

# Questionnaire Design And Validation For Temple Mobile Application

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**Abstract.** Cultural tourism in Indonesia requires more attention to attract younger generation visitors. For example, temples (candi) in East Java, Indonesia, are not popular destination for youngsters considering there is lack of information, attraction, and promotion. This research will focus on this problem by designing a mobile application that will provide interesting information about the temples in East Java. To ensure high utilization, the applications development must be started with capturing the user needs, and ended with the usability test. For these purposes, this research designs the suitable questionnaires as data collection tools. The design process must consider the young generations' preference of contact method and jargon so that it can be easily understood by respondent within the age range of 17 – 27 years old. Two questionnaires are designed as the result of this research namely customer needs questionnaire and usability testing questionnaire. This research also identified the variable that will be tested in usability testing, to check the user friendly-ness of the mobile application. The validity and reliability of the 17 questions has been tested and found to be both valid and reliable so the questionnaires' results can be used for the mobile application development process.

**Keywords:** questionnaire design, usability, mobile application, tourism, temple

## 1. Introduction

Tourism development is an important factor in encouraging the economic progression of a country. In 2017, the tourism sector was included in the top 4 in terms of foreign exchange contributors [1]. Tourism objects can be divided into several categories such as agro tourism, marine tourism, educational tourism, and art and cultural tourism. In 2016, the total number of domestic visitors recorded in East Java, Indonesia, was 13,701,599 people and foreign visitors was 344,212 people [2]. This amount indicates that there is a potential market to advance the tourism sector in the Java region.

Those number cannot represent the condition in cultural tourism, especially for domestic visitors. For example, lack of interest from the community, especially teenagers visiting the temple. The reasons are lack of socialization about the existence of the temple or lack of information that makes teenagers interest to visit historic sites. Visitors need explanation to explain about the history. Another reason is mostly historical sites are damaged because they have no maintenance due to lack of supervision. There are many damaged historical sites such as the Bojongmenje Temple in West Java [3], the Pekalongan Batik Museum [4], and other historical site so they need many efforts to make historical sites, especially temple in East Java, can get more serious preservation.

Promotion is one way to introduce temple sites in East Java to Indonesian teenagers. The Indonesian young generation has high utilization in using smartphone usage that makes Indonesia is classified in the fourth position in the world. The Ministry of Communication and Information of the Republic of Indonesia estimates the number of smartphone users will be more than 100 million users in 2018 [5]. Thus, mobile application can be used to encourage younger generation to know the temple sites around them.

Mobile applications are very popular as seen in the third quarter of 2017, the number of downloaded applications both in Android and iOS has reached 26 billion applications [6]. However, currently only 256 applications showed up in Google Play store with keyword East Java and none of them specifically designed as informative applications regarding East Java temples. This condition encourages the need for an official informative mobile application that consider the usability. The application will be designed especially for younger generation to get sufficient and correct information about temples in East Java. The application must fulfill users' needs by considering the usability variables on the temple's informative mobile application. The application should be complemented by special offers for users to submit their review on a temple so that the application will be more attractive than google.

As part of the product development process of the applications, this research tried to design data collection tools that can be used to collect data to identify the customer needs and also customers' perception of importance on the usability aspects of a mobile applications. This research also tried to design data collection tools to test the usability of the mobile applications which will be conducted at the later stage of the development process. This paper is organized into several sections including introduction, literature review, methodology, result and discussion, and conclusion.

## 2. Literature Review

Color encoding is important tool to make applications, because the chosen colors must provide messages and for the user later. For usability aspect, there are some conditions to create better usability aspect. These conditions include:

1. The colors that is used not dazzle when it is viewed, so the contrast and brightness must be considered in design applications. A good contrast is created by adjust the color used on the same page, so there is no different color temperature. Good brightness is the choice of colors that are not too dazzling and still comfortable to see.
2. The colors that exist on one application page should not be too much, because a lot of colors will cause a lot of messages received by the user when viewing the page. This will make difficult for user to understand the message being conveyed.
3. The colors used must be chosen appropriately, so the suitable combination will be comfortable when it is viewed. This will have an impact on the user's speed in seeing the entire application page clearly and giving an impression. If the selection of color combinations is wrong, it will make the application page give an impression that is not in accordance with the wishes of the buyers, and eyes will be difficult to capture the information available [7].

Product design and development is an attempt to create a new design to solve identified and unsolved problems. The solution is done using intellectual abilities and activities that combines various disciplines in design. This activity is said completed if it is successful in making a design whose specifications are acceptable and work methods clearly defined [8].

Product development can be measured its success from 5 dimensions which generally related to the profit from design made. Those dimensions are:

1. Product Quality: is a dimension that looks at whether the design is made according to consumer demand and how available the consumer will pay for the product produced.
2. Product Cost: is a dimension that sees the costs needed to produce a product. The costs include equipment, operators, and other costs incurred to produce the designed product.
3. Development Cost: is a dimension that looks at how much it costs to design and produce products. Development costs will determine how much profit the company will get in developing the products it produces
4. Development Time: is a dimension that looks at the length of design making until the realization of the design made. The longer the time from development time will result in higher costs.
5. Development Capability: is a dimension that measures the sustainability of a design made in the future, whether there are still opportunities in development and the company's ability to develop existing designs [9].

Product development is divided into several stages starting from making a product development plan and ending with the final design test produced. In each stage of product designation, it needs to be carried out by paying attention to the information obtained in the previous stage and there can be a repeat of the stage if the new information obtained needs to be tested again. This stage is referred to iterations with the objective of producing best design at the end of the project. Concept development includes various stages that must be carried out, including:

- Identifying customer needs: a stage where the developer will try to identify the needs of the community. There are various ways to identify problems by interviews, observations, or collecting questionnaire data. The results of the data obtained will give an overview of what needs that is found in the community now.
- Establishing target specification: a stage for determining the target attribute so it can answer the existing needs. At this stage, using House of Quality in carrying out weighting which attributes need to be chosen to answer existing needs. Attributes will get weighting based on the assessment obtained from the integration of the scale of existing needs [10].
- Concept generation: a stage to produce concepts that will be chosen by the best concept. At this stage the designer will consider the results of the specifications obtained in the previous stage in the concept making process. Brainstorming is one method that is often used in exploring the concepts that will be chosen later [11].
- Concept selection: the selection of concepts, it can use the concept selection matrix to help determine the best concept to continue to the next stage.
- Concept testing: the stage of testing the selected concept by asking value of potential users to find out whether the concept chosen is in accordance with the needs of the user. At the concept testing stage will be carried out by conducting a questionnaire that will be given to several potential users who are selected specifically based on the target market.
- Final specifications settings: the stage of refinement of concept that has been chosen. The results of the concept testing will be used in revising the selected concept, so later the final concept will be obtained to continue in the next stage.
- Project planning: the stage of preparing agenda for activities and making expenditure plans. At this stage the duration of each work and the grouping of the work will help in planning the agenda, so that the project can be completed on time and within budget.
- Economic analysis: a stage comparing the two possibilities that exist to see which choices are more profitable on a profit basis. The purpose of running economic analysis is to calculate opportunity.
- Benchmarking of competitive product: a stage of comparing products or services made with goods that have been circulating with the objective to know the product opportunities can be marketed or not.
- Modeling and prototyping: a prototype-making stage with the objective to realize the concept design that has been selected. After the prototype is finished, several tests will be conducted to find out how potential users respond to the product that has been bolted [9].

Usability is a measure in determining the experience that a user receives in interacting with everything that is operated by the user [12]. There are 5 conditions that must be met in designing an application so that it can be used by users ideally, namely:

1. Learnability: a dimension that measures how easy a user is in learning and using the features in the application
2. Efficiency: a dimension that measures the speed of a user in using the features offered.
3. Memorability: a dimension that measures how well an application can make users remember the features they have in the long run.
4. Errors: a dimension that measures the severity of errors made by the user and how well the response to solve these problems by the user
5. Satisfaction: a dimension that measures the level of user satisfaction in using the application created and the level of benefits provided by the application to the user

Usability testing needs to be done to find out how the user experiences when using the application made, there are 3 types of testing, namely:

- Exploratory: for the first response from the user after using the application given, testing is carried out informally and through a series of fundamental questions.
- Assessment Test: test the concept chosen to a group of people to find out whether the experience received is in line with expectations
- Verification Test: evaluate the design whether it is in accordance with the initial plan in the development of the design made or not [13].

### 3. RESEARCH METHODOLOGY

The questionnaire design methodology started by defining the target user of the final product i.e. the mobile application for East Java temples. The target user dictated how the questions should be arranged and what diction to be used so that it will be easy to be understood. A literature review on the topic and object would help provide information on how to effectively reaching out to the target user by choosing the wording for the questions.

After the questionnaire is filled with questions, then the preliminary survey can be conducted to gather information to validate it. We must ensure that the target users (respondents) understood what is being asked to them. The preliminary survey can also help us to assess whether the questionnaire is a reliable metric to measure the subjective information we need from the respondents. If the results showed that the questionnaire is both valid and reliable, then we can continue collecting data until meeting the minimum number of respondents required. Otherwise, the process must be taken back to questionnaire design phase.

**Figure 1** provide graphical representation of the research methodology. Interviews and observations will be conducted to respondents of young generation with aged 17 – 27 years. From initial survey, there are some variables that are included in the mobile application. Then, we evaluated the usability aspects of mobile application based on web usability design [12] & [14] so that there are 5 dimensions consisting of several variables as presented in **Table 1**.

Table 1. Variables in Usability Test

Dimension	Variables
Learnability	Ease of understanding the contents of the page being read Ease of using and learning the features provided Ease of switching pages on the application Ease in finding the required features
Efficiency	The speed of the user in understanding the contents of the page being read The speed of the user in using and learning the features provided Speed in switching pages on the application User speed in searching for the required features
Memorability	The ease of the user in remembering the function of the features offered Ease of users in reusing existing features Ease of the user to recognize the symbol or icon provided The ease of the user in remembering the location of the features needed when they have not used the application for a long time
Errors	There is a confirmation warning to ensure user choice There is a help feature regarding information needed by the user There is a refresh button to update the contents of the page that is opened
Satisfaction	The entire application system works well and can be used quickly The entire application features function according to the function that should be

Primary data is obtained from the results of questionnaires in the form of comparison tests and questionnaires regarding usability in the designed mobile application. Secondary data comes from book and internet references. After primary and secondary data have been collected, the results of the comparison test will be used as the basis for creating the user interface. Furthermore, after the user interface has been completed, a survey will be distributed with a questionnaire to find out how the responses and input provided by the users will be used in the usability evaluation of the mobile application created. The usability testing will focus on learnability, efficiency, memorability, errors, and satisfaction, then formulating improvements to the interface of the application made

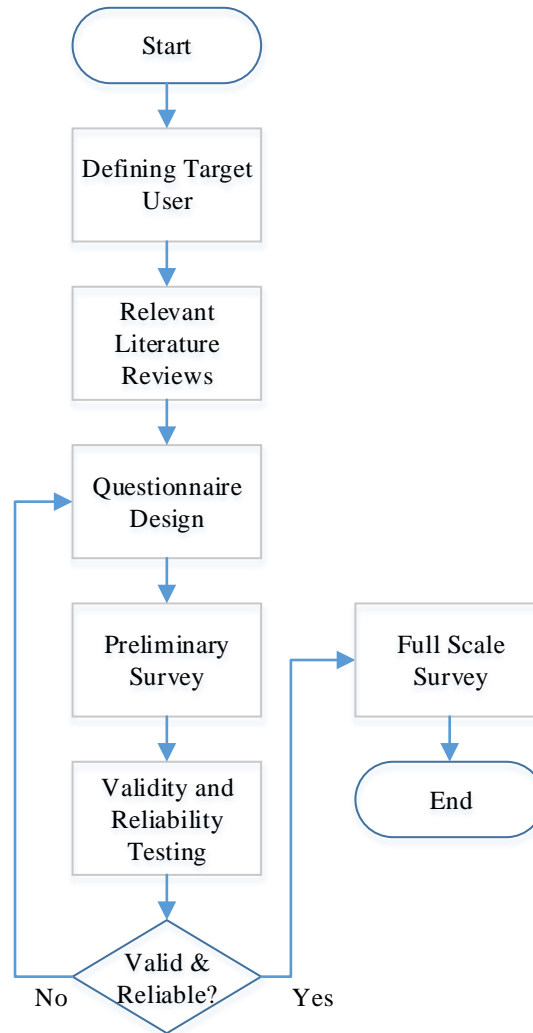


Figure 1. Research Flowchart

#### 4. Questionnaire Design Result and Discussion

We designed two different questionnaires as the purpose of each questionnaire is significantly different. The first questionnaire is intended to identify customer needs and importance level regarding the usability aspects of the mobile application under development. The second questionnaire is intended to measure the level of usability of the mobile application after it is developed. So, the first questionnaire will be used in the early stage of the product development, while the second is used nearing the end of the development process.

The first questionnaire consists of three parts: respondents' profile, concept testing, and usability importance. The questions are shown in **Table 2**. Between Part A and Part B, the respondents are given a brief explanation regarding the mobile application product concept so that the respondent can imagine the product and give their answer for the part B. Part C is designed to measure the importance level of the usability dimensions and will serve as guidelines during the application design and development.

Table 2. First Questionnaire

Part	Num.	Question	Type
A	1	Gender	Closed-Ended Question
	2	Age	Open-Ended Question
	3	Application Platform	Closed-Ended Question
	4	Have you ever used tourism information application?	Closed-Ended Question
	5	Have you ever visited temples in East Java?	Closed-Ended Question
	6	Do you know any applications that specifically about temples?	Closed-Ended Question
B	1	Do you know any applications that resembles FTT?	Closed-Ended Question
	2	Are you interested in using the FTT application?	Closed-Ended Question
	3	Do you think the application will encourage you to visit the temples?	Closed-Ended Question
	4	What features do you think must be included in the FTT?	Multiple Input Question
	5	What other features that you suggest might help improve the FTT?	Open-Ended Question
C	1	The content is easy to be read	5-point Likert Scale
	2	The feature is easy to use and understood	5-point Likert Scale
	3	Easy to navigate through application pages	5-point Likert Scale
	4	Easy to search a certain feature	5-point Likert Scale
	5	The speed of the user in understanding the contents of the page being read	5-point Likert Scale
	6	The speed of the user in using and learning the features provided	5-point Likert Scale
	7	The speed in switching pages on the application	5-point Likert Scale
	8	User speed in searching for the required features	5-point Likert Scale
	9	The ease of the user in remembering the function of the features offered	5-point Likert Scale
	10	Ease of users in reusing existing features	5-point Likert Scale
	11	Ease of the user to recognize the symbol or icon provided	5-point Likert Scale
	12	The ease of the user in remembering the location of the features needed when they have not used the application for a long time	5-point Likert Scale
	13	There is a confirmation warning to ensure user choice	5-point Likert Scale
	14	There is a help feature regarding information needed by the user	5-point Likert Scale
	15	There is a refresh button to update the contents of the page that is opened	5-point Likert Scale
	16	The entire application system works well and can be used quickly	5-point Likert Scale
	17	The entire application features function according to the function that should be	5-point Likert Scale

The second questionnaire that intended to measure the application's usability should use the Part C questions in the first questionnaire. The difference is that the respondents will provide their verdict on the application instead of importance level. In order for the respondents to be able to judge the usability, the surveyor must demonstrated the application and let the users try it. The result of the usability testing can be used to refine the applications to be released as an updated version.

A sampling process involving 100 respondents aged 17 – 27 years old has been done during October 2018 to test the questionnaire validity and reliability. We mainly evaluated the part C of the questionnaire for this purpose.

Table 3. Validity and Reliability Testing Result

Num.	Dimension	Corrected item - total correlation	Cronbach's Alpha	Status
1	Learnability	0.594	0.715	Valid & Reliable
2		0.492		
3		0.437		
4		0.498		
5	Efficiency	0.536	0.748	Valid & Reliable
6		0.545		
7		0.562		
8		0.534		
9	Memorability	0.46	0.632	Valid & Reliable
10		0.397		
11		0.331		
12		0.472		
13	Errors	0.471	0.675	Valid & Reliable
14		0.473		
15		0.533		
16	Satisfaction	0.528	0.69	Valid & Reliable
17		0.528		

**Table 3** summarizes the sampling result which shown that all questions in the questionnaire are both valid and reliable and the sampling result can be used for further product development process. The 17 questions also considered as concise and should be able to maintain respondents' interest in finishing the questionnaire.

## 5. Conclusion and Further Research

To help attracting youngsters to visit temples in Jawa Timur, Indonesia, a mobile application seems like a good alternative. In order to create an effective application, we must ensure that the customer needs are met sufficiently. This research is a part of bigger research to serve that purpose and tried to formulate questionnaire to be used as a data collection tool in identifying the customer needs. The sample of 100 respondents has shown that the 17 questions used to measure the usability are both valid and reliable.

Further research should be done in the area to improve the usability questions further. As mobile applications are sometimes very dependent on the availability of internet connection, it is also interesting to check the usability of such applications where the connection is not stable or consider to create an offline mobile application with application size as the constraints.

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