

## Improving KTMB Ticket Mobile Application using User Centred Design and User Experience Design Approaches

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**Abstract.** Mobile application nowadays has become the way to go for many booking services. Keretapi Tanah Melayu Berhad (KTMB), revolutionaries their business by embracing the technology which led to the launch of KTMB mobile ticket application in September 2015. But only within 6 months from launching, many negative feedbacks and comments were found in Google Play by the users' reviews. The reviews from users were mostly on the deficiency of user interface design and user experience design of an application. They easily got frustrated with the application. In order to tackle with this problem, several analysis for existing application was conducted to create the better user interface design of mobile ticket application. There are several number of techniques used to assess and analyse the existing application weakness in terms of task analysis and user background. The analysis of existing application is performed to recommend alternative user interface design for future application. The analysis of existing application conducted by using three popular techniques in Human-Computer Interaction (HCI) which are Hierarchical Task Analysis (HTA), personas and scenarios. The findings of analysis were used as reference and guidelines to build a new design, alongside the recommended design guidelines for mobile user interface and good user experience from the literature. A prototype which is built based on the recommendation of the alternative user interface was compared with the current improved version of KTMB application via a usability evaluation. The findings of the comparison study shows that the recommendation of new design obtains the highest score of results in comparison to the current improved version of KTMB. This study helps to realize the importance of choosing good user interface design in order to create the great user experience when using an application.

**Keywords:** User Interface Design, User Experience, Usability Evaluation, User Centred Design, Mobile App Principles Design.

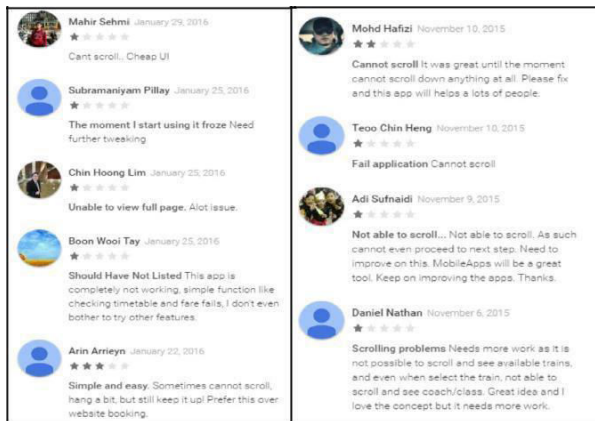
### 1 Introduction

The development of mobile phone technology makes people very concerned about the speed, convenience and comfort in everything they do, especially involving service. In order to meet the needs of today's society, a design application that is very comfortable and easy to accelerate is much needed in everyday affairs. The increase in the use of devices such as phones, electronic equipment for home appliances and any type of machine or device-based technology poses a new challenge in the field of Human-Computer Interaction (HCI) (McNamara and Kirakowski, 2005). A good level of service and comfort of users is very important in maintaining the quality of services. Purchasing train tickets via a smartphone app very quickly and easily is one way of ensuring customer satisfaction, whether locals or tourists.

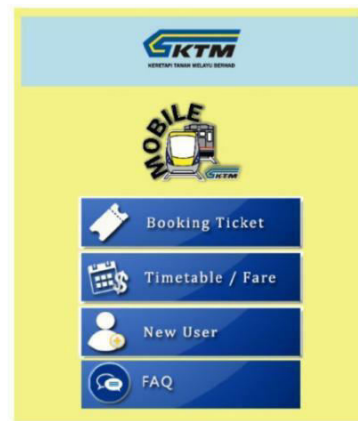
Train service is one of the transport facilities that are often used by the public. Therefore, a facility services such as railway transport can be enhanced through the development of a highly systematic application. Application development that is practical for use by a diverse community is a useful contribution to create a smart city. So, to create an application that is very practical to use, the interface design of an application is taken very seriously in ensuring that every user can avail this facility wisely.

## 2 KTMB Background

*Keretapi Tanah Melayu Berhad* (KTMB) or Malayan Railways Limited is the major railway in Malaysia. KTMB is the only rail services in Malaysia which are used by many people. KTMB MobTicket is a mobile ticket application that has been introduced by KTMB for purchasing train ticket through the smartphone application. Application of KTMB MobTicket Version 1 launched on September 2015 and can be downloaded onto a smartphone. During the 6 months from the launch of KTMB MobTicket, there are several of reviews and comments from the user of an application. Figure 1 shows the users` comments when using the KTMB MobTicket application. The analysis of existing application was made by referencing the several numbers of user feedback about the usability and user experience of an application. Figure 2 shows the main screen design of the KTMB MobTicket Version 1. It`s designed without organize the value of an app upfront, especially at the main screen (Gove, 2016).



**Figure 1:** Collection of user reviews for KTMB MobTicket Version 1



**Figure 2:** Main screen design of the KTMB MobTicket Version 1

## 3 Problem Analysis

The problem of user interaction when using the existing applications examined in depth, by analysing all the problems faced by users when interacting with the KTMB MobTicket application. Therefore, in order to recognize the structure of the KTMB MobTicket application, Hierarchical Task Analysis (HTA) techniques used to categorize each functionality displayed in the existing application. Another technique involved in this phase is the formation of current user persona associated with the existing application. The creation of existing application scenario is one of the techniques used in the phase of analysing the current background of user who face a problem using existing application. The improvement of user experience and usability of future application can be done by carefully analyse the existing application structure and functionality through these three techniques.

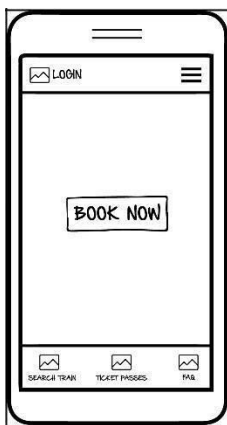
## 4 Methodology

The first phase of the study procedure involving the collection of information related to key words and terms of research. The related keywords of this study, including the information on KTMB background, mobile ticket application, usability and user experience. The second phase of research procedure emphasizes on the study of users background with the existing application. The problem of user interaction when using the existing applications examined in depth, by analysing all the problems faced by users when interacting with the KTMB MobTicket application. The third phase of the research methodology involves the proposed of new user interface design by

improving the existing application. The exploration of user characteristics and system properties from the construction of HTA, personas and scenarios gives a rough idea to recommendation of user interface design development. The fourth phase, the initial design of an application is proposed and illustrated through the sketch of the mobile mock-up screen. The sketch design of an application proposed before proceeding into the development of prototypes. The formation of initial design was done using a number of tools such as Balsamiq Mockups, Mockingbird and MockFlow. The final phase of methodology includes the comparison of new recommendation of alternative design with existing application of KTMB MobTicket. Differentiation of both design is analysed and determined for the findings of the results of this research. In this stage, the comparative assessment of the application conducted by examining in depth the elements associated with the design principle to ensure UX and usability of the mobile application.

## 5 Recommended Design

The selected 25 principles of mobile app design (Gove, 2016) and 10 principles of user interface design (Nielsen, 1995) appropriately used in the recommended design prototype. From the low fidelity of mobile application, the high fidelity prototype will be developed to clearly show the user interface design and user experience of this mobile ticket application. Figure 3 shows the low fidelity of home screen design. It's influenced by the principles of mobile app design from Jenny Gove where the button of "BOOK NOW" highlight the value of an app upfront. The color of an app influenced by the company theme color and the use of icon with text labels applied as shown in Figure 4 to avoid user cluttered with irrelevant information.



**Figure 3:** Low fidelity of home screen design



**Figure 4:** High fidelity of home screen design

## 6 Evaluation Study

The evaluation of this study for user interface and experience design conducted by selecting ten participants from three different backgrounds of user, including student, housewife and businessman as stated in the previous chapter. The task that has been provided need to be completed by participants in order to complete this evaluation study. The experiment was conducted between the user and the prototype of an application through a smartphone device. The session of the evaluation piloted in the prepared situation with the materials provided. This experiment implemented the usability evaluation in order to measure the UX of the recommended design with the current version of the KTMB MobTicket app.

## 7 Result and Discussion

The evaluation results in this study were analysed in order to determine the usability of the proposed design with version two of KTMB MobTicket app. Not all participants that undergo each of task manage to complete the tasks given. The task completion rate for each participant analysed to identify ease of use for each task given. The System Usability Scale (SUS) also used in this evaluation filled by participant as post questionnaire. This SUS consist of 10 items questionnaire with the scale of 5 response (Strongly Disagree to Strongly Agree). This SUS is used to evaluate all participant satisfaction rate between proposed design and version two of KTMB MobTicket app. Moreover, SUS also determine user experience when using the app and justify whether the app facilitates them in order to complete the task. Overall, the total average SUS score for proposed design were 76 where participant satisfied using the proposed design app as shown in Table 1. The score of total average for proposed design shows that the improvement needed to achieve more than 80 of SUS score total average. The KTMB MobTicket app version two total average was 50 where a lot of modification needed to avoid this grade F. Due to low total average score, usability need to be prioritized and fix the unsatisfied design complained by users.

**Table 1.** System Usability Scale (SUS) result

Participant	Scale Position										SUS Score
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
<b>Proposed Design SUS Result</b>											
P1	4	4	4	1	4	1	4	3	5	1	77.5
P2	4	4	5	3	3	2	5	1	5	2	75.0
P3	5	4	4	2	5	1	5	1	5	2	85.0
P4	5	3	5	3	3	2	4	2	5	3	72.5
P5	3	3	3	1	4	2	5	3	4	2	70.0
<b>Total Average</b>											<b>76.0</b>
<b>KTMB MobTicket Version 2 SUS Result</b>											
P6	3	4	3	3	3	2	3	2	3	4	50.0
P7	2	2	4	3	4	4	3	2	4	3	57.5
P8	3	5	5	1	2	4	4	1	4	1	65.0
P9	2	2	2	3	3	2	2	1	1	4	45.0
P10	3	4	2	4	2	4	2	4	3	3	32.5
<b>Total Average</b>											<b>50.0</b>

The analysis from the evaluation study introduced the better enhancement user interface and experience design for KTMB MobTicket app. To sum up, the analysis of the comparison between proposed design and version two of the KTMB MobTicket app shows the new recommendation design of KTMB MobTicket has a better user interface and experience design for train ticket app. Users can easily purchase a train ticket without required to take a long time of learning and quickly use the proposed design app again. The enhancing of user interface design and user experience of mobile train ticket application successfully produces compared to the version of app created by KTMB.

## 8 Conclusion

Enhancing user interface design and user experience of KTMB mobile ticket application gives the value of user importance and task in the field of HCI for the development of an application. There are many considerations

and elements that need to be aware to ensure the usability and user experience of the application. The constructing great user experience for an application can be very subjective as each user has different views and definitions about what is meant by good design and user-friendly.

Furthermore, creating of user experience and usability in mobile device like smartphone leads to the several of challenges and obstacles that may come from technology revolution and user demand. Therefore, analysis and studies on creating and improving the user interface design for mobile devices is one of the most challenging tasks for researchers and persists over time.

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