Usability Evaluation for User Interface Design of Application for Recommender System to Enhance the Potential of Community-Based Tourism in Phatthalung, Thailand

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Abstract. User experience and user interface design are the important processes in software design and development, especially in the design of mobile applications, which must support the growing needs of users. Moreover, the community tourist attractions in Phatthalung Province are still lack of important information for community enterprises and tourist attractions that offers information matched the needs of users. This research, therefore, aimed to create a user interface design on mobile devices by using user experience, and to study the format of the Application for Intelligent Recommender System to enhance the Potential of Community-Based Tourism in Phatthalung so as to support the work of designers. This research compared the 3 models of UI and evaluated the heuristic of user interface to assure that the proposed format conforms to the basic operations of the user interface. The results showed that most users liked visual presentations from Model 1 and the presentation of tourist attractions with maps suggesting trips to tourist attractions including having media related to the community which helped to attract tourists.

1. Introduction
Phatthalung Province is in the southern region of Thailand, and is a city with an ancient history. It is also the secondary tourism province that the Ministry of Tourism and Sports encouraged for tourism promotion policies by engaging the community in order to distribute income to 564 local communities. Each of which has attractive features such as products, souvenirs, and tourist attractions. All of them generate income for the whole community. Therefore, this information is important to publicize for tourists or general public. Currently, the collection of tourist information, travel directions including goods, and souvenir products of community enterprises in Phatthalung Province are still fragmented and is not published online. Thus, this makes it difficult to search and causing not being well-known to tourists, general people, or even people in the community who tend to know only the parts that are relevant to themselves. The agencies responsible for providing services to tourists require a long time to search for various information or sometimes unable to provide information to tourists. When tourists want to ask for information, they can't give an answer which causes the community to lose income both with tourist attractions or interesting community products. However,
the lack of communication channels between tourists and entrepreneurs in the community results in losing business opportunities.

Designing the user interface is one of the important processes in software design and development, especially software development on portable devices. This is due to the limitations of portable devices, both small screen sizes and limited display space which is responsible for both receiving import data and displaying results for users to be able to use in those limited areas. Also, at present, the development of mobile devices moves very fast both in terms of rendering and interacting with users in new ways, such as rendering that requires more realism, gesture operation, voice commands, as well as user demand for mobile applications have increased as a result of the rapid development of mobile devices.

2. Related Work
User Interface Design should be useful to users. This requires an application that does not just focus on the important parts of users' tasks. Users can to interact with interface application in ways that are instinctive and normal. Hence, the User Interface Design should be simpler yet easy to understand by the users. Friendlier software with constrained abilities is seen to be more usable as the user interface greatly affects the quality of the software product [1].

The prototype of the tour guide applications were developed using Smart Space infrastructure to facilitate the integration of internal services and processes in the system. These systems provide complete information retrieval with personalized recommendations and services [1]. The Global Positioning System (GPS) on the mobile phone uses location-based travel in travel applications for indoor or outdoor environments[2]. Integration of travel guides with social networks and a unique set of options offered in the app[3]. The Mobile travel guide system with three layers of web development architecture was developed to help travellers on their travel [4].

Usability is a core terminology in HCI. It has been defined as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use" [5] The usability for user was called "user-friendly," which was vague and contained subjective connotation[6]. Usability is important to any product because if users are not able to achieve their goals efficiently and satisfactory, user can find alternatives to achieve their goals [7]. A usable product seeks to achieve three main outcomes: First, the product is easy for users to become familiar with and competent in using it during the first contact, Second the product is easy for users to achieve their objective through using it, and third the product is easy for users to recall the user interface and how to use it on later visits [8].

User experience (UX) is defined as "the total experience of what users feel Thinking and responding physically and mentally before and during the use of the product or service"[9] In general, an important concept in UX is the process that users have created since they first discovered the product and used all the time [10]. X can be explained by three characteristics. The first is the holistic nature of UX. What is meant by holistic nature is that UX encompasses a broad range of qualities and includes not only the visual, tactile, auditory aspects of the system but also how the system functions under an appropriate usage environment or context. The second characteristic is that UX focus is heavily tilted towards user's perspective. UX is often misunderstood for UI (user interface), as their abbreviations are similar. The third characteristic is that UX has strategic value in product or service development, and UX has become an important topic to be considered by senior management.

Apart from usability, other core components of UX include useful and desirable content, accessibility, credibility, visually pleasing, and enjoyment [10-11].

The design goal for UX is to promote positive feelings. (e.g., satisfying, enjoyable, exciting, motivating, and fun) and Reduce the negative feelings (Such as boring, frustrating, annoying, and cute)
towards a product that is different from a usage target. The UX target is a personal property and is related to how the product feels to users. These systems attempt to use quantitative measurements to measure user's emotion. The measurement has been accepted by medical applications such as pulse and blood pressure measurement, or the use of facial electrocardiogram (EMG) and electrophysiology (EEG) to reflect computer frustration [12]. However, the accuracy in measuring the user experience is still questionable. Although usage and UX are different however not completely separated. In fact, usability is part of user experience.

3. Framework of Usability Evaluation for User Interface Design for Recommender System to Enhance the Potential of Community-Based Tourism in Phatthalung

In part of development of User Interface Design for Recommender System to Enhance the Potential of Community-Based Tourism in Phatthalung, as well as provide travel information.

3.1. Study and Collecting
This process is a researcher studied and gathered data, and get requirement from community-based Tourism in Phatthalung. The scopes of this research area are in 11 areas in Phatthalung. Researcher studied the data and analyzed the interface design to get the format that was suitable to the target group and led to next design guidelines including the study of human resources in the study of behaviour, requirements for using the interface for community tourism that meets the needs, and the suitability of users by giving out questionnaires with samples to get guidelines for interface design.

3.2. User Interface Design
This process creates interface for user interface design of application for recommender system with three models. All three models difference of UX/UI such as feature, color, and etc. Figure 1-3 show example of User Interface from tree model. All 3 models have user interface designs in the Thai language. Model 1 provides login access which supports access via social network and email. The main interface is a classification according to community tourist attractions natural attractions, restaurants, activities that have been rated with reviews based on previous traveler preferences. In addition, system has a function to recommend tourist attractions near the user's location. Traveler can see more detailed information by selecting from the map. Model 2 has access control by login by registering only. The main page is an introduction to interesting places based on reviews. Including a menu to specify the current location for tourists and display relevant promotions. Model 3 users can access by login. By applying for membership or via social network and email. This model of the main page has recommended attractions of each month. With tourist rating reviews as well as specifying the user's current location to recommend nearby places for tourists.

3.3. Usability Evaluation
Tourism application behavior questionnaire was used by applying Focus Group with commands covering usage in 3 different interface model formats with reference to interface formats.

Satisfaction assessment form after the samples had access to use according to the problem set which was a closed evaluation by using the questionnaire form to assess the rating scale (Rating Scale) 5 levels from 1 – 5. The main topic 1) Analyze the format of the interface in data links (Navigation, Signposts, and Way Finding), 2) Analyze the layout of the interface (Layout of Page Elements), 3) Analyze the pattern of product management (Lists of Things), 4) Analyze actions using actions on menus, 5) Show complex data: information graphics, 6) Analyze getting input from Users: Forms and Controls, 7) Using Social Media, and 8) Social Media 9) Visual Style and Aesthetics.
Figure 1. User interface in Model 1

Figure 2. User interface in Model 2

Figure 3. User interface in Model 3

Figure 4. Example of Wireframe

Figure 5. Recommendation UI from Model 1
4. Development and Evaluation system
To develop the system, a researcher took pictures from important parts of for Recommender System to Enhance the Potential of Community-Based Tourism in Phatthalung, Thailand, Figure 4 show an example of Wireframe from adobe XD and Figure 5 show an example of recommender interface. To assess the systems, a researcher asked 75 system experts including traveler to volunteer in assessment. The subjects were asked to rate the relevancy of the search results on a five-point scale; Score 1 is the level of satisfaction improvement, Score 2 is minimum level of satisfaction, Score 3 is medium level of satisfaction, Score 4 is good, Score 5 is very good satisfaction.

The experiment was divided into 2 cases, which were 1) the experimenting with the non-patterned pattern distribution, and 2) the design of the pattern-based interface. In both cases, it required the user interface to design the user interface according to the specified application requirements, which used 5 experimental units per program. In addition, the researcher measured the time spent in designing and the completeness of the design, which was compared with the main scenario possible in the relevant form and had each experimental group switch the application requirements used in each case. All user will be asking to test recommendation process to decide for suitable interface.

5. Result and discussion
The result of user assessment from user interface design of application for recommender system to enhance the potential of community-based tourism in Phatthalung, Thailand showed that all model was a good result and however Model 1 has highest score as shown in following table 1:

| List of the assessment                  | Model 1 | Model 2 | Model 3 |
|----------------------------------------|---------|---------|---------|
| The format of the interface in data links | 4.59    | 4.42    | 3.99    |
| The layout of the interface             | 4.05    | 3.55    | 4.53    |
| The pattern of product management       | 3.78    | 3.78    | 3.72    |
| Actions using actions on menus          | 4.02    | 3.68    | 3.60    |
| Complex data: information graphics      | 4.49    | 4.14    | 4.12    |
| Getting input from Users                | 4.34    | 4.23    | 4.03    |
| Using Social Media                      | 4.56    | 3.50    | 4.75    |
| Visual Style and Aesthetics             | 4.45    | 4.63    | 4.01    |
| Recommender system                      | 4.67    | 4.35    | 4.00    |
| Total                                   | 4.33    | 4.03    | 4.08    |

Moreover, One Way ANOVA was applied from three different model approaches by using \( \alpha = 0.05 \) levels of significance. The result found that the difference in the set of assessment returned from three different interface model approaches were statistically significant.

6. Conclusion
This research designed User experience and User interface design for Phatthalung Province’s community tourism. With a design pattern that coordinates users, the researcher evaluated the design pattern by using the hydrolytic evaluation. All 3 models were created and the researchers applied the suitable model to assess the model by 2 groups of users, which were 1) less experienced users and 2) highly experienced users in designing the user interface. The evaluation found that the layout of the
user interface design from Model 1 helped to enhance the design of the application to meet the needs of users. In addition, users evaluated their opinions on image formats using questionnaires in both sections: of the whole picture and in the form of each item in terms of completeness, and ease of understanding. And overall satisfaction, it found the user commented that they saw with various aspects to evaluate the design pattern. From both assessments, this study shows that the design of the user interface that is created is of good quality for use in the future.

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