Improving the Design and Adoption of Travel Websites: An User Experience Study on Travel Information Recommender Systems

Yu-Hsiu Hung*, Pei-Chieh Hu**, Wei-Ting Lee***

Department of Industrial Design,

National Cheng Kung University, Taiwan

*_idhfhung_/ **p36011090/ **p36011139 @mail.ncku.edu.tw

Abstract: Travel has become an essential part of our life. People love to gather travel information, and post reviews and travel related information over the web, especially through travel related websites/forums. However, the number, size and complexity of these websites imposed challenges on individuals in finding right and needed information. It is also unclear whether the design of these websites and their travel recommendations address travelers' needs and preferences. To improve the user experiences of travel websites, this study investigated travelers' needs and factors affecting the performance and adoption of travel information recommender systems (TIRSs). In this study, three popular travel websites were selected: Google+ Local, Foursquare, and Trip advisor (number of social features, from least to most). Forty-five participants (novice users, 20-35 years old) were recruited to review these websites and to complete a follow-up online questionnaire. The questionnaire consisted of demographic items, travel preference items, as well as items measuring factors affecting the adoption of TIRSs, including: _Recommendation Quality, Social, Trust, Perceived Usefulness, Perceived Ease of Use, Attitude_, and _Intention of Adoption_. Results of the data analysis revealed (1) moderate-to-strong correlations among _Social_, _Trust_, and _Intention of Adoption_ ($r>.65$, $p<.05$), and (2) differences of rating scores on _Social_ and _Trust_ (TripAdvisor: Highest, Foursquare: Lowest). Results of the questionnaire suggested that TIRSs with higher number of social features were more likely to gain trust and be appreciated and adopted by users. The outcome of the study also made design recommendations for travel websites.

**Keywords: Travel Information Recommender Systems, User needs, Adoption**

1. Introduction

According to the 2012 Travel Industry Global Overview, the global tourist population is reaching 12 billion. [8] The online travel industry has grown at an amazing rate. Most consumers booked their travel online, and travel

planning is shifting from offline to online [8]. A 2012 traveler study by Ipsos MediaCT indicated that 83% of leisure travelers and 76% of business travelers planned their trips over the Internet. However, most travelers had no specific targets or search strategies in mind when searching for trip locations. [11] In reflecting such situation, travel websites, such as TripAdvisor, Google+ Local and Foursquare, established travel information recommender systems to help people plan their trip. These travel information recommender systems help users make decisions by providing other users' comments, social ratings, social friends' recommendations, or are based on their Internet search history to recommend spots that users would probably like. While there are more and more people using travel information recommender systems, there is still no enough empirical evidence to support that these travel information recommender systems are adequately towards the needs of the users. Recently, the focus of recommender systems research have shifted from recommendation-generating algorithms [1, 12] to emphasis on discuss on of user-centric evaluation. And some researchers have also provided design methods [17] and suggestions for future research [4].

The studies above focus on discussions on intention of adoption in e-commerce websites. Few studies comparatively focus on travel recommender systems. Therefore, our study focuses on travel websites providing individual travel information and social features. We chose three typical travel information websites : Trip Advisor, Google+ Local, and Foursquare. This study doesn't discuss the official websites of travel agencies which mainly deal with business travels. Our study has four purposes: (a.) Understand the user experiences of the three travel websites. (b.) Understand users' perceptions on the quality of the travel recommendations, social features, trust, perceived usefulness, perceived ease of use, attitude, as well as intention of adoption. (c.) Investigate user needs and adoption intention (d.) Suggest design guidelines for travel recommender interfaces. This study may lead to be better understanding of travelers' needs while they are planning a trip and clarify the reasons which make them generate intension of adopt to a website. The result of this study could be useful to present travel recommender websites and enhances users' intention of using travel recommender websites.

2. Literature review
2.1 Intention of adoption
In the field of recommender systems, the Intention of adoption has usually been the final result of examining the subjective evaluations of users. It is extended from Theory of Reasoned Action (TRA) [2] and Technology Acceptance Model (TAM) [7, 9]. From the perspective of TRA, the attitude and the subjective norm of website users would affect the intentions of act of usage, and of practically using it in the future. From the perspective of TAM, the perceived ease of use and the perceived usefulness of users using a website can be used to predict the acceptance of the website.

2.1.1 Recommender Agent: Research on Intention of adoption

Many research papers which discuss the intention of adoption of recommender systems have been published, examining movies, music, electronic commerce, books and travelling websites. The most prominent one is about e-commerce websites. For example, in Pu's research [18], they designed ResQue (Recommender systems' Quality of user experience) surveys to discuss the usability and the user acceptance of recommender systems. Their results indicate there are four factors affecting the intentions of re-visiting of the websites: perceived usefulness, perceived ease of use, attitude and trust. In Wang and Benbasat's publication, a recommendation agent has been developed, providing shopping advice for digital cameras [22]. They evaluate the adoption intention of recommender systems by trust–TAM model. They prove that trust and perceived usefulness affect the users' intention of adoption, and the perceived ease of use would be changed by the level of trust and perceived usefulness. This research also indicates that users' interaction with recommender systems make users trust recommender systems and establish their intention to adopt recommender systems (On the basis of user's trust the social relations of the websites). In Xiao and Benbasat's research [4], they have reviewed recent research on the recommender systems of the e-commerce to establish 28 propositions based on the theory. Their research indicates that the rich and abundant content of the information of the websites (e.g. product description, professional, consumers' recommendations) affect users' trust, perceived usefulness and satisfaction and further affect users' intention of adoption. The research indicates that the user preference interface, recommend items and the rating mechanism provided to users remarkably affect users' decision pathway, final decisions and the intention of adoption to RA. Therefore, designers should consider user's real needs and avoid designing the websites with personal bias. According to aforementioned research in e-commerce recommender systems, we can conclude three advantages of intention of adoption: 1. Proving the factors that affect users to accept recommender systems by objective research. 2. Discussing the intention of adoption of websites facilitate us in designing the structure of the website. 3. Establishing some suggestions for other researchers. But according to the comprehensive of the present social networks, above papers haven't discussed the effects of intention of adoption influenced by social relationships. Therefore, in addition to using the TAM and TRA framework, this study adds social relation as a new variable. The following part is collected before research of the factors affecting intention of adoption of recommender systems.

2.2 Factors affecting the adoption of Recommender Agent

2.2.1 Recommendation Quality

According to Pu et al. [17], recommender quality is the key factor in a successful recommender system. This will affect users' intention to use the recommender system. Recommendation quality also affects users' perceived searching accuracy and interaction with the recommender system [18]. The higher recommendation quality the users perceive, the more convenience and less effort for them to use a recommender system. [15] The related work

[4, 6, 18] reported on the recommender system in the e-commerce websites indicates that the content of the recommender system and the interface will change users' perspectives toward the recommended items.

2.2.2 Social

The dimensions of "social" include social network and social trust. The study [20] reported that users intend to adopt friends' comments on the websites. Liu and Lee [16] mentioned that the way of linking social network and recommender system could enhance system's performance and further satisfy users' needs. Several studies have focus on trust in social network and reported that users intend to pick the highest trust value based on the social trust [3, 10, 21].

2.2.3 Trust

In the study of e-commerce websites, Wang and Benbasat (2005) noted that trust would be an important factor for users who visit websites for the first time[22]. A recent study in travel field [14] indicates that trust is the most important factor in travel information websites. The main factor reported in [13] stated that users' cognition of navigation function in a travel information will affect their trust of the websites, and further develop their loyalty to the website.

2.2.4 Perceived Usefulness

Pu et al. [18] researched into users, the perception of efficiency and accuracy by comparing those who used and didn't use the recommender systems. The term of usefulness mentioned in their work emphasizes the decision support and decision quality. We can predict users' future intention of adoption via examining whether a travel recommender system support users' decision and achieve their needs.

2.2.5 Perceived Ease of use

The term of perceived ease of use emphasizes the decision efficiency. [18] From the model of Technology Acceptance Model (TAM), both perceived ease of use and perceived usefulness are salient factors that affect intention of adoption. Therefore, to evaluate whether a travel recommender system elicit users preference or not can help to estimate users intention of adoption.

2.2.6 Attitude

Regheb and Beard [19]proposed that attitude consists of affection, cognition and action tendency. Hsu and Huang [13] noted that if users having a positive attitude toward a travel information website, they will revisit the website which means they have adopt the websites.

From literature review, this study provides seven factors that affect users' intention of adoption. We hope these

seven factors have a positive relationship with intentions of adoption. The following is the empirical model of the study: (Figure1)
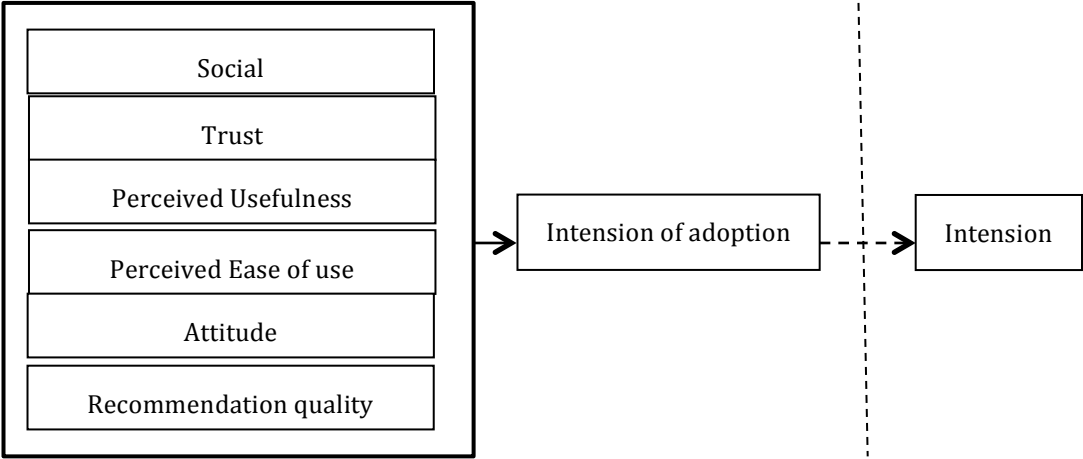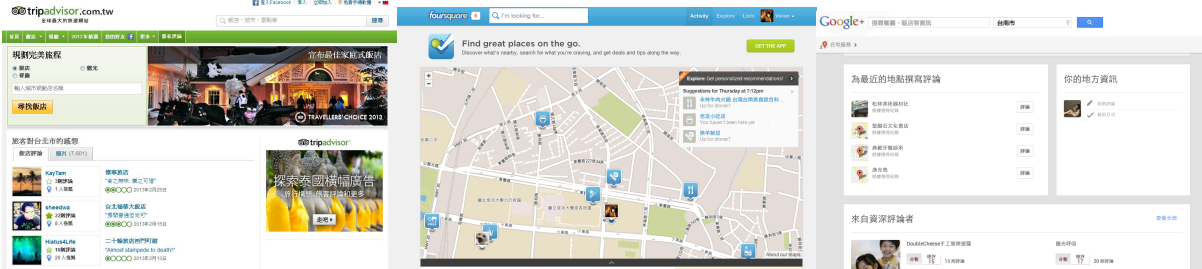

Fig. 1 Empirical model

Fig. 2 Travel websites: TripAdvisor, Foursquare, Google+ Local

3. Method

3.1 Participant

The study evaluated three travel information websites (Figure 2) which had the factors affecting the adoption of RA. We used a between-subject design approach. The travel websites were randomly assigned to three participant groups. The study recruited 45 participants, with an age range from 20 to 35 years old. Those participants are the first-time users of the website. 45 participants were mainly students were included in this study, 31 were males ($M = 23.74$, $SD = 1.81$), and 14 were females ($M = 24.62$, $SD = 1.98$).

3.2 Developmental process of the questionnaire

Our questionnaire items were mainly developed from Pu et al. [18] and Chow & Chan [5]. Then the questionnaires changed from the original subject to topic in travel. As regards to the description of the questions, three subject matter experts (SMEs) evaluated the questions and proofread them afterwards. The SMEs had a

meeting to finalize the structure and questions in the questionnaire.

3.3 Questionnaire

This study used the developed online questionnaire to understand user needs and measure the adoption of intention. First, the questionnaire illustrated the instruction and purpose of the research to explain how the questionnaire was constructed. We also provided a gift certificate as an expression of gratitude to the participants. Second, it explained the definition of recommendation function and used the graphs to introduce the recommendation. It was easier for the participants to fill out the questionnaire by reading the instructions. The response categories of the questionnaire used a 5-point Likert-type scale, ranging from 1 to 5 between a bipolar degree of satisfaction. Its structure was divided into 5 parts：(1) Basic Information (2) A survey on the recommendation quality of the travel websites (3) A survey on the online social network of the travel websites (4) A survey on the comprehensive perception of the travel websites.

4. Result

4.1 Lifestyle

In the study, 76 percent of participants would prefer planning individual travel. However, the percentage of semi-self-travel (20%) and travel agent (4%) are lower than that of the individual travel (76%). Regarding of obtaining the information, 22% of the participants refer to the blog for traveling experience. Participants communicate with one another by social network (13%) and the forum (13%). Table 1 presents what information the participants care during planning their travel. Most of them pay attention to transportation information (21%), travel cost (19%), accommodation (18%). Travelers take travel cost as top priority. Secondly, they consider transportation information. Compared with other information, travelers do not consider discount and emergency contact as very essential.

Table 1. The importance of travel information and the rank of travel information (n=45)

Travel Information	Percentage (%)	Rank
Travel Cost	19%	1
Transportation Information	21%	2
Accommodation Information	18%	3
Weather Information	16%	4
Food Information	14%	5
Discount Information	8%	6
Emergency Contact Information	5%	7

4.2 The relevance of the factors that affect recommendation of travel website

The factors that affect the recommendation function of travel were not normal distribution. Thus, we used Spearman's *rank* correlation test to examine 7 dimensions. Table 2 shows that recommendation quality and users' attitude(r=.563, p<.05), trust(r=.632, p<.05) was significantly correlated. In particular, there was a strongly correlation between recommendation quality and the intention of adoption(r=.978, p<.05). The social degree of recommendation function was a positive correlation with attitude(r=.678, p<.05) and trust(r=.685, p<.05). When using recommendation function, users' perceived usefulness was a positive correlation with attitude(r=.587, p<.05) and trust(r=.634, p<.05). There was a positive correlation between perceived ease of use and users' trust (r=.572, p<.05). With regard to users' attitude, it was a positive correlation with trust (r=.678, p<.05) and the intension of adoption (r=.512, p<.05). Then, users' trust and intension of adoption were significantly correlated (r=.638, p<.05).

Table 2. Factors affecting the adoption of RA：Correlations and Descriptive Statistics

Variables	1	2	3	4	5	6	7
1 Recommendation Quality	-						
2 Social	.386*	-					
3 Perceived Usefulness	.455*	.392*	-				
4 Perceived Ease of Use	.425*	.497*	.333*	-			
5 Attitude	.563*	.678*	.587*	.459*	-		
6 Trust	.632*	.685*	.634*	.572*	.678*	-	
7 Intention of Adoption	.978*	.392*	.411*	.387*	.512*	.638*	-

*p< 0.05, two-tailed.

4.3 Factors affecting the diverseness of travel website

In attitude and trust dimension, the result demonstrated that there was a significant effect of trust at p<.05 level for the three websites [$F(2,42) = 3.771$, p= 0.031]. Post hoc comparisons using the Tukey HSD test indicated that TripAdvisor had an advantage over Foursquare. As a result of not normal distribution, we used Kruskal-Wallis test to analyse 5 dimensions (Recommendation quality, Social, Perceived usefulness, Perceived ease of use, Intension of adoption). Table 3 showed that there was a significant effect of social at p<.05 level for the three websites [$X^2 (2) = 7.137$, p= .028]. After that, the pairwise multiple comparisons illustrated that TripAdvisor was superior to Foursquare.

4.4 Recommendation

Besides understanding the factors affecting the adoption of RA, it could study users' need. Regarding the improvement of travel function, most of the users suggested that websites could provide the latest promotion for recommendation (freq.=11). Second, user considered increasing seasonal scenic spots (freq.=9) (Figure 4). About the users' expectations, most of the travelers got the travel information from Facebook (freq.=15). Moreover, users looked forward to acquiring information via e-mail channels (freq.=11) and applications (freq.=10). In view of recommendation content, the most part of users hoped that the website could provide multiple information of view such as photos, maps etc. (freq.=11).

Table 3. Parametric/Nonparametric analyses on the three travel websites

Variable	Web	n	Mean(SD)	ANOVA		Post Hoc
				df	F	(Turkey)
Attitude	1	15	3.49(0.73)	2	2.731	
	2	15	3.78(0.54)	42		
	3	15	4.02(0.83)	44		
Trust	1	15	3.22(0.60)	2	3.771*	3>1
	2	15	3.58(0.55)	42		1=2
	3	15	3.78(0.57)	44		2=3

Variable	Web	Mean(SD)	Kruskal-Wallis test				
			df	Chi-square	Sig.	Web	Sig.
Recommendation Quality	1	3.31(0.36)	2	4.047	.132	1 vs. 2	.060
	2	3.56(0.36)				1 vs. 3	.118
	3	3.53(0.19)				2 vs. 3	.754
Social	1	3.40(0.49)	2	7.137	.028*	1 vs. 2	.095
	2	3.70(0.46)				1 vs. 3	.008*
	3	3.92(0.53)				2 vs. 3	.332
Perceived Usefulness	1	3.63(0.58)	2	3.950	.139	1 vs. 2	.627
	2	3.60(0.51)				1 vs. 3	.154
	3	4.00(0.46)				2 vs. 3	.056
Perceived Ease of Use	1	3.63(0.72)	2	4.261	.119	1 , 2	.778
	2	3.67(0.65)				1 , 3	.056
	3	4.07(0.42)				2 , 3	.103
Intention of Adoption	1	2.83(0.77)	2	3.461	.181	1 , 2	.079
	2	3.20(0.68)				1 , 3	.168
	3	3.70(0.56)				2 , 3	.706

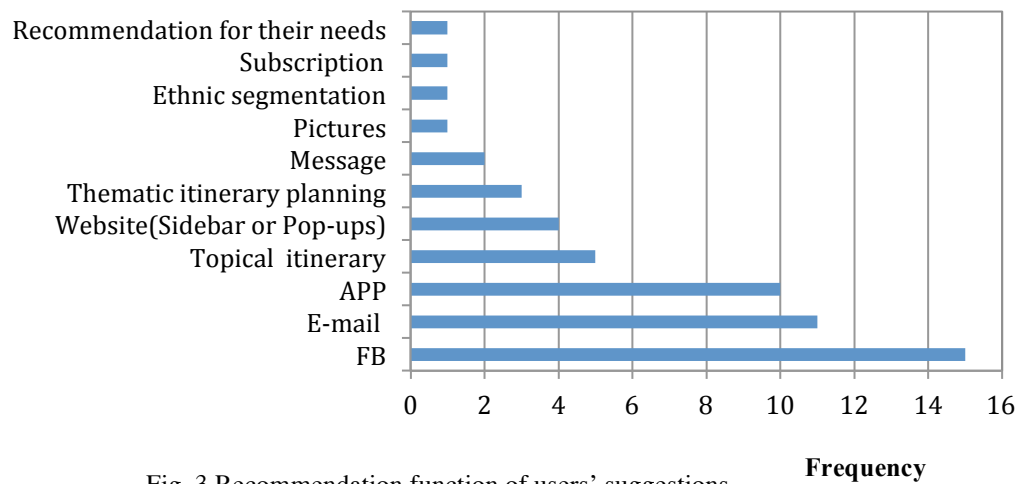*$p < .05$ Note. 1= Foursquare, 2= Google+ Local, 3= TripAdvisor

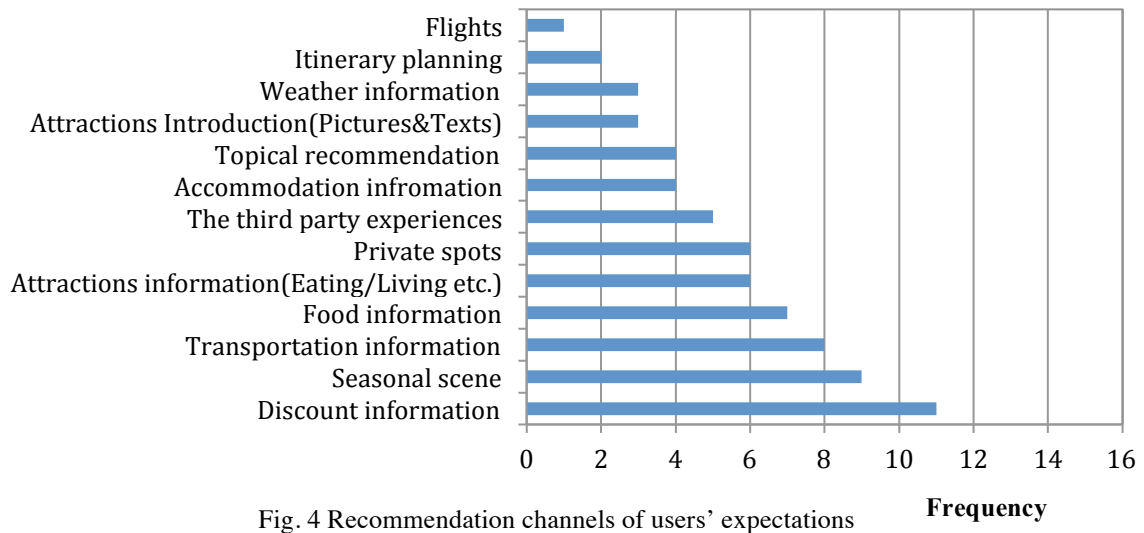Fig. 3 Recommendation function of users' suggestions

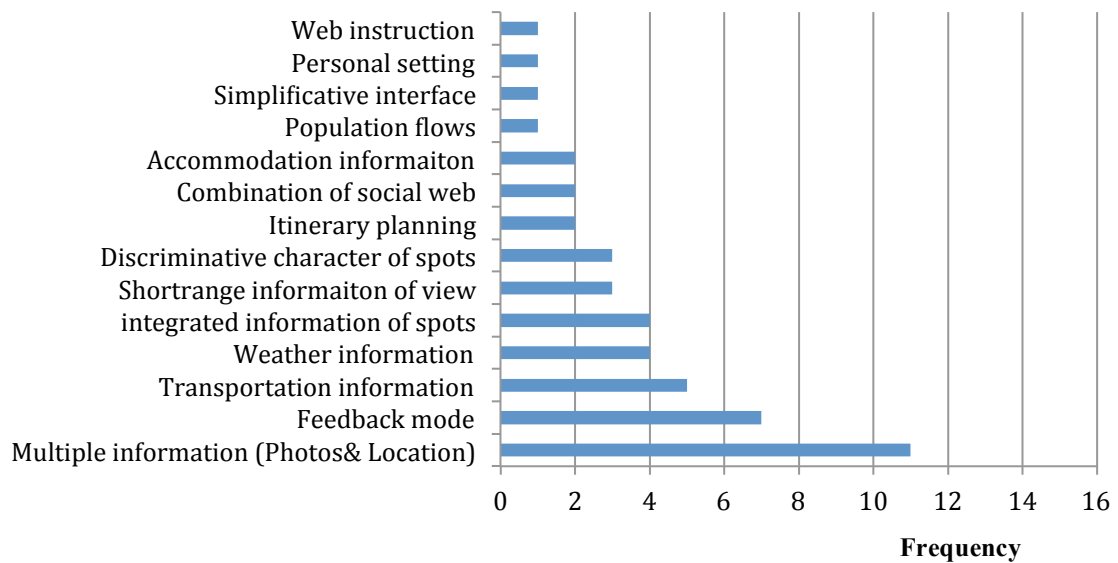Fig. 4 Recommendation channels of users' expectations

Fig. 5 Users' expectations on the recommendation content

5. Discussion

The experimental results indicated that travelers preferred planning their itinerary by themselves. 48 percent of participants looked up information from the Internet such as blog, social websites and the forum. In real life, people were advised from their relative's experiences. Thus it meant that travel information came from trusted third party sources. In comparison with the word of mouth, travelers seldom referred to the information from other organizations. In terms of users' needs, participants expected to receive the information from social websites, apps and e-mails. It could fit diverse demands by way of different medium (Figure 4).

At first, Participants focused on travel costs when planning their travel. Secondly, they desired to know the information to arrange for transportation and accommodation (Table 1). Furthermore, in figure 3, users pointed out that they want to improve the recommendation functions in many ways. It was essential to provide transferring methods and real-time traffic information because websites didn't have complete information to offer users during planning the travel. See Figure 4, Even though users thought that discount information was necessary, users illustrated the important information that ranked lower than travel cost and transportation (Table 1). That is to say, discount information could be improved after reforming other information. Because of the seasonal characters, users recommended that the websites could provide various seasonal scenery or some related seasonal activities and events (Figure 3). It helped tourists to pick the best time for travelling. As shown in Figure 5, participants expected that websites showed multiple information (e.g. photos, maps, contact information) and weather information. Before users assessed their travel, they got a grip on the scenic spots from different perspectives. In spite of multi-criteria ratings in the recommendation section, users don't believe in the criteria when evaluating their travel. Consequently, participants hoped that the recommendation function added the feedback mode to promote its reliability (Figure 5).

A Pearson correlation coefficient was computed to assess the relationship between the factors affecting the adoption of RA. Tables 2 showed that recommendation quality and users' attitude, trust, intention of adoption were a positive correlation. Therefore, we improved recommendation quality to advance users' attitude, trust and intention of adoption. Also, it can enhance the users' chance of adopting the recommendation. The social degree of recommendation function was a positive correlation with attitude and trust; hence we applied social network to increase users' attitude and trust. The result of trust indicated that it had a strong, positive correlation with attitude, perceived usefulness, perceived ease of use and intention of adoption. If recommendation function increases users' trust, it will enhance attitude, perceived usefulness, perceived ease of use and intention of adoption. In terms of users' attitude, there was a positive correlation with perceived usefulness and intention of adoption. As a result of users' attitude, it can promote perceived usefulness and intention of adoption when using the websites, which boost the users' intention of adopting the recommendation.

6. Conclusions and Recommendations

In this study, we have proposed a series of recommendation for designing travel information websites based on the research of users' need. In recommendation channels of users' expectations gives us the illustration of future function in travel information websites (Figure 3). We therefore recommend in designing travel information website, designer should consider the power of social influence. Tools in social network such as using Facebook, App, and E-mail can strengthen the social relationship. In interface design, we recommend designers should array friend's dynamic information, social rating and social comments as the primary information on the websites. Therefore, it can enhance user positive attitude and trust to the travel recommender system. The study found that most travelers tend to acquire the recommendation from the Internet or word-of-mouth by friends and family. Therefore we suggest that in the future interface design of travel information website should consider to show friends' travel information (e.g. tourist map, how many friends have been to the spot, friends' comments and favorites) as the important column. It is also essential to add an evaluation mechanism, including: services, accommodations information, food recommendation, etc. In this way, it is able to enhance the user's attitude, perceived usefulness, perceived ease of use and intention of adoption. For enhancing users' attitude, trust and intention of adoption of website, we suggest that website could provide seasonal landmarks and activities for users according to the season they will to travel (Table 1). Finally, this study also surveyed users' expected function of travel website. The result suggests website should provide surrounding information such as transport, accommodation information and cost. Thus users could plan their own travel according to the information.

7. Future research

In future work, we expect to interview with users who had needs, problems and experience in their itinerary. After collecting the data, we adopt the regression analysis to comprehend the variable correlation. We establish the mathematical model to predict other possibility when finding the main factors affecting the adoption of RA. In addition, we will anticipate that research can cross among the platforms. The platform can present actually users' needs. Namely, users plan their itinerary perfectly via the recommendation function.

References

1. Adomavicius, G. and A. Tuzhilin, (2005).*Toward the Next Generation of Recommender Systems: A Survey of the State-of-the-Art and Possible Extensions*. IEEE Trans. on Knowl. and Data Eng., 17(6): pp. 734-749.

2. Ajzen, I., (1991).*The theory of planned behavior*. Organizational Behavior and Human Decision Processes, 50(2): pp. 179-211.

3. Avesani, P., P. Massa, and R. Tiella. (2005), *A trust-enhanced recommender system application: Moleskiing*. Santa Fe, NM.

4. Bo, X. and I. Benbasat, (2007). *e-commerce product recommendation agents: Use, characteristics, and impact*. MIS Quarterly: Management Information Systems, 31(1): pp. 137-209.

5. Chow, W.S. and L.S. Chan, (2008).*Social network, social trust and shared goals in organizational knowledge sharing*. Information & Management, 45(7): pp. 458-465.

6. Cosley, D., et al. (2003), *Is seeing believing? How recommender interfaces affect users' opinions*. Ft. Lauderdale, FL.

7. Davis, F.D., (1989).*Perceived usefulness, perceived ease of use, and user acceptance of information technology*. MIS Quarterly: Management Information Systems, 13(3): pp. 319-339.

8. Euromonitor, (2012).*World Travel Market Global Travel Trends Report*.

9. Gefen, D., E. Karahanna, and D.W. Straub, (2003).*Trust and TAM in online shopping: An integrated model*. MIS Quarterly: Management Information Systems, 27(1): pp. 51-90.

10. Golbeck, J., (2006), *Generating predictive movie recommendations from trust in social networks*, in *Proceedings of the 4th international conference on Trust Management*, Editor^Editors., Springer-Verlag: Pisa, Italy. pp. 93-104.

11. Google, (2012).*Traveler research studies*.

12. Herlocker, J.L., et al., (2004).*Evaluating collaborative filtering recommender systems*. ACM Transactions on Information Systems, 22(1): pp. 5-53.

13. Hsu, C.H.C. and S. Huang, (2010).*An Extension of the Theory of Planned Behavior Model for Tourists*. Journal of Hospitality & Tourism Research, 36(3): pp. 390-417.

14. Kim, M.-J., N. Chung, and C.-K. Lee, (2011).*The effect of perceived trust on electronic commerce: Shopping online for tourism products and services in South Korea*. Tourism Management, 32(2): pp. 256-265.

15. Knijnenburg, B.P., et al., (2012).*Explaining the user experience of recommender systems*. User Modeling and User-Adapted Interaction, 22(4-5): pp. 441-504.

16. Liu, F. and H.J. Lee, (2010).*Use of social network information to enhance collaborative filtering performance*. Expert Systems with Applications, 37(7): pp. 4772-4778.

17. Pu, P., L. Chen, and R. Hu, (2012).*Evaluating recommender systems from the user's perspective: survey of the state of the art*. User Modeling and User-Adapted Interaction, 22(4-5): pp. 317-355.

18. Pu, P., L. Chen, and R. Hu. (2011), *A user-centric evaluation framework for recommender systems*. 2011. Chicago, IL.

19. Ragheb, M.G. and J.G. Beard, (1982).*Measuring leisure attitude*. Journal of Leisure Research, 14(2): pp. 155-167.

20. Sinha, R. and K. Swearingen. (2001), *Comparing Recommendations Made by Online Systems and Friends*. in *DELOS Workshop: Personalisation and Recommender Systems in Digital Libraries*.

21. Walter, F.E., S. Battiston, and F. Schweitzer, (2007).*A model of a trust-based recommendation system on a social network*. Autonomous Agents and Multi-Agent Systems, 16(1): pp. 57-74.

22. Wang, W. and B. Izak, (2005).*Trust in and Adoption of Online Recommendation Agents*. Journal of the Association for Information Systems, 6(3): pp. 72-102.