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# Usability Testing For Android Based Application “Jogja Smart Tourism”

Harwati<sup>1</sup>, Imam Djati Widodo<sup>2</sup>

<sup>1,2</sup>Industrial Engineering Department, Universitas Islam Indonesia

<sup>1</sup>[harwati@uii.ac.id](mailto:harwati@uii.ac.id), <sup>2</sup>[imamdjati@uii.ac.id](mailto:imamdjati@uii.ac.id)

**Abstract.** The android based application “Jogja Smart Tourism (JST)” is designed to help everyone who visited Yogyakarta to enjoy their travel. As new application, it is need to be tested for its usability before launched. Usability testing will show how easy user interfaces are to used. The objective of this research is to demonstrate the result of usability testing for application JST based on five characteristics: learnability, effectiveness, memorability, errors, and satisfaction. About 30 respondents were involved to test the usability of this application. Learnability and effectiveness is calculated from some task that should be finished by respondents, and the rest aspects are calculated from questionnaires that should be answered after simulation. There are 14 functions bound in this usability testing. The result shows total usability level is in 81.75%. Learnability testing shows that 98.8% of respondent could finish the task successfully with 87.5% in efficiency. The memorability level of respondents is good (84.5%) where their ability to fix the errors is 71.5%. And the last for satisfaction level of application interface is 66.25%. Low level of satisfaction occurred because most of respondent felt uncomfortable with landscape interface of application because they should turn their mobile phone while using JST application and also it happened because the lack of using picture and colour inside the application. Both of these becomes important note for the improvement of further applications where the interface in a portrait version is more comfort the use and also utilization of colour and the image will be the main focus to improve customer satisfaction.

**Keywords:** usability; android; application; tourism; Yogyakarta

## 1. Introduction

Tourism is a sector with strong growth around the world and has gradually changed from a secondary requirement (luxuries) becomes a primary need [1]. The growth of the tourism industry certainly requires special strategies how tourism services could offset the desire of the consumer. So with Yogyakarta area. Yogyakarta is one of the very promising tourism destinations in Indonesia. This is because Yogyakarta has many aspects that support as a potential natural beauty, the area is rich in ancient sites and cultural distinctiveness. Besides, Yogyakarta also has a lot of souvenirs and handicrafts such as batik, silver and pottery with competitive quality. With these forces Yogyakarta has a chance to become one of the important tourist destinations, nationally, regionally, and internationally. With tourism potential is quite large, it should be able to attract tourists Yogyakarta larger. There was lot of effort and strategy to market the tourism object in Yogyakarta. One way is to utilize information technology. The development of communication technology has made it possible



for someone to be able to access content via internet wherever they are via smartphones. Most people today are active users of smart phone and get benefit from many applications that are built on software [2]. The use of smart tourism technologies such as travel-related websites, social media, and smartphones in travel planning has been pervasive and growing [3]. Smart tourism is a tourism information service for tourists [4]. It is a facility that can be utilized in supporting the ease of travel. Development of tourism information system is needed to support the ease of potential tourists to conduct its activities. Specialized in designing travel application still has not been done and is still limited to the application that contains information about the tourist areas along the navigation menu to discover the attractions sought. From the comparison of the previous application, it can be seen that the entire application was only based on presenting static information about the object and tourist facilities in Yogyakarta. There are no applications to provide recommendations tour packages according to the behavior and conditions of tourists who come to Yogyakarta. At the past research it has designed a tourism application to help tourists enjoy the city of Yogyakarta. This travel application focuses on the fulfillment of the essential attributes in a single application based on consumer needs, they are:

- The list of restaurants and hotels and resorts
- The recommendation sites,
- The recommendation package,
- The estimated cost of travel

This system was designed for use on Android mobile phone using the Java programming language and to assist in the process of programming using the Eclipse IDE Indigo. This application provides proposed packages and travel destination adjusted with the tourism personal profile and it is completed with appropriate cost estimation. The interface of this application is shown in the following figure

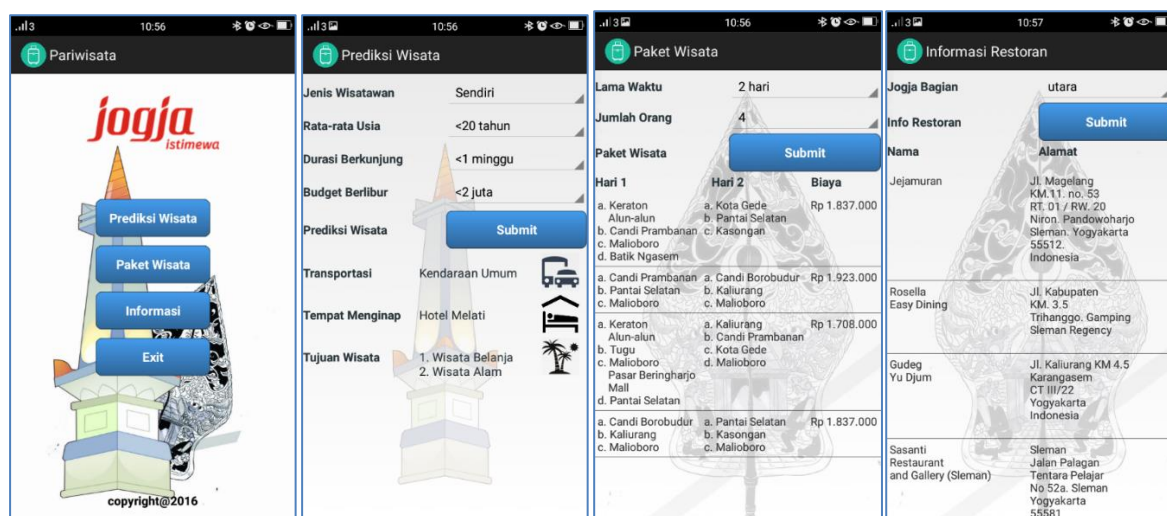


Fig 1. Interface of Application

### 1.1 Research Question

Questions to be solved in this study is how to test the usability for new applications JST based on five aspects learnability, effectiveness, memorability, errors, and satisfaction.

### 1.2 Research Purpose

As new application, it is need to be tested for its usability before launched. Usability testing will show how easy user interfaces are to used. The objective of this research is to demonstrate the result of usability testing for application JST based on five characteristics: learnability, effectiveness, memorability, errors, and satisfaction.

## 2. Literature Review

Usability basically is the quality level of the system (software) that is easy to learn, easy to use, and encourages users to use these devices. Usability is 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 specific context of use” [5]. Usability is also associated with the learnability of the system, its efficiency of use, its easiness to remember, its ability to prevent and recover from errors, and user satisfaction [6]. Usability issues need to be considered early during the software development phase to avoid design rework [7]. In general, there are five requirements or characteristics that must be fulfilled in order for an application reaches the ideal level of usability, they are:

- Learnability: explain the degree of user convenience in studying the applications to meet the basic tasks when first using the application.
- Efficiency: to explain the rate of speed in completing the tasks after studying the application.
- Memorability: explain the degree of user convenience in using the application properly, after long use.
- Errors: explain how the number of mistakes made by users, and how users correct mistakes easily.
- Satisfaction: explain the degree of user satisfaction in using the application.

Research on usability has been widely applied to various areas. Applications in the healthcare industry using usability testing before being released to consumers [8], [9], [10]. In other areas, usability testing is also used in other fields such as academic applications [11], [12], [13] government website [13], [15], [16] and many more. An application with low usability can lead to wastage of time, user frustration, increase frustration and tendency to not want to go back to visit or use existing applications.

## 3. Method

Usability testing was processed using a questionnaire which involves five aspects: Learnability, efficiency, memorability, errors and satisfaction. Respondents cover 30 people with ages 20-40 years consist of 47% women and 53% men. Overall respondents are familiar with and accustomed to using mobile devices with the operating system based on Android. Preliminary observations to the respondents also results assumptions that all of them have the ability to *define*: the ability to recognize, for example the ability to identify the icon in the application, *access*: the ability to collect the necessary information in the digital environment, such as the ability to open the browser and open a search engine, Usability test was conducted by following a flowchart as follows:

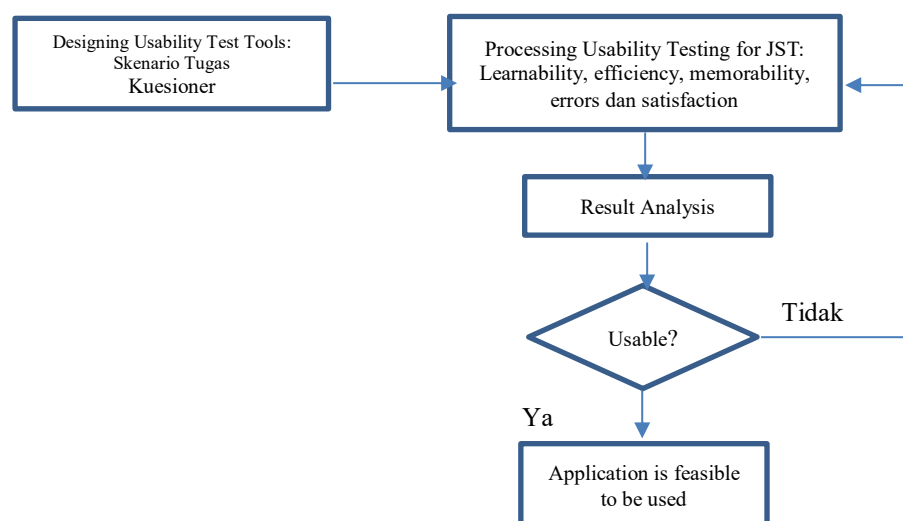


Fig. 2 Usability Testing Method Flowchart

Usability testing instrument was designed to measure five aspects: learnability, efficiency, memorability, errors and satisfaction. Learnability and efficiency was measured using observation sheet after the respondent perform certain tasks. Memorability, errors and satisfaction was measured using a questionnaire *post task*. Function 1 through 6 is a function to measure learnability and efficiency, function 7 to 10 are used to measure satisfaction, functions 11 and 12 are used to measure the errors and the last function 13, and 14 are used to measure aspects of memorability. The following table show plot of usability testing posed to respondents:

Table 1. Aspects of Usability Measurement Plot

| No of Functions | Questions  | L | Ef | M | Er | S |
|-----------------|--|---|----|---|----|---|
| 1               | Is there a travel prediction in the application?                           |   |    |   |    |   |
| 2               | Is there an application menu in the travel package?                        |   |    |   |    |   |
| 3               | Is there a selection of travel forecast budget visit in application menu?  |   |    |   |    |   |
| 4               | Is there a selection of travel packages duration in application menu?      |   |    |   |    |   |
| 5               | Looking for travel predictions   |   |    |   |    |   |
| 6               | Looking for travel packages  |   |    |   |    |   |
| 7               | What is your opinion regarding the organization of menus in applications   |   |    |   |    |   |
| 8               | What is your opinion regarding the terms used in the application           |   |    |   |    |   |
| 9               | What is your opinion about the language used in the application            |   |    |   |    |   |
| 10              | What is your opinion regarding the design of the application               |   |    |   |    |   |
| 11              | Do you fix errors during the use of the system with ease?                  |   |    |   |    |   |
| 12              | Do you easily feel 'lost' when using this application?                     |   |    |   |    |   |
| 13              | Do you remember back in the menus and the look of your application easily? |   |    |   |    |   |
| 14              | Do you think you can use these applications easily in the future?          |   |    |   |    |   |

To measure aspects of learnability and efficiency it was required a scenario that support the functions of 1 to 6. The scenario tasks that must be done for each respondent is presented in the following table:

Table 2. Scenario Task

| No. | Task A must Done   | Yes / No | Level of Ease |
|-----|--|----------|---------------|
| 1   | Find menu prediction of travel   |          | 1 2 3 4 5     |
| 2   | Find menu travel packages  |          | 1 2 3 4 5     |
| 3   | Find the option to visit the prediction budget travel  |          | 1 2 3 4 5     |
| 4   | Finding long been in menu selection travel packages  |          | 1 2 3 4 5     |
| 5   | Looking for travel predictions by category:<br>Type of traveler : Families<br>Average of age : 30-40 years<br>Length : 1-2 weeks<br>Budget : 2-5 million |          | 1 2 3 4 5     |
| 6   | Looking for travel packages by category:<br>Length of time : 2 days<br>Number of people : 5 people   |          | 1 2 3 4 5     |

#### 4. Result

Data taken from each respondent was declared valid if these respondents completing and filling the whole of tasks and questions. Next is example of stuffing recapitulation from the respondent:

Table 3. Summary of Sample Respondents Entry

| Responden | Learnability |    |    |    |    |    | Efficiency |    |    |    |    |    | Satisfacton |    |    |     | Errors |     | Mem |     |
|-----------|--------------|----|----|----|----|----|------------|----|----|----|----|----|-------------|----|----|-----|--------|-----|-----|-----|
|           | F1           | F2 | F3 | F4 | F5 | F6 | F1         | F2 | F3 | F4 | F5 | F6 | F7          | F8 | F9 | F10 | F11    | F12 | F13 | F14 |
| 1         | 1            | 1  | 1  | 1  | 1  | 1  | 4          | 4  | 4  | 3  | 4  | 4  | 4           | 4  | 4  | 5   | 3      | 5   | 4   | 4   |
| 2         | 1            | 1  | 1  | 1  | 1  | 1  | 4          | 5  | 4  | 4  | 4  | 4  | 3           | 4  | 4  | 4   | 4      | 4   | 3   | 4   |
| 3         | 1            | 1  | 1  | 1  | 1  | 1  | 4          | 4  | 5  | 4  | 3  | 4  | 3           | 4  | 3  | 3   | 3      | 2   | 3   | 4   |
| 4         | 1            | 1  | 1  | 1  | 1  | 1  | 4          | 3  | 2  | 4  | 2  | 3  | 3           | 4  | 5  | 4   | 3      | 3   | 4   | 2   |
| 5         | 1            | 1  | 1  | 1  | 1  | 1  | 3          | 3  | 2  | 3  | 3  | 4  | 3           | 2  | 4  | 4   | 3      | 4   | 3   | 5   |
| 6         | 1            | 1  | 1  | 1  | 1  | 1  | 5          | 5  | 5  | 5  | 5  | 5  | 4           | 4  | 4  | 5   | 4      | 4   | 5   | 4   |
| 7         | 1            | 1  | 1  | 1  | 1  | 1  | 5          | 5  | 4  | 3  | 4  | 4  | 4           | 4  | 5  | 3   | 2      | 4   | 5   | 4   |
| 8         | 1            | 1  | 1  | 1  | 1  | 1  | 3          | 3  | 4  | 4  | 3  | 3  | 4           | 3  | 4  | 2   | 3      | 4   | 2   | 4   |
| 9         | 1            | 1  | 1  | 1  | 1  | 1  | 3          | 4  | 4  | 4  | 4  | 4  | 4           | 3  | 4  | 3   | 4      | 2   | 4   | 4   |
| 10        | 1            | 1  | 1  | 1  | 1  | 1  | 5          | 5  | 5  | 5  | 5  | 5  | 4           | 4  | 5  | 3   | 3      | 3   | 5   | 1   |

The level of reliability is calculated using the formula the user's success rate. It is the percentage of respondents successfully completed the task correctly.

$$Learability (\%) = \frac{\sum_{i=1}^n X_i}{n} \times 100\% \dots\dots\dots (1)$$

Where  $X_i$  is the value of the success of the task by respondent  $i$ ,  $X_i = \{0,1\}$

$$Learnability (\%) = \frac{237}{240} \times 100\% = 98,8\%$$

The efficiency is calculated from the ratio of speed for the respondents in doing the task  $i$  (in a Likert scale) to maximum multiple weight and the number of respondents.

$$Efficiency (\%) = \frac{\sum_{i=1}^n X_i}{5 \times n} \times 100\% \dots\dots\dots (2)$$

$$Efficiency(\%) = \frac{1050}{1200} \times 100\% = 87,5\%$$

Memorability is calculated from the comparison grades contents of respondents for F13 and F14 (on a Likert scale) to maximum multiple value by the number of respondents.

$$Errors (\%) = \frac{\sum_{i=1}^n X_i}{5 \times n} \times 100\% \dots\dots\dots (3)$$

$$Errors (\%) = \frac{286}{400} \times 100\% = 71.4\%$$

Satisfaction is calculated from the ratio between respondent satisfaction grades (on a Likert scale) to maximum multiple value by the number of respondents.

$$Satisfaction (\%) = \frac{\sum_{i=1}^n X_i}{5 \times n} \times 100\% \dots\dots\dots (4)$$



$$Satisfaction (\%) = \frac{636}{960} \times 100\% = 66.3\%$$

Thus for overall usability value can be calculated using the following formula:

$$Usability (\%) = \frac{Learnability + Efficiency + Memorability + Errors + Satisfaction}{5} \times 100\% \dots\dots\dots (5)$$

$$Usability (\%) = \frac{98.8 + 87.4 + 84.5 + 71.4 + 66.3}{5} \times 100\%$$

$$Usability(\%) = \frac{408.8}{5} \times 100\% = 81.75$$

The result showed that from six tasks almost all tasks can be done by all respondents (98.8%). It can be concluded that the respondents did not experience difficulties in operating the menus of your application. For testing the efficiency, the overall speed of the respondents to finish the task is very good (87.5%) where the average fastest time achieved to perform the first task (F1, 91.5%), while the average time the longest used to perform tasks to 3 (F3, 80.5%). The level of remembrance of respondents in using the application is at a good level (84.5%). That means respondents are very good at remembering menu functions that exist and sure can use the application without a guide in the future. For an error rate of respondents in using the application is not a lot. It was proved by achieving level of usability for errors at 71.5%. The ability of respondents to correct errors when using an application is 72% of respondents, while the ability to browse the menus on the application resides on the achievement of 71%.

The level of satisfaction with the overall application at the level of 66.25%. The results were not good enough. This happens because of in general of respondents are still not satisfied by the application. Utilities for design or display application only reached 63.5%, while for the organization, language and terminology used is sufficient to satisfy of respondents (84.8%). From the open questionnaire it is known that many respondents felt less satisfied with the display of the menu which made in landscape format. It is considered that respondents feel not comfortable in using the application having to rotate the phone while used. Besides, the use of background colors and images in applications is still very poor thus affecting the comfort of respondents in using the application. Both of these things be important for the improvement of further applications where the application display in a portrait version as well as the use of color and images become a major focus to improve customer satisfaction so that the application is feasible to use.

## 5. Conclusion

From the overall calculation it can be concluded that the level of reusability JST currently on the percentage of 81.75% which there are two things that become the focus of improvement which display the menu and the lack of use of images and colour. This research can be continued in the future by improving the design of existing applications and perform usability tests again to see the increase in user satisfaction levels against the application.

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