

Usability Testing in Tourism Object Management System

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Abstract— In developing a website, it must go through usability guidelines to ensure a system is easy to use. Usability is an important aspect to assess the quality of the website interface. This research was conducted to analyze the usability level of the Tourist Management System. This study used a usability testing method with a performance measurement technique and Retrospective Think Aloud (RTA) technique and used the Post Study System Usability Questionnaire (PSSUQ). The variables measured in this study were effectiveness, efficiency, and satisfaction. The results of this study indicated that the system in terms of administrator users is effective, efficient and satisfying. Whereas in terms of operator users, this system was not effective yet had been efficient and provided satisfaction to users.

Keywords—performance measurement; PSSUQ; RTA; usability; usability testing; tourist management system; Mann Whitney U-test; 8 Golden Rule.

I. INTRODUCTION

Bali Island is a world tourist destination. Tourist visits Bali to contribute positively to the income of each district, one of which is Bangli district. Along with the development of the internet, the role of information technology in the tourism sector has become a major factor in the promotion and management of attractions [1]. Research [2] developed an integrated Tourism Management System. However, the development of this system is only through the technical testing stage (white box and black box test). This system has never been tested for its usability.

In developing a system, the system must meet the usability guidelines to ensure that the objectives of a system can be achieved [3]. Usability testing is done as part of developing a

system that meets the Human-Computer Interaction (HCI) standard [4, 5]. Usability is a crucial issue in HCI because usability is an important aspect to assess the quality of the user interface [4] and reduce user losses in using the system [6, 7]. Systems that have a high level of usability will be used for a long time because many people feel the benefits of the system. [8]. According to ISO 9421-11, it is stated that a good usability standard is the product/system developed that must be used effectively, efficiently, and provide user satisfaction [9].

The usability method can be used to measure aspects of effectiveness, aspects of efficiency, and aspects of customer satisfaction [10, 11]. The effectiveness aspect can be seen from how many tasks can be completed. The efficiency aspect is seen from how much time is needed to complete the task. While the satisfaction aspect is seen from the user's reaction to the ease of the system and is measured by a Likert scale [12].

In the usability testing method, several techniques can be used and one of them is Performance Measurement and Retrospective Think Aloud (RTA). Performance Measurement Techniques are used to measure aspects of effectiveness and efficiency [13]. Aspects of user satisfaction will be measured using the Retrospective Think Aloud (RTA) and the Post-Study System Usability Questionnaire (PSSUQ) questionnaire. Retrospective Think Aloud (RTA) technique is a technique that can be combined with Performance Measurement techniques [14]. The combination of Performance Measurement results and RTA (mind verbalization) can provide complete and accurate information on usability measurements [15]. Besides, the results of the RTA technique can be used as a recommendation to improve a system [15, 16]. To be able to provide recommendations for the improvement of a system, we

can use the 8 Golden Rules theory. The 8 Golden Rules theory is a fundamental rule for designing the interface of a website [17]. Based on the background that has been described, the researcher deemed it necessary to conduct a Usability Testing research in the Tourism Object Management System in Bangli.

II. METHOD

This research is classified as evaluative research, which evaluates the Tourism Object Management System by measuring aspects of usability including effectiveness, efficiency and user satisfaction.

The location of the research in this study was in several tourist attractions in Bangli district. The subjects of this study were Officer of Tourism and Culture as administrators and tourism awareness groups (Pokdarwis) as village operators. The time of this research is 2018. The flow of research to be carried out can be seen in the following figure 1:

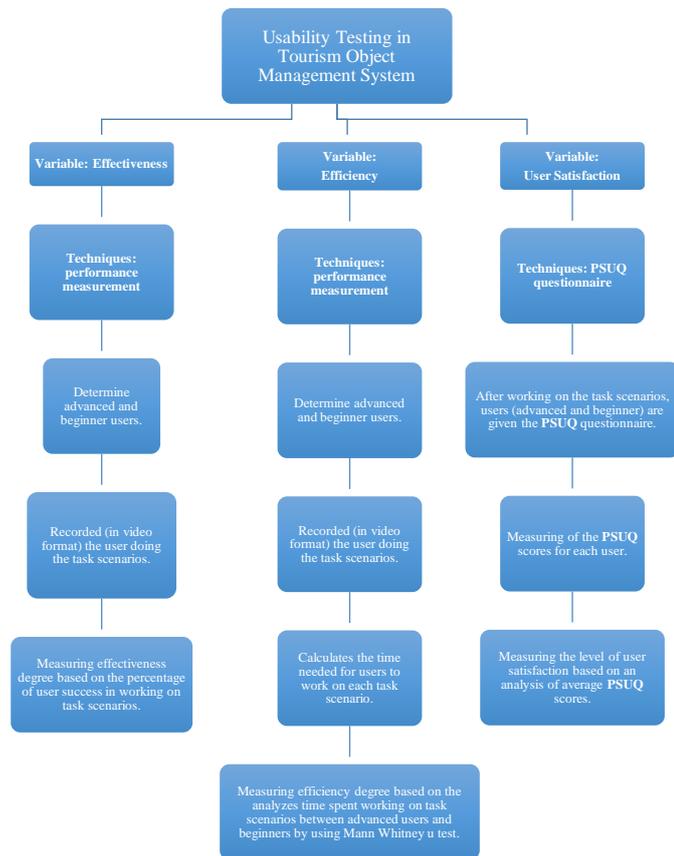


Fig. 1. Flow Diagram of the Study

The research procedures carried out in this study are as follows:

1. Identify the problem
2. Formulate the problem
3. Determine research objectives and benefits
4. Determine the method
5. Data retrieval and data analysis
6. Provision of improvement recommendations

The method used in this study is the usability testing method. The usability testing method is an evaluation method to see the level of ease and comfort of users in using or interacting with an information system. The purposes of doing usability testing [18] are:

1. Identify and correct deficiencies that exist before the product is applied.
2. Finding problems and recommendations for improving the utility/usefulness of product design and development.
3. Ensuring product creations are easy to learn or use, satisfy users and have high-value utilities and functions.

In this study, researchers measured 3 aspects of variables namely effectiveness, efficiency, and satisfaction. The effectiveness aspect can be seen from how many respondents were completed the task and can be measured using performance measurement techniques. For the aspect of efficiency can be measured by looking at the duration of time required by respondents in completing each task and was measured by using performance measurement techniques. The satisfaction aspect can be seen from how satisfied the user is using the system. The satisfaction aspect can be seen in 2 ways, namely the (RTA) technique, and the post-study system usability questionnaire (PSSUQ) questionnaire. The populations in this study were employees of the Department of Tourism and Culture of Bangli Regency as administrators, while the tourism awareness group (Uually in acronym pokdarwis, which stands for Kelompok Sadar Wisata in Bahasa Indonesia) managed the tourist attraction as an operator. The research sample used was 4 administrator respondents and 16 operator respondents. Data collection techniques used in this study is shown as follows:

TABLE 1. PSUQ RUBRICS

No.	Rubrics
1	Overall, I feel satisfied with the ease of using the Attraction Management System
2	How to use the Object Management System is very easy
3	I can complete tasks and scenarios quickly using the Attraction Management System
4	I feel comfortable using the Attraction Management System
5	Very easy to learn the use of the Object Management System
6	I believe I will be more productive when I use the Attraction Management System
7	When an error occurs, the Attraction Management System provides an error message that tells me how to fix the error clearly
8	Whenever I make a mistake when using the Attraction Management System, I can fix it easily and quickly
9	Information (such as online help, notification messages, and other documentation) provided in the Attraction Management System is very clear
10	In the Object Management System, I find it easy to find the information I need
11	The information in the Attraction Management System is very effective in helping to complete tasks and scenarios
12	The organization/grouping of information in the display of the Attraction Management System is very clear
13	Display Management Object System is very convenient
14	I like the look of the Attraction Management System
15	The Object Management System has all the functions and abilities that I expect
16	Overall, I am satisfied using the Attraction Management System.

The provision of improvement in this study used the theory of 8 golden rules. Those golden rules are 8 general rules that become a reference in developing a design. The 8 rules according to [17, 19], namely:

1. Consistency
2. Serving the needs of diverse users
3. There is informative feedback
4. The sequence of steps is clear and there is confirmation at the end
5. Error handlers
6. There is a cancellation or correction feature
7. Support the place of internal control
8. Reducing the burden of short-term memory

III. RESULTS AND DISCUSSION

This study discussed the analysis of the results of the variables of effectiveness, efficiency and user satisfaction using Performance Measurement techniques, Retrospective Think Aloud (RTA) and the PSSUQ questionnaire. To measure the level of effectiveness obtained from the percentage of respondents' success in completing all tasks. For efficiency measurements, researchers compared the duration of task completion time between the beginner group and the advanced group by using the Mann Whitney U-test statistical test.

Whereas to measure the level of user satisfaction can be obtained from the results of the PSSUQ questionnaire.

1. Effectiveness

The level of effectiveness was obtained from the percentage of user success in completing all tasks. If the respondent completes a task successfully, the respondent will get a value of 1, whereas if the respondent fails to complete the task, the respondent will get a score of 0 [20]. The results of completing the tasks of each respondent operator can be seen in Table 2.

TABLE 2. PERCENTAGE OF SUCCESS OF TASK COMPLETION BY EACH RESPONDENT/OPERATORS

Operators Code	Completed Tasks.	Total Task	Percentage of success
OM1	9	10	90 %
OM2	7	10	70 %
OM3	9	10	90 %
OM4	7	10	70 %
OM5	7	10	70 %
OM6	7	10	70 %
OM7	9	10	90 %
OM8	7	10	70 %
OP1	7	10	70 %
OP2	7	10	70 %
OP3	9	10	90 %
OP4	6	10	60 %
OP5	5	10	50 %
OP6	6	10	60 %
OP7	8	10	80 %
OP8	6	10	60 %
Average			72.5%

Based on [21] which stated that from 1,189 tasks and 115 usability tests on 3472 users worldwide, the average level of task scenario completion was 78%. Thus, a system is said to be effective if the percentage of success when completing a task is 78% or more. From the results of data processing above obtained by the percentage of task completion by all operators is equal to 72.5%. The percentage obtained is smaller than 78%. Therefore, the Object Management System in the operators' display can be said to be ineffective. While the results of the completion of the tasks of each administrator can be seen in Table 3.

TABLE 3. PERCENTAGE OF SUCCESSFUL TASK COMPLETION BY EACH RESPONDENT/ADMINISTRATORS

Admin Code	Task has been completed	Total Task	Percentage of success
AM1	10	10	100 %
AM2	9	10	90 %
AP1	9	10	90 %
AP2	10	10	100 %
Average			95 %

Based on the data processing in table 3, the percentage of task completion by administrators is 95%. The percentage obtained is greater than 78%. Therefore, the Attraction Management System in the administrator view can be said to be effective.

2. Efficiency

In measuring the level of efficiency, researchers compared the duration of task completion time between the advanced group and the beginner group using a nonparametric statistical test using the Mann Whitney U-test.

Based on the results of the data analysis of the operators, it was concluded statistically that of the 10 tasks available, there were no tasks that had a significant time difference between the beginner and proficient operators. Based on this, it can be concluded that the user page of the Attraction Management System operator is efficient. Whereas based on the results of the analysis of the data of administrators, it was concluded statistically that of the 10 existing tasks, there were no tasks that had a significant time difference between the beginner and proficient administrators. Based on this, it can be said that the Tourism Object Management System user page is already efficient.

3. Users Satisfaction

The user satisfaction variable in this study was measured using the PSSUQ questionnaire. Data obtained from the PSSUQ questionnaire was processed by calculating the average based on 4 questionnaire indicators namely overall, *sysqual*, *infoqual*, and *interqual*. The average results of each indicator in the operator respondents can be seen in Table 4.

TABLE 4. USER SATISFACTION OF THE OPERATORS

Respondent Code	Questionnaire Indicators			
	Overall (1-16)	Sysqual (1-6)	Infoqual (7-12)	Interqual (13-15)
OM1	5.69	6.00	5.67	5.33
OM2	5.50	6.00	5.33	4.67
OM3	6.63	6.67	6.50	6.67
OM4	5.69	5.33	5.33	6.67
OM5	6.44	6.17	6.50	6.67
OM6	6.00	7.00	5.50	5.00
OM7	6.06	6.17	5.83	6.00
OM8	6.13	6.00	6.33	6.33
OP1	5.63	6.17	5.83	4.67
OP2	6.56	6.33	6.67	6.67
OP3	6.44	6.17	6.50	6.67
OP4	6.06	6.33	5.50	6.67
OP5	6.63	6.33	6.67	7.00
OP6	5.75	5.33	6.00	6.00
OP7	5.56	5.50	5.67	5.33
OP8	6.25	6.67	6.17	5.33
Average	6.06	6.14	6.00	5.98

Based on the results in Figure 2, the overall value obtained is 6.06, *sysqual* is 6.14, *infoqual* is 6.00 and *interqual* is 5.98.

All results obtained from the 4 PSSUQ questionnaire satisfaction indicators are greater than number 4 (median of 7 Likert scales). Based on these results, it can be concluded that the operator respondents were satisfied with the quality of the system (*sysqual*), information quality (*infoqual*) and display quality (*interqual*) of the Attraction Management System. In addition, the operator respondents were also satisfied overall with the Attraction Management System. The results of the PSSUQ questionnaire data processing from the administrator respondents can be seen in Figure 2.

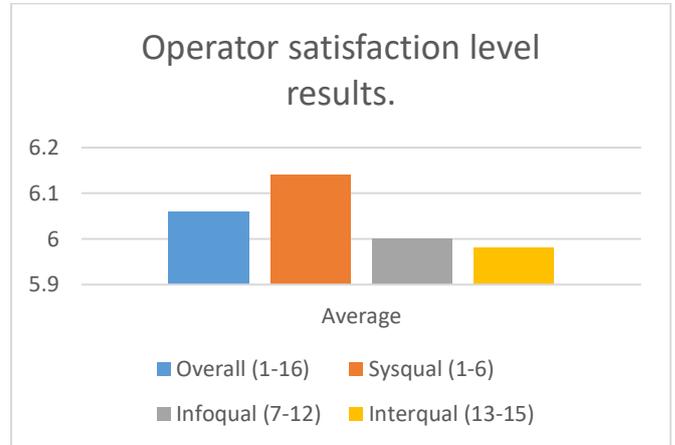


Fig. 2. Operators Satisfaction Level

The average results of each indicator in the administrator respondents can be seen in Table 5.

TABLE 5. USER SATISFACTION OF THE OPERATORS

Respondent Code	Questionnaire Indicators			
	Overall (1-16)	Sysqual (1-6)	Infoqual (7-12)	Interqual (13-15)
AM1	5.25	5.17	5.33	5.33
AM2	6.44	6.50	6.33	6.33
AP1	5.69	5.17	5.83	6.00
AP2	4.94	5.17	5.00	4.33
Average	5.58	5.50	5.63	5.50

Based on the results in Figure 5, the overall value obtained is 5.58, *sysqual* is 5.50, *infoqual* is 5.63 and *interqual* is 5.50. All results obtained from the 4 PSSUQ questionnaire satisfaction indicators are greater than number 4 (median of 7 Likert scales). Based on these results, it can be concluded that the administrator respondents are satisfied with the quality of the system (*sysqual*), the quality of information (*infoqual*) and the quality of the display (*interqual*) of the Attraction Management System. Moreover, administrator respondents were also satisfied overall with the Object Management System. The results of the PSSUQ questionnaire data processing from the administrator respondents can be seen in Figure 3.

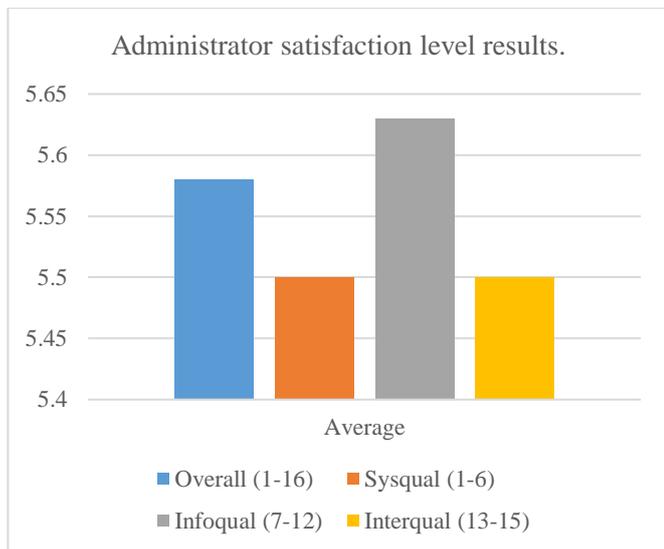


Figure 3. Administrators Satisfaction Level

From the results of usability testing on the tourism object management system, it is known that the operator page has not been effective and there are some errors when the operator respondents and administrators do the work. Therefore, the researchers designed recommendations for improvement based on RTA data, 8 golden rules theory, user expert judgment, and video usability testing analysis. Based on the 8 golden rules theory, the rule most often violated rules no. 1, which is consistency. Inconsistencies are found in the use of color, writing text, and language.

IV. CONCLUSION

Based on the research results obtained, the conclusions obtained from a study entitled Usability Testing in Object Management Systems in Bangli use the usability testing method with Performance Measurement and Retrospective Technique Aloud (RTA) techniques and Post Study System Questionnaire (PSSUQ) questionnaires namely: (1) The Tourism Object Management System in terms of operator users was still ineffective as seen from the results of performance measurement techniques which show the percentage of success of the operator respondents in completing tasks by 72.5% less than the standard of 78%. Based on data analysis using the Mann Whitney U-test statistical test, the Attraction Management System had been efficiently seen from the absence of time difference between task beginners and proficient respondents. Based on the PSSUQ questionnaire data processing, it can be seen that the overall satisfaction score is greater than the standard of 6.06, so that the operator respondents can be said to have been satisfied using the Attraction Management System; (2) The Attraction Management System has been effectively seen the results of the performance measurement technique that shows the percentage of success administrator respondents in completing the task by 95% greater than the standard that is 78%. Based on data analysis using the Mann Whitney U-test statistical test, the Attraction Management System has been efficiently seen from the absence of time difference between task beginners and proficient respondents. Based on the data processing of

administrator respondents using the PSSUQ questionnaire, it can be seen that the overall satisfaction score is greater than the standard of 5.58 so that the administrator respondents can be said to have been satisfied using the Attraction Management System; and (3) The recommendations for improvement given are taken from the data of criticism and suggestions given by respondents, the golden rule 8 theory, user expert judgment, and video usability testing analysis. Based on the theory of 8 golden rules, the rule most frequently violated by the system is rule No. 1 "consistency" in appearance, use of color and use of writing.

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REFERENCES

- [1] C. Putra, A. Iriani, & A.D. Manuputty, "Perancangan dan Implementasi E-Tourism pada Sistem Informasi Pariwisata Salatiga," *Jurnal Teknologi Informasi - Aiti*, vol. 8(1), pp. 76–88, 2011.
- [2] I.M.A. Wirawan, I.W. Suwendra, & I.G.P. Nugraha, Pengembangan Sistem Pengelolaan Objek Wisata di Kabupaten Bangli Berbasis Web Responsive. In *Seminar Nasional Riset Inovatif*, Vol. 5, pp. 545-554, 2017.
- [3] L.S. Wiratama, & D. Sasongko, "Evaluasi Antarmuka Website Smk Muhammadiyah 2 Sragen Menggunakan Metode Usability Testing," *Jurnal SIMETRIS*, vol. 8(1), pp. 135–140, 2017.
- [4] D. Caesaron, "Evaluasi Heuristic Desain Antar Muka (Interface) Portal Mahasiswa (Studi Kasus Portal Mahasiswa Universitas X)," *Jurnal Metris*, vol. 16, pp. 9–14, 2015.
- [5] J.Y.S.H. Preece, *Interaction Design: Beyond Human-Computer Interaction*. John Wiley & Sons, Inc., 2002.
- [6] M.B. Setyawan, Pengukuran Usability untuk Mengetahui Tingkat Penerimaan Website Learning Object di Universitas Muhammadiyah Ponorogo. *Seminar Nasional Inovasi Dan Aplikasi Teknologi Di Industri*, pp. 115–120, 2018.
- [7] S.H. Prayoga, & D.I. Sensuse, "Analisis Usability pada Aplikasi Berbasis Web dengan Mengadopsi Model Kepuasan Pengguna (User Satisfaction)," *Jurnal Sistem Informasi MTI-UI*, vol. 3(1 April), pp. 64–73, 2016. Available at: <https://doi.org/10.1037/cou0000103>
- [8] N.L.A.K.Y. Sarja, Analisis Pengukuran Faktor Usability Sistem Informasi Konferensi Nasional Sistem Dan Informatika Stikom Bali. *Seminar Nasional Teknologi Informasi Dan Multimedia*, pp. 6–7, 2016.
- [9] T. Jokela, N. Iivari, J. Matero, & M. Karukka, The standard of user-centered design and the standard definition of usability. *Proceedings of the Latin American Conference on Human-Computer Interaction - CLIHIC '03*, pp. 53–60, 2003. Available at: <https://doi.org/10.1145/944519.944525>.
- [10] Yumarlin, "Evaluasi Penggunaan Website Universitas Janabadra Dengan Menggunakan Metode Usability Testing. *Informasi Interaktif*," vol. 1(1), pp. 35–44, 2016
- [11] N.I. Zulkifli, & A.H. Sutomo, "Usability Testing Sistem Informasi Pendoron Darah (Studi Kasus di Unit Pelayanan Transfusi Darah RSUD Dr . Sardjito Yogyakarta)," *Journal of Information Systems for Public Health*, vol. 1(1), pp. 10–15, 2016.
- [12] J. Jeng, "Digital Libraries : Effectiveness , Efficiency , Satisfaction , and Learnability," *Libri*, vol. 55, pp. 96–121, 2005.
- [13] A. Neely, M. Gregory, & K. Platts, "Performance measurement system design: A literature review and research agenda," *International Journal of Operations and Production Management*, vol. 25(12), pp. 1228–1263, 2005. Available at: <https://doi.org/10.1108/01443570510633639>.
- [14] N.W. Utami, *Evaluasi Usability pada E-Learning Universitas Pendidikan Ganesha dengan Metode Usability Testing*. Singaraja: Universitas Pendidikan Ganesha, 2016.
- [15] Z. Guan, S. Lee, E. Cuddihy, & J. Ramey, The validity of the stimulated retrospective think-aloud method as measured by eye tracking. *Proceedings of the SIGCHI Conference on Human Factors in*

- Computing Systems - CHI '06*, 1253, 2006. Available at: <https://doi.org/10.1145/1124772.1124961>
- [16] A. Hyrskykari, S. Ovaska, P. Majoranta, K.J. Rähkä, & M. Lehtinen, "Gaze Path Stimulation in Retrospective Think-Aloud," *Journal of Eye Movement Research*, vol. 2(4), pp. 1–18, 2008. Available at: <https://doi.org/10.16910/jemr.2.4.5>
- [17] Y.L. Prasetyo, 8 Golden Rules Interface Design, 2016. Retrieved from <https://socs.binus.ac.id/2016/12/22/8-golden-rules-interface-design/>
- [18] I.G.W. Pura, R.A. Anugraha, & Y.N.D. Yekti, Pengujian dan Perbaikan Desain Material Handling Equipment Buncis di PT. ABOFARM untuk Meningkatkan Efisiensi Kerja menggunakan Metode Pengembangan Produk Ulrich Eppinger. *E-Proceeding of Engineering*, vol. 2(2), pp. 4424–4432, 2015.
- [19] B. Shneiderman, & C. Plaisant, *Designing The User Interface*. Maryland: Pearson Education, 2015.
- [20] L. Chrisantyo, & B. Waluyo, Pembuatan Aplikasi Event Management System yang Usable untuk Event Asian Youth Day, vol. 4(1), pp. 31–42, 2018.
- [21] J. Sauro, What is a good task-completion rate? From Measuring U, 2011. Retrieved from <http://measuringu.com/task-completion/>