Advances in Social Science, Education and Humanities Research, volume 625
ICON ARCCADE 2021: The 2nd International Conference on Art, Craft, Culture and Design (ICON-ARCCADE 2021)

Usability Testing Over E-Tourism Information System to Measure Domestic Tourist Satisfaction In Balikpapan

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ABSTRACT
Information technology is one the advanced technology in this era which is the most powerful thing that give us advantage in everyday activity. In this days, we can access all information every second every day without boundaries with our gadget to wherever we go. There are so many types of digital platform that provide this kind of information such as social media, application, and website. They have their own interactive user interface as we did in this study is website interface. In this study we implemented a good design concept especially for website interface because there are 547.200 new websites are created globally. In this pandemic era there are multiple of it. This study used usability testing which focused on measuring user experience on the developed website. The developed website developed based on cased study of two tourism websites and tested on the user. In this study, a tourism website which affected creative industry the most during this pandemic was analyzed to see the exact data of user measurement. Feedback was also required to increase the result of the measurement. The study showed us that user interface design affected people to understand every information served on the website, the user can easily recognize the purpose of every button and its operation on the website. Finally, a good user interface based on usability testing can help user to control the website and give the website a lot of traffic. In addition this study shows us that we need to consider user experiences before launching it globally. The number of error shows that the design need to improved even it seems better and has new design style. In other words, an eye-catching design is not always suitable for website user interface.

Keywords: *UI/UX, Website, Tourism, IoT, Usability*

1. INTRODUCTION

In this very fast digital information era, the internet has become a media that is needed by the people to obtain or exchange information all over the world without boundaries. The internet network is expanding rapidly so it is very easy to use anywhere. This is the reason of the increasing number of web designs that developed this time. Tourism sector is one of the potential sectors in Indonesia, including Balikpapan, which is located in East Kalimantan, has various tourism spot, such as beach, nature, and historical tourism.

However, the dissemination of information about the charm of this tour is still ineffective. This is quite risky in the midst of increasingly rapid technological developments, and therefore it is time for the information management system to be managed effectively using interactive media. This needs attention from the Regional Government because of the development of the sector tourism will have an impact on increasing the number of domestic tourists and foreign tourists who come to Balikpapan so that it can increase the sector the community's economy and provide substantial foreign exchange for the region and the country.

For this reason, this study will examine a web-based information system that can introduce the potential of coastal tourism for the Department of Tourism and Creative Economy based on Augmented Reality. This website is designed to be used by the public in finding information about the tourism

charm of Balikpapan. The tourism sector is one of the new types of industry that is able to accelerate economic growth and provide employment, increase income, standard of living, and stimulate other productive sectors.

Therefore, as a complex sector, tourism can also realize classic industries such as the handicraft and souvenir industry, as well as the culinary, lodging, and transportation industries. Tourism is a variety of tourism activities and is supported by various facilities as well as services provided by the community, entrepreneurs, the Government, and the Regional Government.

Meanwhile, ecotourism is tourism that utilizes the potential of coastal natural resources and their supporting components, both natural and artificial or a combination of natural and artificial. The creative economy is a concept in the new economic era that can intensify information and creativity by relying on new ideas and knowledge from human resources which are the main production factors.

2. METHODOLOGY

In this study, the method that will be used to measure how effective the system is designed is usability testing. Testing will be conducted on 10 respondents. This measurement is carried out with the aim of knowing the effectiveness of the designed system [1][2][3][4][5]. In this study, the author will assess User Experience using studies on usability aspects to assess User Experience as a whole. In planning research on usability studies, researchers are required to find the right matrix to be used in examining the level of usability of a system. In this test, the researcher uses several matrices which include: The aspects of usability includes:

- (Usefulness)
- (Ease of Use)
- (Ease of Learning)
- (Satisfaction)

2.1 Data Collection

The design of the website system was obtained by means of case studies on tourism websites indoensia.travel and visitsingapore.com. The system on the two websites becomes a reference and guide for the basis for designing a tourism website that is designed. The participants who will be tested are 10 people aged 18-36 years. In this study, each participant will be asked to test the system that has been built based on usability aspects.

First, participants will be asked to test the system that has been created, after that participants are asked to rate the interface that has been built. Then the author will observe whether the built interface can be used easily by users.

The first task is that participants are asked to assume they are looking for information related to tourism objects in Balikpapan. Then participants were asked to try the system based on the given task. After participants finished completing the task, participants were asked to fill out a questionnaire.

2.2 Data Analysis

In usability studies, researchers are required to identify the independent and dependent variables. The independent variable is the aspect that can be manipulated to answer the research questions, while the dependent variable is the variable that will be calculated as the conclusion of the research results.

In this study, the independent variable is the tourism website system, while the dependent variable is the usability of the system, ease of use of the system, ease of learning to use the system, user satisfaction and the level of user confidence in making decisions.

The author will conduct research on User Experience in the visualization system by using a questionnaire in the form of questions grouped based on the independent variables mentioned above. The author uses a 5-point Likert scale to represent the level of user agreement with the questionnaire questions. The results of the questionnaires that have been collected will be given a weight for each answer that has been filled out by the participants.

The data obtained from the questionnaire results were measured using a confidence level interval calculation of 95% and a t-distribution table. After this test was completed, the researcher collected self-reported data using a questionnaire. As explained in chapter 3, the researcher will limit the scope to 4 matrices, namely Usefulness, Ease of Use, Ease of Learning, and Satisfaction.

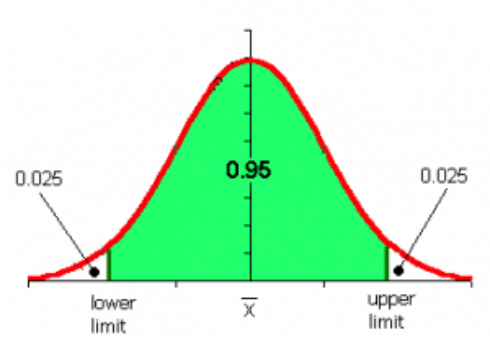


Figure 1 Image: WUSTL.EDU

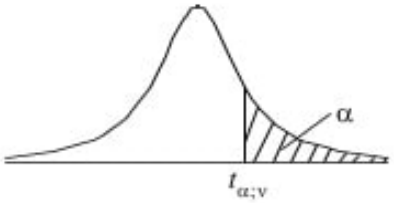
$$\bar{x} \pm t_{(1-\frac{\sigma}{2})} \frac{s}{\sqrt{n}}$$

Figure 2. Confidence level Interva

Table 1. Table of the Student's t-distribution

Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha;\nu}$ where
$\Pr(T_\nu > t_{\alpha;\nu}) = \alpha$, with ν degrees of freedom



ν \ α	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.076	31.821	63.657	318.310	636.620
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587

2.3 Prototype

The main menu page is a landing page that contains a summary of tourist attractions in Balikpapan. The interface and features in it are obtained from references to well-known tourism websites, namely https://indonesia.travel and https://visitsingapore.com. From the two websites, this prototype was taken and made which will then be tested on participants.

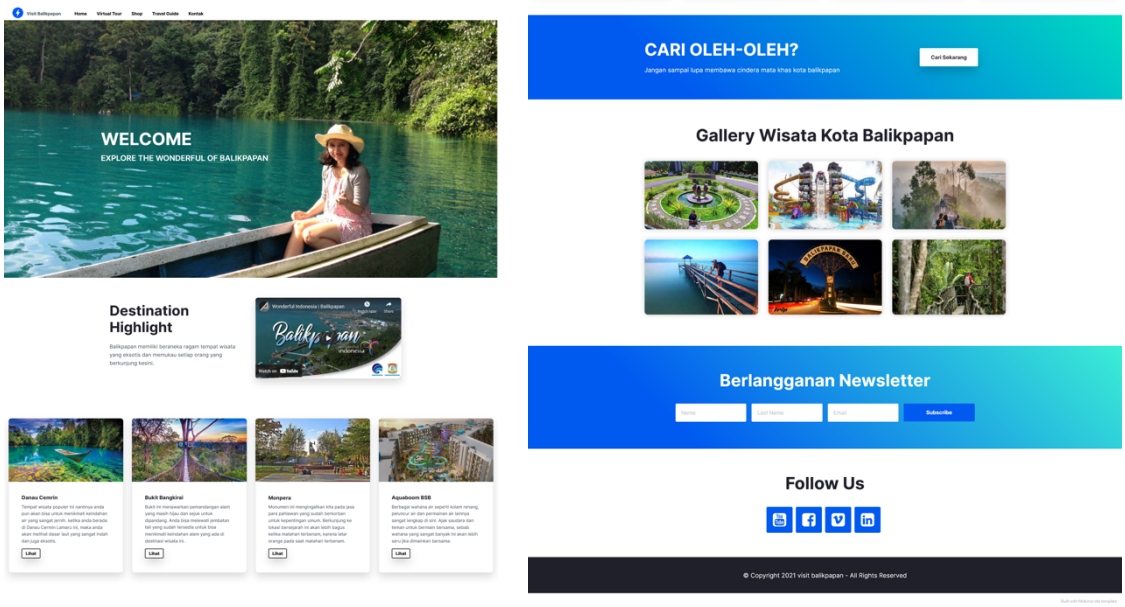


Figure 3 Prototype Interfaces

3. RESULT AND DISCUSSION

The evaluation of the questionnaire used the USE questionnaire from Lund (2001) to capture information about Usability, Ease of Use, Ease of Learning, and Satisfaction. In designing the questionnaire to assess usefulness, 8 questions were used, 11 questions were used for Ease of Use, 4 questions were Ease of learning and 5 questions were Satisfaction. Furthermore, the results of the questionnaire will be processed and concluded. The results of the questionnaire will be processed using a top-2box calculation method where only the results of the top 2 values will be taken to evaluate the system. Data from usability questionnaire observations can be seen in tabel 2, table 3, table 4 and table 5.

Table 2. Ease of Use

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Q1	5	5	5	5	5	5	5	4	5	4
Q2	4	5	5	5	4	5	4	5	4	5
Q3	5	5	5	5	4	5	4	5	4	5
Q4	5	4	4	5	4	5	4	5	5	4
Q5	3	3	3	2	3	4	5	4	4	5
Q6	4	4	5	5	4	4	5	4	4	5
Q7	5	4	5	5	5	5	5	4	5	4
Q8	4	5	4	5	3	5	5	4	4	5
Q9	5	5	5	5	5	5	4	5	4	4
Q10	5	5	5	5	5	5	4	4	4	4
Q11	4	4	4	5	4	5	4	4	5	4

Table 3. Usefulness

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Q1	4	5	5	5	4	5	5	5	5	5
Q2	3	3	4	3	3	4	5	3	3	4
Q3	4	5	5	5	5	5	5	5	5	5
Q4	5	4	5	5	4	5	5	4	4	4
Q5	5	4	4	4	4	5	5	4	5	5
Q6	4	4	5	4	4	5	5	4	3	4
Q7	5	5	5	5	5	5	5	4	4	4
Q8	4	5	5	4	5	5	5	4	3	4

Table 4. Ease of Learning

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Q1	5	5	4	5	5	5	5	4	4	5
Q2	5	4	4	5	4	5	4	4	4	5
Q3	5	5	4	4	5	5	4	5	4	5
Q4	5	4	5	5	5	5	4	4	5	4

Table 5. Satisfaction

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Q1	4	5	5	4	4	5	4	4	5	5
Q2	5	5	5	5	5	4	5	5	5	5
Q3	4	5	5	5	5	4	4	3	5	5
Q4	5	5	5	3	5	5	4	4	5	5
Q5	4	5	5	5	5	4	5	4	5	4

P = Participant
Q = Question
Blue = Value 4-5
Yellow = Value 1-3

3.1 Usability Questionnaire Evaluation

In this evaluation section, the results of the questionnaire are processed and concluded by representing the results of the questionnaire as frequency data so that the calculated data can describe the characteristics of this system. The results of the questionnaire recap from the four matrices used can be seen in Table 5 Calculation of Usefulness, Table 6 Calculation of Ease of Use,

Table 7 Calculation of Ease of Learning and Table 8 Calculation of Satisfaction.

Because in this evaluation the top-2box technique is used, the values taken are only values of 4 and 5. The results of this Usefulness evaluation show that 90% of participants agree that this system is useful with the number of Net Boxes or the level of strongly agree that this system is useful is 55 %. Some participants chose values 2 and 3 because according to participants they were still unsure or disagreed whether this system was able to provide full control in supporting the process of finding information. This is based on the information obtained by the participants themselves regarding their different needs.

The results of the Ease of Use evaluation showed that 100% of participants agreed that this system was easy to use with the number of Net Boxes or the level of strongly agreeing that this system was easy to use as many as 80% of participants. Among the responses by the participants themselves, there were scores of 2 and 3 because the participants were confused and did not agree whether this application could be easy to use or not.

From the results of the top-2box calculation on Ease of Learning, it was found that as many as 100% of participants agreed that this application was easy to learn with the percentage of participants who strongly agreed was 58%. From the research data in the table above, it can be concluded that this website is easy to use.

From the results of the top-2box calculation on Satisfaction, it is found that 96% of participants are satisfied with this system with the percentage of participants who are very satisfied on this website is 66%. Among the responses by the participants themselves there were scores of 2 and 3 because participants were confused and did not agree that they were satisfied with this application.

After getting the results of the Top 2 Box calculation, the researcher also calculated the 95% confident level. The following is the calculation of the confidence level interval using the mode from the questionnaire results (table 9.)

Table 6. Ease of Use

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Top Box	Top 2 Box	Agree	Net Top Box
Q1	5	5	5	5	5	5	5	4	5	4	80%	100%	100%	80%
Q2	4	5	5	5	4	5	4	5	4	5	60%	100%	100%	60%
Q3	5	5	5	5	4	5	4	5	4	5	80%	100%	100%	80%
Q4	5	4	4	5	4	5	4	5	5	4	50%	100%	100%	50%
Q5	3	3	3	2	3	4	5	4	4	5	20%	50%	50%	20%
Q6	4	4	5	5	4	4	5	4	4	5	40%	100%	100%	40%
Q7	5	4	5	5	5	5	5	4	5	4	80%	100%	100%	80%
Q8	4	5	4	5	3	5	5	4	4	5	50%	90%	90%	50%
Q9	5	5	5	5	5	5	4	5	4	4	70%	100%	100%	70%
Q10	5	5	5	5	5	5	4	4	4	4	60%	100%	100%	60%
Q11	4	4	4	5	4	5	4	4	5	4	30%	100%	100%	30%
Mean											56%	95%	95%	56%

Table 7. Usefulness

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Top Box	Top 2 Box	Agree	Net Top Box
Q1	4	5	5	5	4	5	5	5	5	5	80%	100%	100%	80%
Q2	3	3	4	3	3	4	5	3	3	4	10%	40%	40%	10%
Q3	4	5	5	5	5	5	5	5	5	5	90%	100%	100%	90%
Q4	5	4	5	5	4	5	5	4	4	4	50%	100%	100%	50%
Q5	5	4	4	4	4	5	5	4	5	5	50%	100%	100%	50%
Q6	4	4	5	4	4	5	5	4	3	4	30%	90%	90%	30%
Q7	5	5	5	5	5	5	5	4	4	4	80%	100%	100%	80%
Q8	4	5	5	4	5	5	5	4	3	4	50%	90%	90%	50%
Mean											55%	90%	90%	55%

Table 8. Ease of Learning

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Top Box	Top 2 Box	Agree	Net Top Box
Q1	5	5	4	5	5	5	5	4	4	5	70%	100%	100%	70%
Q2	5	4	4	5	4	5	4	4	4	5	40%	100%	100%	40%
Q3	5	5	4	4	5	5	4	5	4	5	60%	100%	100%	60%
Q4	5	4	5	5	5	5	4	4	5	4	60%	100%	100%	60%
Mean											58%	100%	100%	58%

Table 9. Satisfaction

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	Top Box	Top 2 Box	Agree	Net Top Box
Q1	4	5	5	4	4	5	4	4	5	5	50%	100%	100%	50%
Q2	5	5	5	5	5	4	5	5	5	5	90%	100%	100%	90%
Q3	4	5	5	5	5	4	4	3	5	5	60%	90%	90%	60%
Q4	5	5	5	3	5	5	4	4	5	5	70%	90%	90%	70%
Q5	4	5	5	5	5	4	5	4	5	4	60%	100%	100%	60%
	Mean										66%	96%	96%	66%

Table 10. USE Questionnaire Modus

Partisipan	Usefulnes	Ease of Us	Ease of Le	Satisfaction
1	4	5	5	4
2	5	5	4	5
3	5	5	5	5
4	5	5	5	5
5	5	4	5	5
6	5	5	5	4
7	5	4	4	4
8	4	4	4	4
9	5	4	4	5
10	4	4	5	5
Mean	4.7	4.5	4.6	4.6
Stdev	0.48	0.53	0.52	0.52

Usefulness

95% confident rating of the population of the Usefulness questionnaire is between 4.6 to 5. This means that the possible results of the questionnaire if tested on the real population, 95% of participants who answered whether the application was useful or not were between the Likert scale points of 4.6 and 5.

$$\bar{x} \pm t_{(1-\frac{\sigma}{2})} \frac{s}{\sqrt{n}} = 4.7 \pm 2.262 \frac{0.48}{\sqrt{10}} = 4.7 \pm 0.34$$

Ease of Use

95% confident the population rating of the Ease of Use questionnaire is between 4.1 to 4.9. This means that the possibility of the results of the questionnaire when tested on the real population, 95% of participants who answered that it was easy to use or not the application was between the Likert scale points of 4.1 and 4.9.

$$\bar{x} \pm t_{(1-\frac{\sigma}{2})} \frac{s}{\sqrt{n}} = 4.5 \pm 2.262 \frac{0.53}{\sqrt{10}} = 4.5 \pm 0.38$$

Ease of Learning

95% confident the population rating of the Ease of Learning questionnaire is between 4.0 to 4.6. This means that the possibility of the results of the questionnaire when tested on the real population, 95% of participants who answered that it was easy to learn or not the application was between the Likert scale points of 4 and 4.6.

$$\bar{x} \pm t_{(1-\frac{\sigma}{2})} \frac{s}{\sqrt{n}} = 4.6 \pm 2.262 \frac{0.52}{\sqrt{10}} = 4.6 \pm 0.37$$

Satisfaction

95% confident the population rating of the Satisfaction questionnaire is between 4.2 to 4.9. This means that the possible results of the questionnaire when tested on the real population, 95% of participants who answered whether they were satisfied or not using the application were between the Likert scale points of 4.2 and 4.9.

$$\bar{x} \pm t_{(1-\frac{\sigma}{2})} \frac{s}{\sqrt{n}} = 4.6 \pm 2.262 \frac{0.52}{\sqrt{10}} = 4.6 \pm 0.37$$

You can see the results of the four matrices above in graphic form below. The data presentation of the four matrices is presented using a radar graph to see the tendency of the characteristics of this application system to lead to Usefulness, Ease of Use, Ease of Learning, or Satisfaction. The following are the results of the presentation of the four matrices in the form of a radar graph (figure 4)

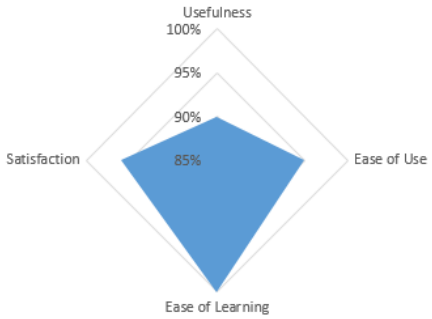


Figure 4 Graph of the percentage of data processing using the top-2 box method

4. CONCLUSION

The Balikpapan city tourism information portal is designed with the aim that Balikpapan city tourism can be exposed and recognized by everyone through digital devices. The website and system are designed to provide information so that it creates a sense of desire to come to visit tourism locations in Balikpapan. Besides being able to display information about tourism, this website provides a souvenir shopping feature so that users can order souvenirs typical of Balikpapan without the need to leave their home or place of residence. The concept of this tourism website is expected to become a one stop tourism center for the city of Balikpapan and in the future development users can download the application on the play store.

Based on the results of usability testing measurements, it can be concluded that the website that was developed in general can provide information related to tourism objects in Balikpapan. Websites. The designed website still has inconsistent sections in the tourism photo gallery section. Based on the results of the questionnaire distributed to 10 participants, it was found that 90% of participants agreed this application was useful, 95% of participants agreed that this application was easy to use, 100% of participants agreed that this application was easy to learn and 96% of participants were satisfied with this application. Based on the calculation of the probable 95% confidence level of the population, the results of the Usefulness questionnaire are between 4.6 and 5 Likert scale, Ease of Use is between 4.1 and 4.9 Likert scale, Ease of Learning is between 4.2 and 4.9 Likert scale, and Satisfaction is between 4.2 and 4.9 Likert scale.

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