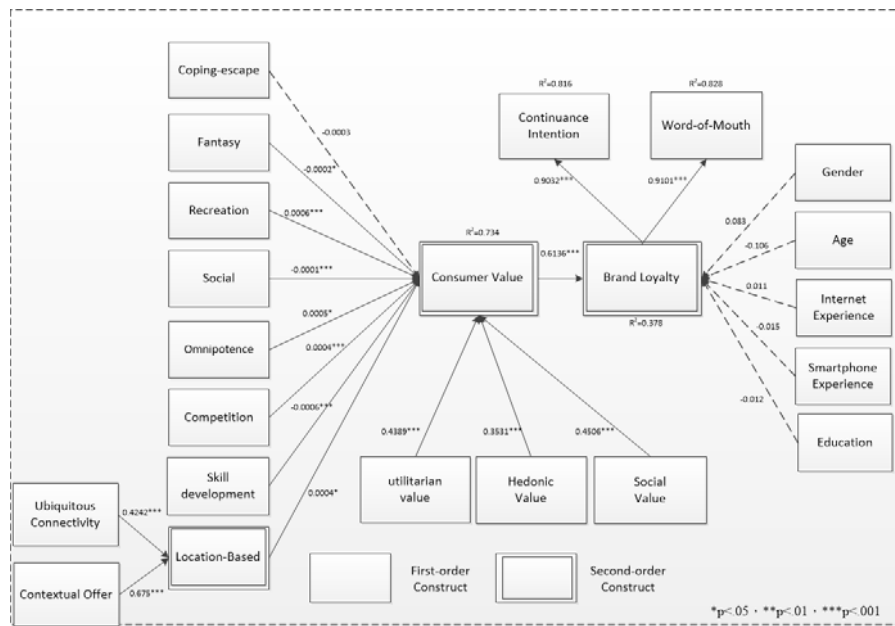

Figure3：PLS results of the research model

Table 4：PSL Confirmatory Factor Analysis and Cross-Loading

	CI	CO	COM	COP	FAN	FV	HV	OMN	RE	SD	SOC	SV	UC	WOM
CI1	**0.910**	0.299	0.350	0.271	0.349	0.385	0.430	0.371	0.437	0.356	0.347	0.341	0.274	0.569
CI2	**0.889**	0.268	0.297	0.292	0.323	0.344	0.358	0.264	0.363	0.315	0.373	0.324	0.292	0.511
CI3	**0.821**	0.261	0.352	0.224	0.388	0.376	0.373	0.380	0.369	0.343	0.289	0.370	0.265	0.607
CO1	0.308	**0.867**	0.347	0.252	0.332	0.326	0.362	0.401	0.295	0.293	0.189	0.234	0.600	0.388
CO2	0.278	**0.925**	0.316	0.250	0.343	0.291	0.308	0.378	0.263	0.296	0.215	0.209	0.603	0.349
CO3	0.278	**0.915**	0.284	0.258	0.320	0.271	0.310	0.365	0.241	0.271	0.245	0.215	0.562	0.335
CO5	0.267	**0.865**	0.328	0.254	0.334	0.289	0.368	0.418	0.302	0.261	0.230	0.270	0.598	0.363
COM1	0.299	0.219	**0.858**	0.428	0.473	0.395	0.425	0.516	0.451	0.468	0.411	0.562	0.380	0.415
COM2	0.392	0.385	**0.825**	0.483	0.580	0.465	0.655	0.547	0.619	0.519	0.367	0.438	0.396	0.458
COM3	0.259	0.287	**0.845**	0.361	0.416	0.326	0.393	0.468	0.384	0.437	0.327	0.501	0.312	0.385
COP1	0.278	0.262	0.462	**0.871**	0.535	0.374	0.508	0.467	0.581	0.474	0.345	0.361	0.287	0.326
COP2	0.249	0.233	0.385	**0.794**	0.460	0.279	0.350	0.415	0.404	0.434	0.310	0.337	0.239	0.292
COP3	0.252	0.196	0.403	**0.887**	0.453	0.324	0.422	0.419	0.507	0.476	0.362	0.430	0.253	0.285

	CI	CO	COM	COP	FAN	FV	HV	OMN	RE	SD	SOC	SV	UC	WOM
COP4	0.262	0.287	0.500	**0.909**	0.530	0.382	0.541	0.469	0.602	0.481	0.366	0.453	0.314	0.352
FAN1	0.369	0.290	0.482	0.458	**0.827**	0.446	0.493	0.446	0.481	0.436	0.303	0.376	0.356	0.407
FAN2	0.205	0.190	0.349	0.424	**0.714**	0.328	0.338	0.322	0.385	0.333	0.346	0.265	0.257	0.337
FAN3	0.368	0.382	0.552	0.490	**0.850**	0.452	0.612	0.570	0.589	0.424	0.323	0.373	0.432	0.469
FV1	0.404	0.236	0.448	0.395	0.463	**0.851**	0.479	0.392	0.534	0.410	0.359	0.389	0.313	0.475
FV2	0.393	0.340	0.449	0.368	0.516	**0.922**	0.507	0.429	0.531	0.387	0.355	0.426	0.407	0.485
FV3	0.357	0.286	0.390	0.309	0.420	**0.850**	0.432	0.395	0.483	0.353	0.312	0.331	0.362	0.417
FV4	0.313	0.282	0.364	0.301	0.399	**0.859**	0.429	0.356	0.471	0.350	0.332	0.339	0.367	0.416
HV1	0.430	0.365	0.500	0.407	0.537	0.499	**0.893**	0.496	0.645	0.393	0.355	0.353	0.392	0.465
HV2	0.374	0.288	0.583	0.523	0.578	0.483	**0.912**	0.480	0.686	0.476	0.418	0.465	0.393	0.450
HV3	0.409	0.378	0.536	0.521	0.573	0.469	**0.925**	0.515	0.690	0.413	0.348	0.420	0.418	0.471
OMN1	0.267	0.244	0.435	0.356	0.345	0.256	0.308	**0.756**	0.337	0.373	0.284	0.394	0.279	0.251
OMN2	0.398	0.375	0.513	0.463	0.533	0.442	0.544	**0.810**	0.516	0.452	0.313	0.412	0.366	0.425
OMN3	0.268	0.424	0.531	0.416	0.492	0.378	0.446	**0.874**	0.450	0.373	0.305	0.457	0.407	0.392
RE1	0.446	0.311	0.514	0.408	0.538	0.539	0.658	0.462	**0.827**	0.350	0.288	0.344	0.424	0.523
RE2	0.319	0.218	0.481	0.636	0.521	0.476	0.627	0.481	**0.879**	0.436	0.386	0.437	0.256	0.360
RE4	0.384	0.263	0.510	0.529	0.528	0.477	0.620	0.455	**0.865**	0.461	0.349	0.416	0.313	0.432
SD1	0.321	0.241	0.422	0.441	0.412	0.344	0.342	0.367	0.404	**0.786**	0.318	0.448	0.325	0.321
SD3	0.352	0.246	0.515	0.442	0.457	0.399	0.423	0.454	0.434	**0.902**	0.433	0.565	0.319	0.369
SD4	0.323	0.321	0.515	0.502	0.419	0.362	0.438	0.440	0.408	**0.875**	0.350	0.480	0.313	0.328
SOC1	0.331	0.250	0.367	0.323	0.320	0.313	0.291	0.282	0.311	0.371	**0.864**	0.478	0.246	0.303
SOC2	0.332	0.182	0.392	0.366	0.387	0.345	0.371	0.354	0.347	0.387	**0.920**	0.502	0.209	0.321
SOC3	0.363	0.229	0.411	0.375	0.355	0.379	0.424	0.346	0.398	0.394	**0.888**	0.539	0.220	0.312
SV1	0.389	0.303	0.570	0.424	0.383	0.367	0.482	0.482	0.491	0.474	0.503	**0.862**	0.320	0.408
SV2	0.334	0.216	0.512	0.420	0.377	0.384	0.372	0.418	0.390	0.552	0.509	**0.917**	0.260	0.346
SV3	0.339	0.190	0.514	0.420	0.386	0.421	0.395	0.467	0.405	0.568	0.546	**0.932**	0.266	0.334
SV4	0.373	0.234	0.555	0.407	0.416	0.383	0.406	0.512	0.407	0.528	0.514	**0.924**	0.328	0.400
UC1	0.283	0.492	0.367	0.293	0.409	0.341	0.393	0.353	0.328	0.330	0.176	0.301	**0.870**	0.457
UC2	0.259	0.594	0.353	0.255	0.366	0.375	0.373	0.319	0.299	0.289	0.229	0.262	**0.888**	0.451
UC5	0.254	0.569	0.371	0.252	0.347	0.327	0.340	0.431	0.346	0.316	0.225	0.248	**0.746**	0.364
WOM1	0.601	0.348	0.455	0.321	0.458	0.504	0.492	0.405	0.514	0.352	0.320	0.352	0.466	**0.921**
WOM2	0.542	0.341	0.430	0.369	0.435	0.406	0.399	0.412	0.401	0.394	0.332	0.420	0.402	**0.846**
WOM3	0.551	0.368	0.433	0.269	0.456	0.444	0.442	0.364	0.427	0.301	0.270	0.308	0.469	**0.864**

CI, continuance intention; CO, contextual offer; COM, competition; COP, coping-escape; FAN, fantasy; FV, utilitarian value; HV, hedonic value; OMN, omnipotence; RE, recreation; SD, skill development; SOC, social; SV, social value; UC, ubiquitous connectivity; WOM, word-of-mouth.
Note: Bold numbers indicate item loadings on the assigned constructs.

Table 5：Two-sample t-test for paired data

	Mean(Standard deviation)		T
	BEFORE	AFTER	
Continuance Intention	5.42(0.911)	5.60(0.854)	-4.825***
Word-of-Mouth	5.88(0.753)	6.00(0.790)	-3.039***
Brand Loyalty	5.65(0.760)	5.81(0.745)	-4.610***

*p<.05，**p<.01，***p<.001

Conclusion

The purpose of this study is to thoroughly examine the complex relationships between mobile gamification design elements, brand experience and brand loyalty of game design strategy. The proposed two research questions: First, how can location-based gamification be designed and leveraged to increase consumer value? Second, is location-based gamification really capable of fostering brand loyalty?

This study conducts the research model through reviewing existing literature. First, we defined 8 suitable elements for mobile gamification design: coping-escape, fantasy, recreation, social, omnipotence, competition, skill development, and location-based. Furthermore, we incorporated consumer value and brand loyalty into the research model, and discussed how these gamification elements affect brand loyalty through perceived consumer value. Subsequently, using the 8 elements for mobile gamification design, the study developed a mobile app that's designed for contextual marketing to verify our model. Thus, our research contributions are as follows:

First, mobile commerce and mobile application service shall become important trends in technology in the future. This study argues that the need is to add *location-based* service into gamification elements for increasing player engagement within the game and enhancing a brand's consumer value through on-location interaction. Second, the study was develop a mobile gamification app based on the above 8 elements, and using the quasi-experimental method was verify that mobile gamification design elements can effectively improve consumer brand loyalty through perceived values. Third, the study added the location-based element of mobile gamifaiction to the original game design, to investigate consumer brand loyalty from a marketing angle. In the future, we hope to see corporations incorporate gamification concepts into other applications, e.g., training or sales, during their creative process, thereby increasing the job performance of respective departments.

In sum, this study, through our verification of the proposed model, intends to identify the relationships between key factors, and the results can be served as a reference for potential customers, existing customers, and mobile application developers. The insight provided by this study is extremely important for mobile application developers because the creation of applications that satisfy consumers' need cab enhance their loyalty, promote the market of mobile commerce, and increase commercial values. These improvements eventually result mutual benefits. Moreover, this is an opportunity for researchers to systematically apply diffusion-related theories to mobile commerce, and the results are significant contributions to the academic circle and industry. Consequently, accumulated knowledge can generate more potential research directions and topics.

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行政院國家科學委員會補助國內專家學者出席國際學術會議報告

2017 年 08 月 22 日

報　告　人姓　　　名	吳雅鈴	服　務　機　關及　　職　　稱	淡江大學資訊管理系 副教授
會　議　時　間地　　　點	2017/8/10-2017/8/12 **Boston, USA**	本　會　核　定 補　助　文　號	MOST 104-2410-H-032 -046 -MY2
會　議　名　稱	（中文）　第 23 屆美洲資訊系統國際研討會議 （英文）　23th Americas Conference on Information Systems (AMCIS 2016)		
發　表　論　文　題　目	（中文）　行動遊戲化設計之應用程式實作與使用成效評估 （英文）Implementation and Evaluation of Mobile Gamification Design for Effective Performance		

報告內容應包括下列各項：

一、參加會議經過

The conference was held in **Boston, USA**. During the three-day seminar, many tracks of IS study were held. I had chance to interact and conduct deep discussion on several important topics on Social Media Technique.

二、與會心得

With the prevalence of E-commerce, online shopping, via computers and smart devices (mobile phones, tablets, etc.), has become an indispensable part of most people's daily lives. One of the disadvantages of online shopping is that consumers cannot directly touch or observe the products to learn about their function and content. Therefore, it is important that online sites present products in a way that embodies all kinds of cues in order to facilitate consumers' decision-making. Countries around the world are developing both infrastructures to facilitate the development of service quality and strategies to enhance the utilization of the developed technologies.

三、建議

There is an important committee related to the research of IS communications technology. This group involves academics from Europe, Australia, Canada, America, Asia, etc. We will keep interactive relationship with this group.

104年度專題研究計畫成果彙整表

計畫主持人：吳雅鈴				計畫編號：104-2410-H-032-046-MY2	
計畫名稱：行動遊戲化設計之應用程式實作與使用成效評估					

成果項目				量化	單位	質化 （說明：各成果項目請附佐證資料或細項說明，如期刊名稱、年份、卷期、起訖頁數、證號...等）
國內	學術性論文	期刊論文		0	篇	
		研討會論文		0		
		專書		0	本	
		專書論文		0	章	
		技術報告		0	篇	
		其他		0	篇	
	智慧財產權及成果	專利權	發明專利 申請中	0	件	
			發明專利 已獲得	0		
			新型/設計專利	0		
		商標權		0		
		營業秘密		0		
		積體電路電路布局權		0		
		著作權		0		
		品種權		0		
		其他		0		
	技術移轉	件數		0	件	
		收入		0	千元	
國外	學術性論文	期刊論文		2	篇	[1]Shih, Ying-Wei, Wu, Ya-Ling, Wang, Yi-Shun, and Chen, Chiung-Liang (2016) "Investigating the Post-adoption Stage of Voice over Internet Protocol (VoIP) Telephony Diffusion: A Use-diffusion Approach," Information Technology & People, forthcoming. (SSCI, Impact Factor: 1.150) [2]Wu, Ya-Ling* (2016) "Gamification Design: A Comparison of Four M-Learning Courses," Innovations in Education and Teaching International, forthcoming. (SSCI, Impact Factor: 0.667)
		研討會論文		1		[1]Wu, Ya-Ling, Shih, Y-W, and Hsiung, C-Y, "Understanding Online Impulsive Purchase Intention: The Role of Extrinsic Product Cues"

					Proceedings of the 23th Americas Conference on Information Systems 2017 (AMCIS 2017), Boston, MA, USA, August 10-12, 2017.
	專書			0	本	
	專書論文			0	章	
	技術報告			0	篇	
	其他			0	篇	
智慧財產權及成果	專利權	發明專利	申請中	0	件	
			已獲得	0		
		新型/設計專利		0		
	商標權			0		
	營業秘密			0		
	積體電路電路布局權			0		
	著作權			0		
	品種權			0		
	其他			0		
技術移轉	件數			0	件	
	收入			0	千元	
參與計畫人力	本國籍	大專生		0	人次	
		碩士生		2		本計畫需要大量蒐集實驗資料，故需要二名碩士級研究助理，最高學歷至少為資訊或企業管理相關領域之大學畢業生，以協助本計畫之資料檢索、實驗活動執行、文獻探討、以及一般事務性工作（如：報帳等）
		博士生		0		
		博士後研究員		0		
		專任助理		0		
	非本國籍	大專生		0		
		碩士生		0		
		博士生		0		
		博士後研究員		0		
		專任助理		0		
其他成果（無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。）						

科技部補助專題研究計畫成果自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現（簡要敘述成果是否具有政策應用參考價值及具影響公共利益之重大發現）或其他有關價值等，作一綜合評估。

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1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估
   ■達成目標
   □未達成目標（請說明，以100字為限）
   　　　□實驗失敗
   　　　□因故實驗中斷
   　　　□其他原因
   說明：

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2. 研究成果在學術期刊發表或申請專利等情形（請於其他欄註明專利及技轉之證號、合約、申請及洽談等詳細資訊）
   論文：■已發表　□未發表之文稿　□撰寫中　□無
   專利：□已獲得　□申請中　■無
   技轉：□已技轉　□洽談中　■無
   其他：（以200字為限）

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3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性，以500字為限）

   First, mobile commerce and mobile application service shall become important trends in technology in the future. Second, the study was develop a mobile gamification app based on the above 8 elements, and using the quasi-experimental method was verify that mobile gamification design elements can effectively improve consumer brand loyalty through perceived values. Third, the study added the location-based element of mobile gamifaiction to the original game design, to investigate consumer loyalty.

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4. 主要發現
   本研究具有政策應用參考價值：■否　□是，建議提供機關
   （勾選「是」者，請列舉建議可提供施政參考之業務主管機關）
   本研究具影響公共利益之重大發現：□否　□是
   說明：（以150字為限）
   Using the 8 elements for mobile gamification design, the study developed an app that's designed for contextual marketing to verify our model.