

# Two Perceived Dimensions of Technology Acceptance Model in Mobile Tourist Guide Context

Numtip Trakulmaykee, Yaowalak Trakulmaykee, and Khanungnit Hnuchek

**Abstract**—The purpose of this study is to examine the new technology acceptance model that is appropriate to predict users' intention to use mobile tourist guide. In this study, we propose the new model which is developed based on the original technology acceptance model. Statistical analysis is employed to evidence the advantage of new proposed model. In order to investigate efficiently, this study uses SmartPLS using PLS Algorithm to analyse dataset which collects data from tourists via survey questionnaire. The findings in this study reveal that the proposed model is more appropriate than original technology acceptance model to predict and explain users' acceptance technology in the context of mobile tourist guide. All proposed factors in the first dimension (perceived usefulness, perceived ease-of-use and perceived compatibility) and second dimension (perceived content quality, perceived interaction quality and perceived appearance quality) are the factors of users' intention to use mobile tourist guide.

**Index Terms**—Intention, mobile, technology acceptance model, tourist guide.

## I. INTRODUCTION

Users' acceptance of information technology has been considered as successful measure of technology adoption in variety of contexts. Without users' acceptance, the new technology will be waste and useless. Therefore, the Technology Acceptance Model (TAM) has been continuously employed to study the users' acceptance. The TAM was proposed by [1] in 1989, it explains how and when users will use technology. Nowadays, the users' acceptance technology still is studied in the new technologies in particular of mobile application in several contexts. As a result of difference in technological features, the users' acceptance and users' perception still need to study in each technology and user group [2], [3].

Mobile tourist guide (MTG) is application on mobile devices for tourists to get tour information such as maps, attractive places, accommodations, transportations, and local food. As a result of mobile limitations, the design and development of mobile applications are different from information systems on computer. Therefore, mobile developers need to focus on design qualities (e.g., content quality, interaction quality, appearance quality) in order to fix the mobile limitations such as small screen, limited

storage and computed speed. Furthermore, most tourists always use tour information on their move, and then their perception in compatibility possibly influences their intention to use MTG.

In this paper, we propose the new technology acceptance model to explain the factors of tourists' intention to use MTG. The proposed model is developed based on TAM [1] and examined by statistical analysis. The findings of this study will be the evidence to reveal appropriate technology acceptance model in the context of MTG.

## II. RELATED WORKS

### A. Technology Acceptance Model

The TAM has received considerable attention of researchers in the information technology (IT) field over the past decade. Previous researches have demonstrated the validity of TAM across a wide range of IT [4-6]. TAM is used to predict and explain technological usage, it posit two primary determinants of IT acceptance. The first determinant is perceived usefulness (PU) which is defined as the degree to which person believes that using a particular system would enhance his or her performance. The second determinant is perceived ease-of-use (PEU) which is defined as the degree to which person believes that using a particular system would be free of effort. Both PU and PEU influence user's behavioural intention to use technology. Additionally, PEU also influence PU in TAM [1].

Although TAM is widely used to study technology in variety of contexts, TAM does not concern on quality factors and other important factors related to users' intention to use technology. Consequently, TAM has been adapted by IT researchers or integrated with other theories in order to provide a more comprehensive model structure for predicting users' intention to use technology. In this paper, we propose four determinants which possibly influence on tourists' intention to use MTG: perceived compatibility (PCP), perceived content quality (PCQ), perceived interaction quality (PIQ), and perceived appearance quality (PAQ).

### B. Perceived Compatibility (PCP)

Nowadays the technology devices are developed based on the supporting task and lifestyle of users. The compatibility has been one of the most important factors of users' intention to use technologies [2]. In general, high incompatibility will decrease the likelihood of adoption [7]. Users will be unwilling to accept a new technology if that technology is not compatible with their works [8]. Likewise,

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Ref. [9]-[11] highlighted the role of lifestyle that it is a key factor in determining the adoption rate. Therefore, tourists' perception in compatibility possibly influence on tourists' intention to use MTG. In this study, PCP focuses on users' lifestyle and travel style. PCP is defined as the degree to which an innovation is perceived as being consistent with the existing values, needs and past experiences.

### C. Perceived Content Quality (PCQ)

The content quality is important to success the IT adoption [12]-[17], it has been highlighted when firms want to design and develop mobile information services for their customers. Ref. [18] identified the role of information quality in the success of information system. In the context of digital tourist guides on mobile phones, Ref. [19] also highlight the importance of content quality. They suggested that the providing contents should be valuable, updated and high quality. Similarity, Ref. [20] reported the importance of sufficient information in mobile information service for tourist. Tourists need the tour information about accommodation, food and transportation. Therefore, this study considers PCQ to be a factor of users' intention to use MTG. In this study, PCQ focuses on content quality in terms of sufficient content, up-to-date, completeness and accuracy. PCQ is defined as the degree of perception in quality of the content that is provided by the MTG to satisfy tourists' needs.

### D. Perceived Interaction Quality (PIQ)

Interaction quality has been considered in IT studies since a last decade. Ref. [21] highlighted that most users will consider interaction as one of their expected qualities. He noted that users' dissatisfaction will relate to interaction that is not intuitive, easy, understandable, responsive, and pleasant. In mobile applications, the interaction quality is considered as an important usability issue because the input device on the small screen needs a high level of efforts while interacting with mobile devices [22, 23]. Therefore, in the context of MTG, users' perception in interaction quality is considered to be a factor of users' intention to use MTG. In this study, PIQ focuses on usability in terms of structure, navigation, and consistency on mobile information application. A consistent design of menus guarantees easy access to the desired information [24]. PIQ is defined as the degree of perception in the level of achievement which the MTG provide easy and efficient methods of interaction.

### E. Perceived Appearance Quality (PAQ)

The appearance quality is critical helping to meet users' expectation on mobile application because of the small screen and inconvenient input [16]. Mobile application must include short and concise textual descriptions accompanied by pictures and multimedia content used to provide user information [24]. Moreover, mobile application should follow a hierarchical multi-level structure that helps users to easily search their interesting information. Ref. [25] demonstrated in their study that appearance design and interface style should be considered for group of target users. Likewise, Ref. [26] highlighted the expectant quality and perception quality as appearance quality associated with users' satisfaction to use technology. Therefore, users' perception in appearance quality may be a factor of users'

intention to use MTG. In this study, PAQ focuses on the perception in quality of display screen in terms of attractiveness, proper organized design, layout, and proper multimedia. PAQ is defined as the degree of perceived display screen in terms of clear and understandable presentation on mobile screen.

## III. METHODOLOGY

In statistical analysis, we use the data set which is collected from tourists using survey questionnaire. All measures in questionnaire are adapted from good reliable items which Cronbach's alpha values exceed 0.70 as presented in Appendix. To ensure the effectiveness of questionnaire, the pilot test is used before data collection stage. In pilot test, the questionnaires are distributed to 30 convenient tourists at Suvarnabhumi Airport in Thailand. Finally, the completed questionnaires are distributed to tourists using convenience sampling technique. Before filling out the questionnaire, the MTG usage and MTG features are demonstrated to users and then users have the chance to try out the MTG. The number of total cases is 684 that is sufficient to analyse with confirmatory factor analysis [27].

To evaluate the proposed model, we analyse data set with a confirmatory factor analysis using SmartPLS. The SmartPLS is powerful Structural Equation Modelling (SEM) software to analysis data. In the first step, the measurement analysis is used to examine in terms of validity and reliability of measures. Next, the model analysis is used to evaluate three models and compare results.

**Model 1** is original TAM which has two factors (PU and PEU) to influence users' intention to use MTG.

**Model 2** has three factors (PU, PEU and PCP). This model has three generic perceptions which are two original perceptions from TAM and PCP.

**Model 3** has five factors (PU, PEU, PCP, PCQ, PIQ and PAQ), two factors are original factors in TAM and the other three factors are extended factors. Thus, the perceptions in this model consist of three generic perceptions and three quality perceptions. The Model 3 is the proposed model of this study.

## IV. STATISTICAL ANALYSIS AND RESULTS

In this section, we analyse the measurement in terms of reliability and validity. Then the comparison results of three models are demonstrated in model analysis subsection.

### A. Measurement Analysis

The reliability and validity are established by factor loading, composite reliability (CR), average variance extracted (AVE), and variance inflation factors (VIF) as presented in Table I. The factor loadings of all items also are higher than 0.60, which consider to be acceptable measurement [27]. The AVE of each variable is above 0.50, thus the convergent validity of this study is adequate. The CR values in this study range from 0.93 to 0.97, which indicate the reasonable reliability level (CR > 0.70) for the measured items.

Discriminant validity is tests correlations between

variables. To test the discriminant validity, the values of square root of AVE are computed as diagonal elements. These values should exceed the inter-construct correlations for adequate discriminant validity. As shown in Table II, all diagonal elements in this study are larger than their corresponding correlation coefficients, and all correlation of constructs are significant ( $p < 0.01$ ). Thus, the discriminant validity of study is acceptable. The VIF of each variable also is less than the acceptable cut-off points of value 5 [27]. It indicates this study does not have any multicollinearity problem, and then this study can continue to analyse model using confirmatory factors analysis.

TABLE I: RELIABILITY AND VALIDITY ANALYSIS

Variable	Item	Loading	CR	AVE
Perceived usefulness (PU)	PU1	0.82	0.93	0.77
	PU2	0.92		
	PU3	0.87		
	PU4	0.89		
Perceived ease-of-use (PEU)	PEU1	0.92	0.97	0.87
	PEU2	0.95		
	PEU3	0.94		
	PEU4	0.93		
Perceived compatibility (PCP)	PCP1	0.92	0.96	0.89
	PCP2	0.95		
	PCP3	0.94		
	PCP4	0.93		
Perceived content quality (PCQ)	PCQ1	0.86	0.93	0.78
	PCQ2	0.89		
	PCQ3	0.90		
	PCQ4	0.88		
Perceived appearance quality (PAQ)	PAQ1	0.89	0.94	0.80
	PAQ2	0.89		
	PAQ3	0.91		
	PAQ4	0.92		
Perceived interaction quality (PIQ)	PIQ1	0.91	0.95	0.82
	PIQ2	0.94		
	PIQ3	0.91		
	PIQ4	0.87		
Intention to use MTG (INU)	INU1	0.89	0.93	0.77
	INU2	0.90		
	INU3	0.79		
	INU4	0.92		

TABLE II: CORRELATION ANALYSIS

	PU	PEU	PCP	PCQ	PAQ	PIQ	INU
PU	<b>0.88</b>						
PEU	0.65	<b>0.93</b>					
PCP	0.60	0.52	<b>0.94</b>				
PCQ	0.68	0.51	0.69	<b>0.88</b>			
PAQ	0.60	0.56	0.63	0.64	<b>0.90</b>		
PIQ	0.65	0.62	0.51	0.69	0.75	<b>0.91</b>	
INU	0.64	0.70	0.72	0.68	0.64	0.61	<b>0.88</b>

B. Model Analysis

Fig. 1 presents the analysed results of Model 1 which has two factors (PU and PEU) of intention to use MTG. The effects of PU ( $\beta = 0.52, p < 0.001$ ) and PEU ( $\beta = 0.52, p < 0.001$ ) on intention to use MTG is quite strong. Furthermore, PEU has direct effect on PU ( $\beta = 0.65, p < 0.001$ ). These results are similar to the results in TAM. However, PU and PEU can explain only 42.1% ( $R^2$ ) of observation variance in intention to use MTG.

To increase the  $R^2$  value, the appropriate variables should be included in model. Therefore, the PCP is included in Model 2 and examined in order to ensure the appropriation

of additional factor. The  $R^2$  value of Model 2 is 0.519 and  $\Delta R^2$  is 0.098 as presented in Fig. 2, thus Model 2 is more appropriate to explain tourists' intention to use MTG than Model 1. The effects of PU ( $\beta = 0.23, p < 0.001$ ) and PEU ( $\beta = 0.26, p < 0.01$ ) on intention to use MTG is significant. The PEU has direct effect on PU ( $\beta = 0.65, p < 0.001$ ). In addition, the result shows that PCP has the largest direct effect on tourists' intention to use MTG ( $\beta = 0.45, p < 0.001$ ). Therefore, PCP should be included into TAM to efficiently predict and explain international tourists' intention to use MTG.

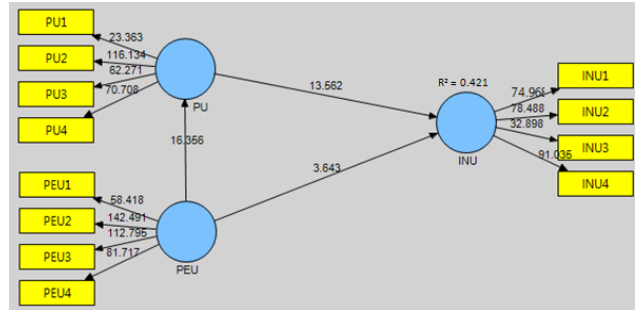


Fig. 1. Structural analysis results of original TAM.

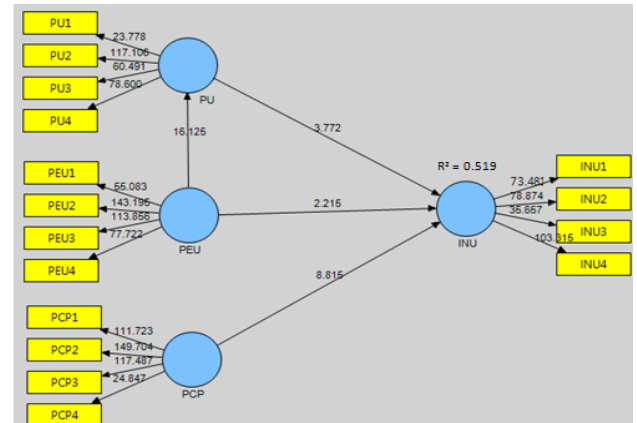


Fig. 2. Structural analysis results of Model 2.

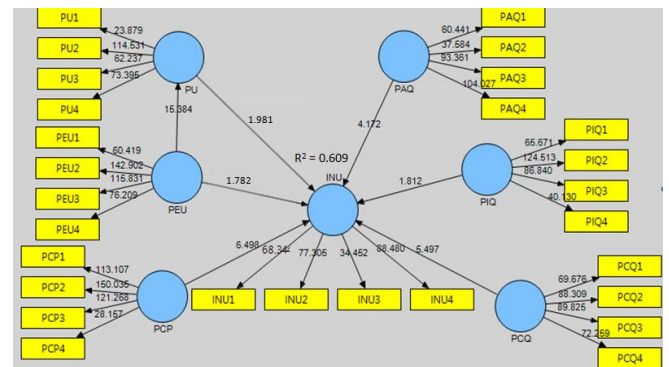


Fig. 3. Structural analysis results of Model 3.

As can be seen in Fig. 3, the proposed model or Model 3 can explain and predict users' intention to use MTG more than the original TAM or Model 1 ( $R^2 = 0.609, \Delta R^2 = 0.188$ ). From structural analysis, all t-values (1-tailed) exceed 1.65 then every relationship in proposed model is significant. It indicates that the direct factors of tourists' intention to use MTG are PU ( $\beta = 0.08, p < 0.05$ ), PEU ( $\beta = 0.01, p < 0.05$ ), PCP ( $\beta = 0.33, p < 0.001$ ), PCQ ( $\beta = 0.25, p < 0.001$ ), PIQ ( $\beta = 0.09, p < 0.05$ ), and PAQ ( $\beta = 0.22, p < 0.001$ ). In the context of MTG, the direct effect PCP on tourists' intention is the largest effect. It indicates that international tourists

concern about the compatibility more than the other factors, especially the two factors (PU and PEU) of original TAM. Furthermore, PEU also has the positive roles on PU ( $\beta = 0.65, p < 0.001$ ).

### V. DISCUSSION

Based on the existing theory of TAM, this study presents and validates the proposed model that explains international tourists' intention to use MTG. The results report the same results in TAM and previous studies [4]-[6] that PU and PEU have positive impacts on intention to use MTG and PEU has a positive impact on PU. However, this study demonstrate that only two factors in TAM (PU and PEU) are not enough to explain and predict international tourists' intention to use mobile technology in the context of MTG. PCP, PCQ, PIQ and PAQ should be included in MTG acceptance model. Therefore, the theoretical contribution of this study is our proposed model that can explain and predict international tourists' intention to use MTG more than the original TAM in particular of users' perception.

For practical contribution, our empirical study provides the guidance for MTG providers and MTG developers. The findings indicate that the significant perceptions of international tourists' intention to use MTG are both generic perceptions (PU, PEU and PCP) and quality perceptions (PCQ, PIQ and PAQ). Especially, PCP, PCQ and PAQ strongly impact international tourists' intention to use MTG.

Among the five user's perception, PCP has the strongest effect on intention to use MTG. This is consistent with earlier studies [10], [11] that users' lifestyle will strongly affect their decision to use the mobile technology. Thus, MTG providers should carefully consider the issues of compatibility to ensure that their offering meets their users' travel style and lifestyle. The example is that most international tourists want to taste the local food and need the recommended restaurants nearby their location, thus the map and guide detail (location-based information) are very important for them. However, the providers and developers should consider the internet connection, free WIFI and internet fee in their countries. If they provide only online contents in their MTG and their international tourists cannot connect internet, then the MTG is not compatible in international tourists' travel.

In terms of quality perception, the results of this study suggest that providers and developers need to recognise the limitations of mobile devices (e.g., screen size, memory, processing power, storage and user interface). The results indicate that all quality perceptions are stronger impacts on international tourists' intention to use MTG than PU and PEU. International tourists understand the limitations of mobile devices, thus they do not expect a lot of contents in MTG. They need only sufficient tour contents that can support their travel. However, the tour contents should be up-to-date, accurate and reliable. Furthermore, the providers and developers should consider the appearance quality. The display screen should design and develop based on attractive presentation, appropriate layout, proper multimedia, and proper font and colour [24]-[26]. Consistent with the existing studies [22], [23], interaction quality is a factor on users' intention to use mobile application. However, in

context of MTG, international tourists less concern about it because users have the experiences in mobile applications today and they know how to interact with mobile applications. Therefore, providers and developers can provide and design MTG without a lot of thoughtfulness in terms of interaction design.

As a main limitation of the study, this paper focuses on users' perceptions as factors of intention to use MTG. Future research should also broaden the model including possible factors which may influence on international tourists' intention such as technology experience and travel experience.

### VI. CONCLUSION

This study reveals the factors of international tourists' intention to use mobile application in the context of MTG. The results from analysis in this study have several contributions in terms of theoretical and practical aspects. For the theoretical contribution, this paper proposes the framework of users' intention to use MTG in terms of users' perceptions. Our empirical study reveals that five user' perceptions will influence on their intention to use MTG. It can be the evidence to confirm that original TAM cannot be the appropriate model to predict and explain tourists' intention to use technology in the context of MTG. For the practical contribution, the results of study provide the understandings of international tourists' MTG perceptions. In order to achieve any mobile adoption projects, tourism providers and tourism departments should focus on these factors in terms of MTG development and MTG providing for international tourists.

#### APPENDIX: A MEASUREMENT IN THIS STUDY

Item	Measure	Adapted Source
PU1 PU2 PU3 PU4	Ease of access tour information Speed of access tour information Time saving for trip planning Effectiveness	[28], [29]
PEU1 PEU2 PEU3 PEU4	Ease of learning Ease of use Level of effort Level of understanding	[29], [30]
PCP1 PCP2 PCP3 PCP4	Compatibility in travel Compatibility in travel style Compatibility in life style Compatible usage via mobile devices	[11], [29]
PCQ1 PCQ2 PCQ3 PCQ4	Need sufficiency Up-to-date Accuracy Reliability	[16]
PAQ1 PAQ2 PAQ3 PAQ4	Attractive presentation Appropriate layout Proper font and color Proper multimedia	[12], [16]
PIQ1 PIQ2 PIQ3 PIQ4	Ease of moving back Design consistency Navigation Menu awareness	[23]
INU1 INU2 INU3 INU4	Usage for planning trip Usage in during trip Usage for sharing trip experiences Usage in the next trip	[31]-[33]

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