

# Usability Testing on Flight Searching Website Using Heuristic Evaluation

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**ABSTRACT**

Usability is determined as how a product can be used to achieve certain goals effectively, efficiently and satisfyingly. The purpose of the current study is to understand the ease and effectiveness flight searching form in Garasitiket with usability testing. Usability test was done by comparing an existing and an alternative form using respondents from members and non-members of Garasitiket. Data was analyzed using ANOVA. The result showed that “familiar” might not fully affect users in selecting user interface. However, it may have effects on the user’s mental model. A mental model will influence users to passionate with an existed user interface rather than to try a new one. Statistical analyses indicated that there were no significant differences between User Experience Model 1 and 2. Furthermore, User Experience Model 1 was more preferable rather than User Experience Model 2.

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**1. INTRODUCTION**

Based on functions, the website is divided into four categories: entertainment, information, communication and commerce [1]. Entertainment category provides relaxation to users who want to stress relief; an information website is used for finding information easily and quickly; a communication website facilitates communicating with the community; and a commerce website is used for meeting between sellers and buyers by online. Garasitiket is one of websites that provided online ticket reservation especially domestic route in Indonesia. Garasitiket has been established since 2011 in Yogyakarta Indonesia. Total active members of Garasitiket are about 228 peoples that spread all over Indonesian territory. The total tickets sold by Garasitiket per month are about 800 tickets. This amount of transactions indicates that Garasitiket is highly trusted website. As an online ticket reservation, Garasitiket provide a searching facility to facilitate when the user need to book or issued his/her ticket.

However, evidence, shows that numerous websites available to the public are not comparable in term of quality. Users often have difficulties in finding information in a ubiquitous information [2]. Abundance of information and services content does not guarantee that the website satisfies the user’s needs. The challenge for web developers is how to create an information efficiently and interactively in order to make easy and efficient for the user [3]. The one of method to evaluating effectiveness and ease of website called usability testing [4]. The term “usability” means how far a product can be used to get the goals effectively, efficiently and satisfyingly [5]. On the other hand usability can be considered as two concepts i.e. pre-use usability and user performance (task completion time). Pre-use usability is defined as a perceived user on website before actual use while user performance is the result of user activities on a website. The one objective of user performance measures is task completion time [1]. Furthermore user performance was one of the primary determinants of usability [6].

Providing users with comfortable websites will increase the marketing level [7]. Accordingly, usability testing is essential conducted to identify problems of users to find a proper flight searching. In the present study, Garasitiket provided an alternative flight searching to replace their existing form. The effectiveness of both flight searching was evaluated using usability testing. A preliminary study on usability

flight searching has been done by the members of Garasitiket and indicated that there were no significant differences between User Experience Model 1 and 2 [8]. The present study was performed to justify the limitation in the first study only involved Garasitiket members. In the current study, the respondents were taken from the members of Garasitiket and non-members.

## 2. RESEARCH METHOD

Usability testing in this study was performed by comparing existing and alternative forms. The existing form, namely “User Experience Model 1”, is a searching form that used by Garasitiket website since 2011, while the alternative form, namely “User Experience Model 2” is provided to replace User Experience Model 1. User Experience Model 1 and 2 are presented in Figure 1 and 2. The usability testing consists of three categories i.e. inquiry, inspection, and formal usability testing [4]. This study was involved in formal usability testing category that using actual users and real task to test a Garasitiket website with the result could provide a usable facility. The scenario of testing was done by some step as follows :

1. Group member A was given task to search a flight schedule using User experience Model 1;
2. Group member B was given task to search a flight schedule using User Experience Model 2;
3. Group non-member A was given task to search a flight schedule using User experience Model 1;
4. Group non-member B was given task to search a flight schedule using User experience Model 2;

Figure 1. Example of flight searching for User Experience Model 1

Figure 2. Example of flight searching for User Experience Model 2

This study involved 120 respondents and divided into two major groups, namely members and non-members. The member group was divided into two groups i.e. member A who did User Experience Model 1 and Member B who did User Experience Model 2. Similarly, the non - member group was also divided into two, groups i.e. non-member A and non-member B who completed User Experience Model 1 and User Experience Model 2 respectively. The scoring was done using a questionnaire that developed based on Ten Nielsen Heuristic Evaluation (HE). HE was developed by Jakob Nielsen and Rolf Molich to assess usability web site [9] [10].

Ten main components of HE:

1. Visibility of system status
2. Match between system and reviews the estate world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

Eight of ten components used in questionnaire i.e. visibility, match between system and the real world, user control and freedom, consistency and standards, error prevention, recognition rather than recall, flexibility and design. Whereas, two components i.e. help users recognize, diagnose, and recover from errors and help and documentation were removed from the questionnaire because lack of facilities in the Garasitiket website. Design elements, the most widely used in this study, were loaded with the question number ten to thirteen. This was because the design was identified as factor of acceptance key and successful implementation of the web site and e-commerce [11]. Color was one of the design elements that was tested in this study because it affected to perception, psychological reactions, emotions and user behavior [12]. The color is also an expectation of a “brands”, for example red color synonymous with Coca-Cola and blue synonymous with IBM [13]. Color testing focuses on contrasting background and text color that writing was easy to read. Non-member group prefers User Experience Model 2 in text and color composition. The questions based on HE as shown in table 1.

Table 1. The Questions based on the Ten Nielsen Heuristic Evaluation elements

Number	Ten Nielsen Group	Questions
1	Visibility	Searching form helps the user to see the route and flight schedule
2	Match between system and the real world	Searching form gives a result to help the user to determine the option of flight schedule
3	User control and freedom	Searching form of schedule and flight route can be used easily
4	User control and freedom	The form can be understood easily
5	Consistency and standards	Optioning word in the form is easy to be understood
6	Error prevention	The system gives error messaging to user, if the user makes the mistake in form entry
7	Recognition rather than recall	There is an explanation to help the user in form entry
8	Recognition rather than recall	Using a symbol or picture
9	Flexibility	The information is divided into one level, so it's not needed to open the new page
10	Design	The available form for searching the route and flight schedule interactively
11	Design	The font size that used is suitable and it's easy to read
12	Design	Option color that's used between the background color and font are proper so it's easy to read
13	Design	Information grouping of flight route is great so users can understand the information easily

Each question was scored using a five Likert scale from strongly disagree (1), disagree (2), do not know (3), agree (4), and strongly agree (5) [14]. Data was analyzed using Analysis of Variance (ANOVA) to find differences between subject and user experience model factors. All statistical analysis was done using SPSS version 20. Cross tabulation analysis was also performed to obtain the distribution of respondents in each group [15].

### 3. RESULTS AND ANALYSIS

User Experience Model 1 and 2 have significant differences in the layout, color combination, where clause query, available seat, data displaying, sorting method, users characteristic, easy to compare and information retrieval that shown in Table 2.

Table 2. The significant differences of User Experience Model 1 and 2

Category	User Experience Model 1	User Experience Model 2
<b>Layout</b>	More minimalist, only includes departure, destination and date	More complex, includes departure, destination, date, number of seats and sorts the results by price or schedule
<b>Color combination</b>	Gray and orange	Gray, red, and dark blue
<b>Where clause query</b>	Constraint with airline in where clause	Not constraint airline in where clause
<b>Join table</b>	Inner join	Outer join
<b>Available seat</b>	Not defined available seat	Defined available seat
<b>Data displaying</b>	By airline	All airlines
<b>Sorting method</b>	No sorting method	Simple sort with insertion sorting
<b>Users characteristic</b>	Should have knowledge of airline schedule and route	Should not have knowledge of airline schedule and route
<b>Easy to compare</b>	More difficult to compare prices	Easier to compare price
<b>Information retrieval</b>	Faster in information retrieval	Slower in information retrieval

The result of data analysis using ANOVA was shown as Table 3.

Table 3. Result statistical analysis using ANOVA

Number	F, Sig.	Subject	User Experience	Subject*User Experience
1	F	3.160	2.373	1.699
	Sig.	0.078	0.126	0.195
2	F	2.715	6.109	2.715
	Sig.	0.102	0.015	0.102
3	F	1.509	2.806	0.312
	Sig.	0.222	0.097	0.578
4	F	0.797	0.797	1.794
	Sig.	0.374	0.374	0.183
5	F	0.386	0.139	2.608
	Sig.	0.536	0.710	0.109
6	F	0.474	1.171	0.784
	Sig.	0.492	0.281	0.378
7	F	5.898	2.621	0.164
	Sig.	0.017	0.108	0.686
8	F	1.804	0.134	1.208
	Sig.	0.182	0.715	0.274
9	F	4.205	11179	2.459
	Sig.	0.043	0.280	0.120
10	F	0.945	1.412	0.105
	Sig.	0.333	0.237	0.746
11	F	0.173	0.019	0.942
	Sig.	0.678	0.890	0.334
12	F	0.837	4.236	2.563
	Sig.	0.362	0.042	0.112
13	F	0.056	2.735	0.893
	Sig.	0.814	0.101	0.347
Total	F	0.124	1.586	1.989
	Sig.	0.725	0.210	0.161

Based on the analysis data using ANOVA, there was no significant difference between User Experience Model 1 and 2 in total score and the majority of the questions. This means that in general both of User Experiences have the same usability level according to the use of members and non-members. However, some significant differences were found in the user experience factor in question number 2, 11, and 12, and in the subject factor in question number 7 and 9. Based on cross tabulation analysis, there was a tendency of respondents preferring the User Experience Model 1 from the greater responses of “agree” and “strongly agree” of each question.

Further research was needed to combine two or more approaches such as HE and analytic hierarchy process (AHP) or User Testing. However, previous research showed that HE conducted found that 60% of problems, while the User Testing only find 30% of the problems and the remaining 10% were found by both methods. Based on these data, it can be concluded that for HE usability testing has greater accuracy than the user testing [16]. Usability research combined between HE and AHP, it means that the problem of ranking is obtained, then the priority solution to the problem can be resolved so that the website will be easier to use [17]. Therefore, the research that's carried in Garasitiket used HE method with a reinforced two reasons. The reason was because the existing system was tested and recommended method was HE [18], in addition, HE has a greater accuracy in finding usability problems.

#### 4. CONCLUSION

The present study concludes that :

1. There were no significant differences between User Experience Model 1 and 2 with a variance value of total on subject factor 0.124 (0.725), user experience factor 1.586 (0.210), and subject \* user experience factor 1.989 (0.161). This result indicates that Garasitiket could use User Experience Model 1 or 2. However, Garasitiket should provide another User Experience to improve their website and to test again before implementation.
2. According to the website functions, Garasitiket was involved “commerce” category that brings the airline as a seller and user as a buyer of the ticket.
3. The study also found that users of Garasitiket preferred user performance that refers to a result of user activities i.e. flight schedule data.
4. A behavior factor does not fully influence the user in choosing “user interface”, but it can make users have a “mental model” match between the user interface and cognitive user so that it will become easier when using the User Experience Model 1.

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