

## An Innovation of Active Tourism Information Acquisition System

<sup>1</sup>, N. Sakulngam, <sup>2</sup>, S. Sinthupinyo, <sup>3</sup>, N. Thawesaengskulthai, <sup>4</sup>, S. Durongwatana

<sup>1</sup>Department of Technopreneurship and Innovation Management, Chulalongkorn University, Thailand

<sup>2</sup>Department of Computer Engineering, Chulalongkorn University, Thailand

<sup>3</sup>Department of Industrial Engineering, Chulalongkorn University, Thailand

<sup>4</sup>Department of Statistic, Chulalongkorn University, Thailand

### -----ABSTRACT-----

Recent improvements in data communication can empower new features in various industries. Tourism can also profit from real-time data communication to attack problems of data untimeliness, which is one of main problems existing in tourism industry in Thailand. Hence, this study is aimed at developing an active tourism information acquisition system using gamification concepts. Our system is created from customer needs through the QFD technique, from which we found that two key issues, e.g. (1) incentive by gamification and (2) highly increasing up-to-date data, can influence travelers to visit certain places. Our work uses technology acceptance survey from 554 travelers. We have found the actual factor that affect user adoption and inspire user to make the travel happens. When the users accept and use the system, the tourism information will be collected and updated in the system continually. The paper demonstrates that applying acquisition system with tourism sector can be used to improve the system in the same domain to actually support business by responding to the travelers' demands decisively.

**KEYWORDS** - acquisition systems, gamification, QFD, Technology acceptance model, Tourism information.

Date of Submission: 16 April 2014



Date of Publication: 30 April 2014

### I. INTRODUCTION

Tourism is one of the world's largest and most rapidly expanding industries, contributing to over ten per cent of global GDP and generating employment for 200 million people, according to annual research by the World Travel & Tourism Council 2012. Specifically in Asia Pacific including Thailand, the tourism industry is necessary for income and national GDP.

The tourism industry in Thailand is actively promoting inbound foreign travel. Reference to statistic from Ministry of Tourism and Sports in Thailand in 2013 shows that the number of travelers have risen 23.16%, equivalent to 22.72% of average income when compared to the past [see Table 1]. The notabilities of Thailand include the variety of products, foods, and cultural heritage, and tourist attractions. These assets have made Thailand a main coordinator in the field of tourism and aviation after the official establishment of the ASEAN Economic Community or AEC in 2015.

**Table 1.** The number of arrivals from foreign travelers (Jan-Sep, 2013)

Country of Nationality	Number of Arrivals			Tourism Receipts (Mil.Baht)		
	2013	2012	%Δ	2013	2012	%Δ
Asia	12,080,389	8,974,773	+34.60	392,878.04	282,074.46	+39.28
Europe	4,421,935	3,912,164	+13.03	283,390.75	243,627.35	+16.32
The Americas	833,210	770,970	+8.07	54,743.01	49,454.27	+10.69
South Asia	1,003,192	954,301	+5.12	36,024.09	33,801.72	+6.57
Oceania	749,993	771,600	-2.80	50,392.89	50,590.51	-0.39
Middle East	469,897	478,020	-1.70	27,171.16	27,509.74	-1.23
Africa	114,194	111,912	+2.04	6,439.60	6,420.14	+0.30
<b>Grand Total</b>	<b>19,672,810</b>	<b>15,973,740</b>	<b>+23.16</b>	<b>851,039.54</b>	<b>693,478.19</b>	<b>+22.72</b>

Source: The ministry of tourism and sports, 2013

Information technologies and tourism are two of the most dynamic motivators of the emerging global economy. Both tourism and IT increasingly provide strategic opportunities and powerful tools for economic growth. Technology plays a vitally enabling role in tourism and is crucial to the expansion of the industry[1]. Tourism information is distributed over various sources. This is highly problematic for travelers. Therefore, an extensive data collection is necessary to make accumulated data from different sources more easily accessible.

In many works relating to the tourism, the studies about motivations of travelers are recognized as a starting point in order to understand travelers' behaviors [2-5]. Motivations have also been seen as a tool to segment the tourism market. Currently, there are no systems, which acquire tourism information using gamification concepts. Referring to my previous study, which explores the behavior of the travelers using tourism information technology systems in Thailand. The result reveals that most travelers still search for information from several sources. In addition, 80% of the travelers in our sampling groups have opinion that the tourism information is not updated, some information is lost and most of useful information of useful information is scattered over several sources, from where information each sources provides different suggestions. The problem is that software developers do not know the actual required information of travelers and factors that can motivate actual travel to Thailand[6].

According to Sakulngam et.al.(2013)[6], we study travelers' behavior and the demand in order to find motivational factors to stimulate real travel. The study shows that the factors consisting of activity types, reward types, and the traveler types are the key motivations, generating traveling activities in Thailand. The activity type is home stay. The reward type is traveling package promotion including the hotel discount and reward goods (see Fig.1). These findings help businesses to respond to traveler's demand decisively.

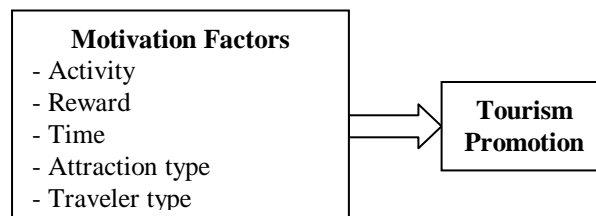


Figure 1. The tourism motivational factor framework

## II. LITERATURE REVIEW

The research model of this study is based on the Technology Acceptance Model and gamification concept, whereby an active tourism information acquisition system have a direct and positive relationship with perceived usefulness, perceived ease of use, attitude, intention of use and usage behavior toward to technology adoption.

### A. Technology Acceptance Model (TAM)

The TAM is a theory that describes the prediction of each individual action, which can be forecasted from three variables; (1) beliefs, (2) attitudes, and (3) intentions. This theory is explained that humans would do anything by cause and effect from two key factors: (1) attitude toward behavior, and (2) subject norm. The TAM is developed to predict these users behavior. By showing that the perceived usefulness and perceived ease of use of the technology would affect the thinking and attitude towards using for behavioral intention of use and evaluation of the value of each of those outcomes[7]. The goal of the TAM is to provide an explanation about the determinants of the technology acceptance that is capable of explaining user behavior towards computer technologies.

The TAM is used to test with the user's behavior in the context of the varied information of technology, which includes; computer user. [8, 9], computer application[7, 10, 11], and internet [12-15].

In my study, we use TAM in three contexts as follows:

- (1) A context of information requirements uses the relevant factors between the tourism data, the functions system, and the motivation to use the system.
- (2) A context of the information search uses three factors namely the perceived usefulness, the perceived ease of use and the attitude.
- (3) A context of the technology adoption factor. To identify what factors having a positive relationship with other factors, and influence the results of performance in the using data significantly follow the TAM context in the research framework.

### B. Quality Function Deployment (QFD)

Quality Function Deployment (QFD) is a structured approach to defining customer needs or requirements and translating them into specific plans to produce products to meet those needs. The "voice of the customer" is the term to describe these stated and unstated customer needs or requirements, which was developed by Yoji Akao in Japan in 1966. QFD has demonstrated the reduction of development time by one-half to one-third[16].

The goal of QFD is to translate subjective quality criteria into objective ones that can be quantified and measured. It can then be used to design and manufacture the product. QFD is a complimentary method for determining how and where priorities are assigned in product development. QFD process uses a matrix to translate customer requirements from initial planning stages through production control[17]. In my study, the acquisition system is created from customer needs through the QFD technique [see Table 2-3].

**Table 2.** The QFD of an innovation of active tourism information acquisition systems

Design Requirement		Service Menu									
		login	User Profile	search	Report	Social Share	Share & Post	Review & Rating	Map	Reward & Promotion	Trip Planning
Customer Requirement	How										
	What										
Permission Access	Set permission to access the system	◆	◆	x	◆	◆	◆	◆	x	◆	◆
	Identify user level	◆	◆	x	◆	●	●	◆	x	◆	◆
Functionality	Access the system from all device (computer and Smart phone Mobile)	◆	x	◆	◆	◆	◆	◆	◆	◆	◆
	Quick search tourism information	x	x	◆	◆	●	●	●	◆	◆	◆
	Create trip planning	◆		●	◆	◆	◆	◆	◆	◆	◆
	Take a picture and share to other friend on Social network	◆	●	●	◆	◆	◆	◆	◆	◆	◆
	Show statistic report related tourism	●	●	◆	◆	◆	◆	◆	●	◆	◆
	Save favorite information	x	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Connect other service to search Thailand tourism information	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Show attraction location	x	●	◆	◆	◆	◆	●	◆	●	◆
	Review and rating service	◆	◆	●	◆	◆	◆	◆	●	◆	◆
Information and display	Classification of information related to travel.	x	◆	●	◆	◆	◆	◆	●	◆	◆
	Show tourism information order by rating, price, distance	x	◆	◆	◆	◆	◆	◆	◆	◆	●
	Show user status icon	◆	◆	◆	◆	◆	◆	◆	●	◆	●
	Information is accurate and reliable.	x	◆	◆	◆	◆	◆	◆	◆	◆	◆
	Update with data continuously.	x	◆	◆	◆	◆	◆	◆	◆	◆	◆
Motivation and Promotion	Have activity to accumulate points to redeem prizes. During the trip.	●	◆	◆	◆	◆	◆	◆	●	◆	◆
	Have discount and promotion relate with the trip	●	◆	◆	◆	◆	◆	◆	●	◆	◆

◆: Strong (9), ●: Medium (6), x: Weak (1)

**Table 3.** The comparison function with others application

item	Function	Groupon	Foursquare	trip Advisor	Agoda	Ensogo	Pantip	Buzzebees	thaitrip4u	TAT Web site	The acquisition
1	Search information										
2	Acquisition Information										
3	Ordering Information by popular vote.										
4	Establishing a network connection for other users.										
5	Create a promotion that users participate.										
6	Rating and Reward										
7	Evaluate Service by user										
8	Review & Recommend by user										
9	Scheduling order the user										
10	Check-in location										
11	The divided level of the user.										
12	Online Market										
13	Connection with the financial system.										
14	Providing Web site forms										
15	Providing application forms										
16	Display data in report form										
17	Educating tourism										
18	To give advice on the trip.										

(Y) Have function,  (N) No function

**C. Gamification concept**

Gamification is a relatively new IT trend recognized by Gartner. The travel companies and tourism organizations are increasingly using gaming techniques through social media channels to generate brand awareness and build loyalty as revealed in the World Travel Market Global Trends Report 2013.

The main idea of gamification is as follows:

“gamification is the broad trend of employing game mechanics to non-game environments such as innovation, marketing, training, employee performance, health and social change.”[18].

In my study, we focus deeply on using game-based mechanics and game thinking to motivate and induce the traveler. We apply the game structure from the view of MDA framework, where “M” stands for mechanics, “D” for dynamics and “A” for aesthetics. “Mechanics describes the particular components of the game, at the level of data representation and algorithms. Dynamics describes the run-time behavior of the mechanics acting on player inputs and each other’s outputs over time. Aesthetics describes the desirable emotional responses evoked in the player, when the user interacts with the game system” [19]. The compositional foundation of the game, which is considered for use in the gamification development of the tourism field, includes rules, achievements, badges, challenges, point systems and rewards. Since there are more important game elements, we use these compositions to persuade travelers to follow the rules or conditions set by the system. The system use rules or conditions to collect information needed for the system.

**D. Research Model and Hypothesis**

The research model is presented in Fig.2. Technology adoption is a critical intervening variable in the innovation diffusion[20]. Thus, the system is developed as a potential user's assessment of the desirability of using that technology[21]. According to the TAM, the model predicts an individual's use of technology. The hypothesis summary is shown in Table 4.

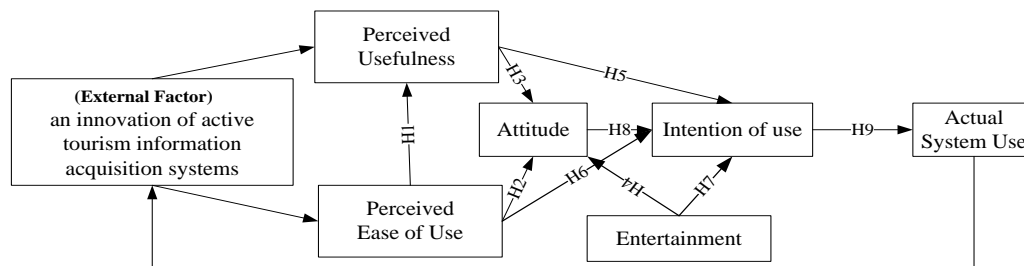


Figure 2. The research framework

**Perceived Usefulness (PU)**

The perceived usefulness typically has a stronger direct effect on attitudes than the perceived ease of use and a direct effect on the intension of use[21]. An individual adopts a new technology primarily because of the functionality offered, rather than because it is easy to use. Thus, users tend to overcome difficulties in using new technology if the benefits of usage are substantive.

**Perceived Ease of Use (PEU)**

The perceived ease of use is a variable in the innovation adoption decision[22]. Thus, the decision to adopt a new technology is related to how to use the technology and the complexity of the technology.

**Attitude (ATT)**

Attitude toward an innovation is a critical intervening variable in the innovation adoption decision [22]. Thus, attitude toward a specific information technology is conceptualized as a potential user's assessment of the desirability of using that technology[21].

**Intention of Use (IU)**

Intention of use is a critical intervening variable in the innovation adoption decision[22]. Thus, intention of use is a main part to decide to adopt new technology if the users have a good attitude with new technology[21].

**Entertainment (ENT)**

The entertainment has a direct effect on attitude and intention of use. Thus, the entertainment plays critical role in guiding concept design and graphic user interface, so as to attract the user to new technology.

**Actual System Use (ASU)**

The actual system use is a critical intervening variable in the innovation diffusion[20]. The use of acquisition system leads to tourism information collection.

**Table 4.** The hypothesis summary

Item	Hypothesis
<b>Hypothesis 1 :</b>	
h <sub>0</sub>	The perceived ease of use (PEU) did not effect to the perceived usefulness (PU).
h <sub>1</sub>	The perceived ease of use (PEU) effect to the perceived usefulness (PU).
<b>Hypothesis 2 :</b>	
h <sub>0</sub>	The perceived ease of use (PEU) did not effect to the attitude (ATT).
h <sub>1</sub>	The perceived ease of use (PEU) effect to the attitude (ATT).
<b>Hypothesis 3 :</b>	
h <sub>0</sub>	The perceived usefulness (PU) did not effect to the attitude (ATT).
h <sub>1</sub>	The perceived usefulness (PU) effect to the attitude (ATT).
<b>Hypothesis 4 :</b>	
h <sub>0</sub>	The entertainment (ENT) did not effect to the attitude (ATT).
h <sub>1</sub>	The entertainment (ENT) effect to the attitude (ATT).
<b>Hypothesis 5 :</b>	
h <sub>0</sub>	The perceived usefulness (PU) did not effect to the intention of use (IU).
h <sub>1</sub>	The perceived usefulness (PU) effect to the intention of use (IU).
<b>Hypothesis 6 :</b>	
h <sub>0</sub>	The perceived ease of use (PEU) did not effect to the intention of use (IU).
h <sub>1</sub>	The perceived ease of use (PEU) effect to the intention of use (IU).
<b>Hypothesis 7 :</b>	
h <sub>0</sub>	The entertainment (ENT) did not effect to the intention of use (IU).
h <sub>1</sub>	The entertainment (ENT) effect to the intention of use (IU).
<b>Hypothesis 8 :</b>	
h <sub>0</sub>	The attitude (ATT) did not effect to the intention of use (IU).
h <sub>1</sub>	The attitude (ATT) effect to the intention of use (IU).
<b>Hypothesis 9 :</b>	
h <sub>0</sub>	The intention of use (IU) did not effect to the technology adoption (TA).
h <sub>1</sub>	The intention of use (IU) effect to the actual system use (ASU)

**III. METHODOLOGY**

The target population of this study is travelers, both Thai and foreign, who use mobile and smart phones, and travels in Thailand. The sample set consists of 554 persons, calculating from the quantity of hotels in the ten most popular provinces in terms of tourism. The underlying hypothesis is that the number of travelers in a province positively correlates with the number of hotels in that particular province [see Table 5].

$$n = \left( \frac{z_{\frac{\alpha}{2}} \sigma}{E} \right)^2$$

**Table 5.** The represent value of each variable

$(1-\sigma) * 100\%$	E	$\sigma$	$z_{\frac{\alpha}{2}}$	n
95.00	5	60	1.96	554

The study and data collection was conducted in order to obtain answers to research gaps that active information acquisition systems could encourage more storing of tourism information. The study was divided into four phase as follows:

- (1) Literature review, following by creation the conceptual framework and analysis the customer needs through the QFD technique.
- (2) A survey of the target population, and data analysis to be used in the design and development of the tourism gamification concept, which divides the research into two steps as follows:

- The opinion survey of travelers, which is the main target group, employs questionnaires as research instrument. The question is divided into four parts: part 1-assessing the ability of the program user, part 2 - evaluating of the result from using the program (to assess the suitability and ease of using evaluating satisfaction programs in the added functionality, to assess the satisfaction of the user interface screen), part 3 - commenting and suggestions: For the development and improvement of the program (the strengths of the program, the weaknesses of the program, the main problems obtained from using the application, other functions which the program should have, other suggestions), part 4 - Personal data (gender, age, occupation, monthly income, marital status, race / nationality).

- The analysis pertaining to the satisfaction and demand of the customer for use in the design and development.

- (3) A development of gamification concepts of a tourism service. The aim of this study is to create an innovative acquisition system that motivates travelers to collect and update the tourism data continuously. The data is collected from real usage of travelers. As a result the obtained data is valid and is benefit for prospective travelers. The process to generate and update tourism information into the system is presented in Fig.3.

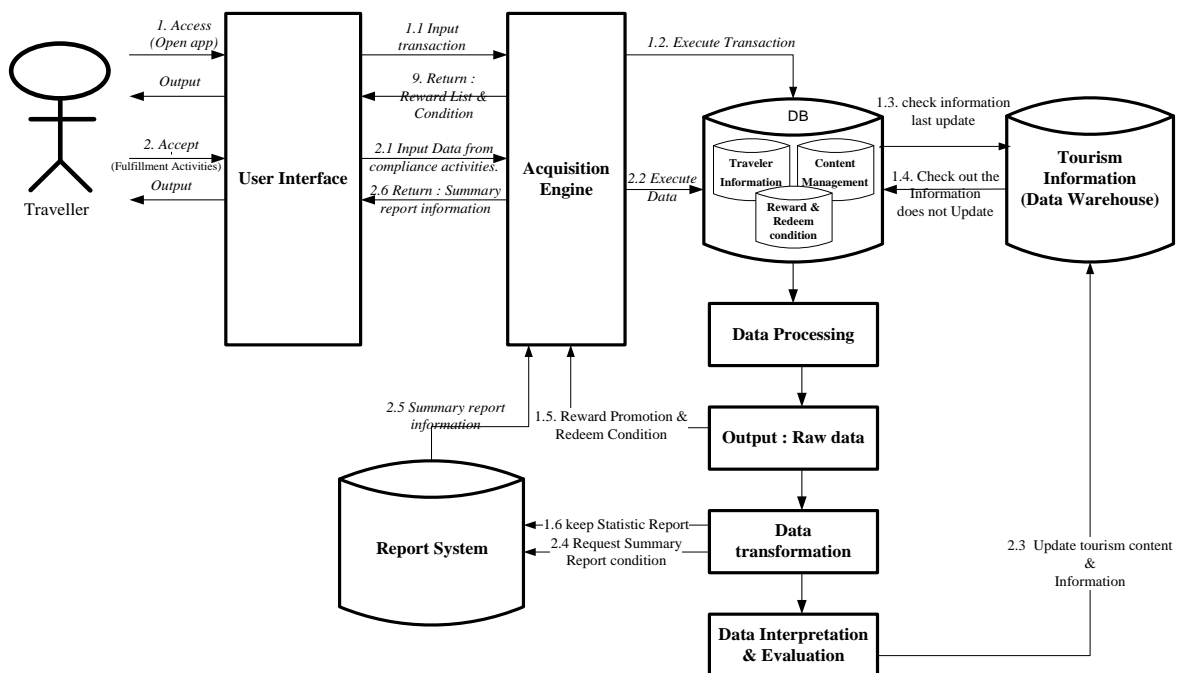


Figure 3. Process to generate and update tourism information into the system

The development of new tourism services is divided into four steps as follows:

- (1) Concept development and testing by using the information received from travelers in the target group to develop system design. The concept is tested further with the lead user.
- (2) The prototype development in the form of an application on a mobile smart phone.
- (3) The user acceptance test. Examiners consisting of 10 IT professionals validate the accuracy of the functionality from test results.
- (4) Study of TAM model to test the sampling group consisting of traveler, both Thai and foreign who are active smart phone users.

The acquisition system is developed on gamification concept in the tourism field, which is used as a tool for tourism data collection into the system by creating activities to provide incentive rewards such as:

- Persuade travelers to participate by answering questions in each category required by system. This includes information about tourism attractions, accommodations, price, and evaluate services during the trip.
- Collect location services to verify the genuine location. All information was transmitted continually to the traveler, collected and processed by the system to constantly update data.

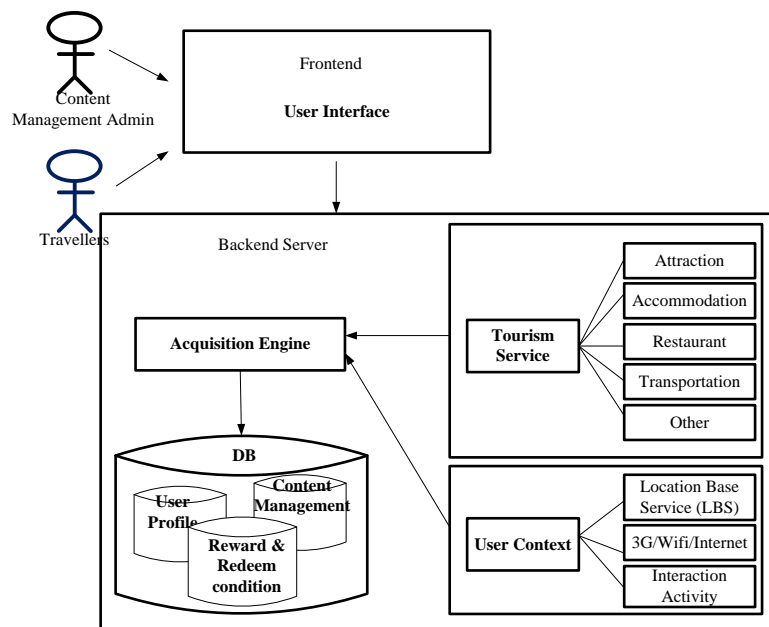


Figure 4. The system architecture

Fig.4 represents the architecture of an active tourism information acquisition system, which is divided in two main sections:

- (1) The front-end user interface screen, which supports the performance of web browser and mobile application. The front-end interface connects to the back-end system. It can process data by function & feature of the system. The operation feature of the section, which connects with the user, is divided into two parts according to privileges of the user as follows:
  - The screen for content management admin, which is used to manage all data in the system, such as rewards, activity and monitoring new data imported by the user.
  - The screen for the user or traveler, which is used to display all menus. The traveler can access for storing tourism data into the system based on the system format.
- (2) The processing unit of the operation of the system or backend server includes the following major components:
  - Acquisition engine module is the core processing unit of the system. The data management systems will be constantly updated by using rewards to persuade visitors to update information.
  - A database unit is developed on MySQL database, which performs to collect all of the data and process by the acquisition engine. The tourism data consists of the user profile, the rewards and activity, and the tourism content data.
  - The tourism service is information about tourist attractions, hotels and resorts, restaurants travel, and other information, such as hospitals, government offices, banks, police stations, etc.
  - The user context depends on the mobile phone, which is used to access the system, because the system can support either a web application or mobile application. The user context consists of the location-based service, the 3G/ Wi-Fi/internet, and the interaction activity.

IV. RESULT

The result from 554 questionnaires found that whenever users design to get the reward, they will take action based on set system condition including answer the questionnaire, location check-in and scan QR code on destination. These three activities is one way to acquire travel related information.

We designed and developed the user interface of a web application and mobile application (see Fig.5), which connects to the server. Before travelers use this application they must register his/her information on web application, the system will collect their profile and analysis their reward pattern by traveler type in database. When traveler users design to get the reward on application he/she needs to log in to verify his/her authenticity. The system will generate the questionnaire or activity related travel in set of system condition. The traveler’s focuses the acquisition system’s function in four areas is shown in Table 6.

Table 6. Function area of interest

Area of Interest	Service Function	Level of interest	Refer to screen	Screen Description
Permission Access	Login	3*	(a)	Login to get reward
Functionalities	Search Trip Planning Map	5* 4* 4*	(b) (c) , (d) (e)	Search tourism information Create trip planning Map
Monitoring and Display	Report Review & Rating Social Share	4* 5* 4*	(f) (g) (g)	Trip top hit report Service evaluation
Reward and Promotion	Reward & Promotion	5*	(h) (i), (j)	View Reward System condition pattern in DB

\* Results are averaged from a five-point Likert Scale.



Figure 5. The screen of function area of interest



The user acceptance test result can be concluded from the accuracy testing of the active tourism information acquisition systems. The result tested by ten IT professionals is shown in Table 7.

**Table 7.** Test result of the user acceptance test

Test Scenario	Expected Result	Result
<b><i>Test Login</i></b>		
Login by use the username and Password which have in the system.	The system can login to system, the system will show Main menu.	Pass
Login by use the username and Password which don't have in the system.	The system cannot login to system, the system inform that username/Password is not correct	Pass
Login by use the correct username but wrong Password.	The system cannot login to system, the system inform that username/Password is not correct	Pass
Login by use the wrong username but correct Password.	The system cannot login to system, the system inform that username/Password is not correct	Pass
<b><i>Test User Profile Management</i></b>		
Registering to be new users.	The system can put the user profile to register for using system.	Pass
Checking the accuracy of the form of displaying user profile information.	The user profile can display user's information (name, position, collected point, user profile)	Pass
Editing user profile and saving information.	User profile information changed to be new information which is edit	Pass
Checking collected point after update user profile.	The user's collected point is increased by the system.	Pass
<b><i>Test Search tourism information</i></b>		
Putting the information which is needed to search.	The system can put tourism information which needs to search in the searching space.	Pass
Checking the accuracy of the result of the information which gets from searching.	The result of information which gets from searching is according to the data and condition which needs to search.	Pass
Checking the update of the result of the information which gets from searching.	The result of information which gets from searching is updated and according to the real data.	Pass
<b><i>Test view Report</i></b>		
Checking the displaying of the Statistic Report information.	The system can display the tourism information in the statistic report form.	Pass
Checking the displaying of summary report information.	The system can display the tourism information in the statistic report form.	Pass
<b><i>Test share to other social</i></b>		
Sharing tourism information to other social Network.	The user can share the tourism information through Facebook.	Pass
<b><i>Test post and share tourism information</i></b>		
Posting the information about tourism and sharing to public.	The user can post the tourism information and share it to the travelers who use Snapz trip to see.	Pass
<b><i>Test review and rating</i></b>		
Reviewing the tourism information.	The user can review the tourism information through the system.	Pass
Evaluating and rating the service.	Can evaluate and give rating service through the system.	Pass
<b><i>Test MAP</i></b>		
Searching the coordinate of the tourist attraction from Menu Map.	The system can show the result of the information about searching coordinate of tourist attraction from Menu MAP correctly.	Pass
<b><i>Test Reward and Promotion</i></b>		
Checking the displaying of reward information and promotion.	The system can show the result of the reward and promotion information correctly, and according to the condition.	Pass
Getting reward and promotion.	Can get reward and promotion from the system.	Pass
Checking the generate condition of the redeem reward.	The system can generate the redeems condition pattern from DB.	Pass
Responding the answering activity according to the system to collect point.	The user can take action base on set system condition to get point.	Pass
Checking the update information to put into the system.	The system can update tourism information correctly.	Pass
Checking the collected point.	The system can calculate and update the collected point	Pass

Test Scenario	Expected Result	Result
	correctly according to the condition.	
<b>Test Trip Planning</b>		
Creating Trip Planning	The user can create Trip Planning.	Pass
Editing Trip Planning	The user can edit trip planning information and update the information into system.	Pass
Deleting Trip Planning	The user can delete trip planning information.	Pass
Share Trip Planning to public	The user can share trip planning information to public and the travelers who use Snapz trip to see.	Pass

The data collected from respondent of a sample size of 554 persons, having age between 26-49 years and revenue in the range between 25,000 and 40,000 Baht. The study by the TAM model reveals that the users highly intend to use our system (4.57\*) and the system can highly help them planning and selecting the tourism services (4.41\*). The system attracts the travelers to use it (3.91\*), it stimulates the travelers to travel (3.86\*), and it is user-friendly (3.83\*). The result tested followed by the TAM is shown in table 8-9.

**Table 8.** Measurement properties for multi-item constructs<sup>a</sup>

Constructs	Mean	S.D.	Level of acceptance
<b>Perceived Usefulness (PU)</b>			
Available to use the application.	4.33	.711	Maximum
The application helps to create a trip planning.	3.70	.837	Moderate
The application helps to provide the information which accordance to their need.	4.57	.504	Maximum
The application helps to create the motivation of the using.	3.87	.860	High
The application has a benefit to the tourism.	3.50	.820	Moderate
The application has a benefit to the tourism planning.	3.93	1.015	Maximum
The application has a benefit to the making decision for tourism.	4.27	.980	Maximum
<b>Average</b>	<b>4.02</b>	<b>.818</b>	<b>Maximum</b>
<b>Perceived Ease of Use (PEU)</b>			
Comforting to use the application in many channels.	4.27	.980	Maximum
The application has the way to communicate with the user easily.	4.60	.498	Maximum
Using application to communicate with friends easily.	3.33	.758	Moderate
The application has the classification of the information which understands easily.	3.10	.759	Moderate
The application has the reliable information displaying.	4.30	.466	Maximum
The application has the updating information which accordance to the real data.	3.43	.504	Moderate
<b>Sum average</b>	<b>3.83</b>	<b>.660</b>	<b>High</b>
<b>Attitude (ATT)</b>			
The use of application is the bright idea.	3.80	.551	Moderate
The use of application can motivate the need to travel.	3.37	.765	Moderate
The use of application can make satisfied.	4.07	.521	Maximum
The use of application can help to motivate people to tourism.	3.83	.592	High
<b>Sum average</b>	<b>3.86</b>	<b>.575</b>	<b>High</b>
<b>Entertainment (ENT)</b>			
The use of application helps to make an enjoyment.	3.83	.648	High
The use of application can attractive.	4.13	.681	Maximum
<b>Sum average</b>	<b>3.91</b>	<b>.664</b>	<b>High</b>
<b>Intention to use (IU)</b>			
The application helps to plan and choose the tourism service.	3.97	.999	Maximum
The Travelers can use application to search and update the tourism information by themselves.	4.73	.583	Maximum
The travelers has enough abilities to use application (prototype system)	4.53	.681	Maximum
<b>Sum average</b>	<b>4.41</b>	<b>.754</b>	<b>Maximum</b>
<b>Actual system use (ASU)</b>			
The travelers need a chance to use the application continually.	4.73	.082	Maximum

\* Results are averaged from a five-point Likert Scale (1-5).

Constructs	Mean	S.D.	Level of acceptance
If the travelers have the application, they would like to use it.	4.47	.104	Maximum
If the travelers have the application, they would recommend it to their friends.	4.53	.124	Maximum
<b>Sum average</b>	<b>4.57</b>	<b>.103</b>	<b>Maximum</b>

<sup>a</sup>Scale items were based on five-point level (1-1.80 = “minimum”, 4.21-5 = “maximum”).

**Table 9.** Path analysis and the impact of direct – indirect

		Estimate	S.E.	C.R.	P
1	Perceived usefulness (PU) <-- Perceived ease of use (PEU)	.076	.021	3.575	***
2	Attitude (ATT) <-- Perceived ease of use (PEU)	.054	.011	4.562	***
3	Attitude (ATT) <-- Perceived usefulness (PU)	.059	.026	4.996	***
4	Attitude (ATT) <-- Entertainment (ENT)	.051	.019	24.685	***
5	Intention of use (IU) <-- Perceived usefulness (PU)	.173	.031	5.614	***
6	Intention of use (IU) <-- Perceived ease of use (PEU)	-.082	.036	-2.273	.023
7	Intention of use (IU) <-- Entertainment (ENT)	.303	.015	20.652	***
8	Intention of use (IU) <-- Attitude (ATT)	-.054	.039	-.355	.723
9	Usage (US) <-- Intention of use (IU)	.091	.019	4.858	***

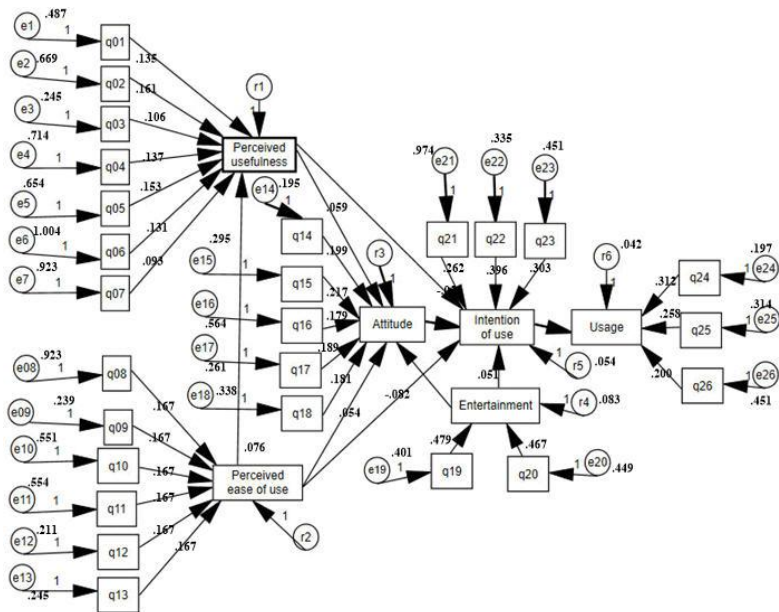


Figure 6. Path coefficients of the assumptions model.

In my study, we have found the perceived usefulness, perceived ease of use, attitude towards use, intention of use, and entertainment are the factors that affect user adoption and inspire user to make the travel happen. The result of this study is as follows.

**Hypothesis 1:**

$h_0$ : The perceived ease of use (PEU) did not effect to the perceived usefulness (PU).

$h_1$ : The perceived ease of use (PEU) effect to the perceived usefulness (PU).

Path coefficient between the perceived ease of use and the perceived usefulness is equal to .076 (p-value < .05), the perceived ease of use is positively significant to the perceived usefulness. (Reject  $h_0$ , Accept  $h_1$ )

**Hypothesis 2:**

$h_0$ : The perceived ease of use (PEU) did not effect to the attitude (ATT).

$h_1$ : The perceived ease of use (PEU) effect to the attitude (ATT).

Path coefficient between the perceived ease of use and the perceived usefulness is equal to .054 (p-value < .05), the perceived ease of use is positively significant to the attitude. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 3:**

$h_0$ : The perceived usefulness (PU) did not effect to the attitude (ATT).

$h_1$ : The perceived usefulness (PU) effect to the attitude (ATT).

Path coefficient between the perceived usefulness and the attitude is equal to .059 (p-value < .05), the perceived usefulness is positively significant to the attitude. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 4:**

$h_0$ : The entertainment (ENT) did not effect to the attitude (ATT).

$h_1$ : The entertainment (ENT) effect to the attitude (ATT).

Path coefficient between the entertainment and the attitude is equal to .051 (p-value < .05), the entertainment is positively significant to the attitude. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 5:**

$h_0$ : The perceived usefulness (PU) did not effect to the intention of use (IU).

$h_1$ : The perceived usefulness (PU) effect to the intention of use (IU).

Path coefficient between the perceived usefulness and the intention of use is equal to .173 (p-value < .05), the perceived usefulness is positively significant to the intention of use. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 6:**

$h_0$ : The perceived ease of use (PEU) did not effect to the intention of use (IU).

$h_1$ : The perceived ease of use (PEU) effect to the intention of use (IU).

Path coefficient between the perceived ease of use and the intention of use is equal to -.082 (p-value < .05), the perceived ease of use is negatively significant to the intention of use. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 7:**

$h_0$ : The entertainment (ENT) did not effect to the intention of use (IU).

$h_1$ : The entertainment (ENT) effect to the intention of use (IU).

Path coefficient between the entertainment and the intention of use is equal to .303 (p-value < .05), the entertainment is positively significant to the intention of use. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 8:**

$h_0$ : The attitude (ATT) did not effect to the intention of use (IU).

$h_1$ : The attitude (ATT) effect to the intention of use (IU).

Path coefficient between the attitude and the intention of use is equal to -.054 (p-value < .05), the attitude is negatively significant to the intention of use. (*Reject  $h_0$ , Accept  $h_1$* )

**Hypothesis 9:**

$h_0$ : The intention of use (IU) did not effect to technology adoption (TA).

$h_1$ : The intention of use (IU) effect to the technology adoption (TA).

Path coefficient between the intention of use and the usage is equal to .091 (p-value < .05), the intention of use is positively significant to the usage. (*Reject  $h_0$ , Accept  $h_1$* )

## V. CONCLUSION

The system condition pattern in database is capable to utilize to be a database which is plugged into a server when the user registered to the system his/her profile will be collected in database and the system will select the suitable reward pattern for the user and when the user clicks to get reward any item, the system will provide the redeems condition in questionnaire pattern, which relates to tourism information. When the user take action based on set system condition, the system will be collected and updated tourism information into database continually. This paper provides the developed tourism gamification system from customer needs through QFD technique. Key function of this system consists of generate rewards and redeems condition function, check last update information function, generate report function, collect and update information function.

The innovative system contributes new knowledge which gathers increasingly on database. The system will collect more data and repeatedly analysis the newly obtained data. The tourism information in database will get bigger. Our framework implies to increase learning model. If the tourism information changes, the pattern of set system condition to acquire data also changes. The same as tourism products and services changed, the knowledge in database will change to new condition as well. Therefore, the database developed in this study is capable to accumulate new knowledge and update tourism information all the time.

The findings from this study can be used to improve the system in the same domain to actually support business by responding to the travelers' demands decisively. In addition, the findings would help to reduce the cost of storing the information into the systems. Because the data is collected by users so the receiving data is according to the users' needs.

### Study limitations and further research

This study focuses on developing and testing the system accuracy. The test result shows that the travelers accept and use the system. The quantity of data is likely to increase. Thus, this study suggests that the data's quality should be considered for future research.

### REFERENCES

- [1]. D. Ake, "GIS and the tourism industry". SEDA – Council of Governments, Lewisburg, 2001.
- [2]. J.L. Crompton, *Motivations for pleasure vacation*. Annals of Tourism Research, 1979. **6**(4): p. 408-424.
- [3]. G.M.S. Dann, *Tourist motivation: An appraisal*. Annals of Tourism Research, 1981. **8**(2): p. 187-219.
- [4]. A. H. N. Mak, K. K. F. Wong, and R. C. Y. Chang, *Health or Self-indulgence? The Motivations and Characteristics of Spa-goers*. International Journal of Tourism Research, 2009. **11**(2): p. 185-199.
- [5]. M.M. Nowacki, *Quality of Visitor Attractions, Satisfaction, Benefits and Behavioural Intentions of visitors: Verification of a Model*. International Journal of Tourism Research, 2009. **11**(3): p. 297-309.
- [6]. N. Sakulngam, et al., *A Study of tourism promotion factors affecting travelers' demand in Thailand*. (Philosophy doctoral degree of Technopreneurship and Innovation Management Program) Chulalongkorn University, Bangkok, Thailand., 2013.
- [7]. F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology". MIS Quarterly, 1989. **13**(3): p. 319-340.
- [8]. S. Taylor and P. A. Todd, *Assessing IT usage: The role of prior experience*. MIS Quarterly, 1995a. **19**(4): p. 561-570.
- [9]. S. Taylor and P. A. Todd, *Understanding information technology usage: A test of competing models*. Information Systems Research, 1995b. **6**(2): p. 144-176.
- [10]. F. Davis, R. P. Bagozzi, and P. R. Warshaw, *User acceptance of computer technology: A comparison of two theoretical models*. Management Science, 1989. **35**: p. 982-1003.
- [11]. K. Mathieson, *Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior*. Information Systems Research, 1991. **2**(3): p. 173-191.
- [12]. R. Agarwal and J. Prasad, *A conceptual and operational definition of personal innovativeness in the domain of information technology*. Information Systems Research, 1998. **9**(2): p. 204-215.
- [13]. D. Gefen, D.W. Straub, and M.C. Boudreau, *Structural equation modeling and regression: Guidelines for research practice*. Communications of AIS, 2000. **4**(7).
- [14]. P. A. Pavlou and M. Fygenon, *Understanding and predicting electronic commerce adoption: An extension of the Theory of Planned Behavior*. MIS Quarterly, 2006. **30**(1): p. 115-134.
- [15]. Hans Van der Heijden, *User Acceptance of Hedonic Information Systems*. MIS Quarterly, 2004. **28**(4).
- [16]. Y. Akao, *Quality Function Deployment*. Productivity Press, Cambridge MA., 1990.
- [17]. Becker Associates Inc, *Quality Function Deployment*. Creative industries research institute, 2000.
- [18]. S. Deterding, et al., *Gamication. using game-design elements in non-gaming contexts*. In Proceedings of the 2011 annual conference extended abstracts on Human factors in computing systems, CHI EA '11, 2001: p. 2425-2428, New York, NY, USA, 2011. ACM.
- [19]. R. Hunicke, M. LeBlanc, and R. MDA. Zubek, *A Formal Approach to Game Design and Game Research*. 2004.
- [20]. E. M. Rogers, *Diffusion of innovations*. 5 ed. 2003: New York, NY: Free Press.
- [21]. F. Davis, R. P. Bagozzi, and P. R. Warshaw, *User acceptance of computer technology: A comparison of two theoretical models*. Management Science, 1989. **35**: p. 982-1003.
- [22]. E.M. Rogers, *Diffusion of innovations*. 1995, New York: The Free Press.