

Adapting The User-Centered Cognitive Walkthrough (UC-CW)

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DETERMINANTS OF THE ISLAMIC E-RESOURCES QUALITY AND ITS ACCEPTANCE AMONG MUSLIM SCHOLARS IN INDONESIA: A Case project

Adapting The User-Centered Cognitive Walkthrough (UC-CW) for Assessing the User Experience of Smart Regency Mobile-Apps Service in Indonesia

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Abstract—Because the number of districts in Indonesia is four times that of cities, regency development requires serious consideration. However, very few studies are still available to explore districts from an ICT utility management perspective. This study aims to evaluate the user experience of a mobile-based smart regency application used in regencies. The method used is the User-Centered Cognitive Walkthrough (UC-CW), an enhanced Cognitive Walkthrough (CW) method. In this user experience evaluation method, the evaluator gives scenario-based tasks and several questions to mobile-app users to find problems that interfere with the learning process. This method is suitable for use on systems that have just been released because it can explore users' cognitive processes when using the system. Respondents in the study were ten users of mobile-based smart regency applications. The results show that many problematic features or functions cannot be used, or the data is still empty. This study contributes to the evaluation recommendations of user experience and provides input for application developers and policymakers to pay more attention to the factors that affect the user experience of smart regency application users in the regions.

Keywords—user experience, smart regency, user-centered cognitive walkthrough

I. INTRODUCTION

According to the notes on the code and data for the 2020 government administration area, there are four times as many districts (415) as cities (93) [1], [2]. The above illustrates that expansion should be a more serious concern in the ICT development district or smart regency. However, the research trial indicates that there are still relatively few studies examining the various dimensions of Smart Regency. The economic, living conditions, policies, social, and cultural factors, economic aspects, law, geographical conditions, job issues, solutions, and environmental concerns of cities and districts are significantly different [3]–[5]. As a direct consequence, they require a different model and approach than urban areas' smart cities.

Smart regency was introduced in various Indonesian regions to handle resources efficiently, including the District

of Sumenep, one of which is to create the mobile application Sumekar-Online. However, the author observes that in the application of Smart Regency, particularly Sumekar Online, there are numerous issues with accessibility, usability, and knowledge utilization, all of which significantly impact the performance of smart regency services. The User-Centered Cognitive Walkthrough (UC-CW) method is used for assessing the usability and user experience in the system. Methods for user-centered approaches are available; however, current assessment methods, such as formal Think Aloud (TA) usability testing, can be very expensive and time-consuming [6]. Other widely accepted methods, including Heuristic Evaluation (HE) and Cognitive Walkthrough (CW), are efficient and well-established expert methods.

The purpose of this research is to assess the user experience of a mobile smart regeneration app. The Cognitive Walkthrough method is the method used. The evaluator gives users scenario-based tasks and various questions in this user experience evaluation method to identify issues that interfere with the learning process. This method is suitable for recently released systems because it can explore users' cognitive processes using the system. Ten users of mobile smart regency applications were respondents to this study. This study guides app developers and policymakers on the factors affecting intelligent remedial application users' user experience in the regions and provides insight into them theoretically.

II. LITERATURE REVIEW

A. The Smart Regency Development in Indonesia

Smart Regency is an ICT-based district development concept to optimize regional resources efficiently. This concept is similar to a smart city concept but differs in terms of government structures, area size, variations in livelihoods, population, economy, and socio-culture [3]. There are several studies regarding the development of smart regency in Indonesia, including testing the quality of e-service [5], tourism promotion [7], online community-based community participation [8], public services based on smart netizen applications [9], traffic [10], quality of information

systems[11], measurement of community readiness[12], various application applications[13], smart village model village for rural areas[14], technology adoption[4], electronic-based service quality analysis[15], smart regency models and frameworks[3], identification and differences in service maturity[16], factors affecting success[17], identification and ranking of critical factors[18]. Besides, there are several previous studies, namely the development of smart economy[19], management of toilets for public services, synergy and simultaneousness in the bureaucracy[20], destination management for smart tourism[21], identification and readiness models[22], [23], understanding of intentions to use applications[24], holistic-social dimensions from a community perspective[25], exploration of factors adoption for sustainability[26], determining the direction of regional development[27], the concept of village development and smart tourism[28], developing smart villages to strengthen smart cities[29], Smart SMEs [30], SOA for e-government integration[31] and its knowledge management system[32].



Fig. 1. Pamckasan Smart is one of the Smart Regency Mobile Apps Service in Indonesia

B. User-Centered Cognitive Walkthrough (UC-CW)

Cognitive Walkthrough (CW), a group-based method based on cognitive explorational learning theories or user capabilities, was developed by Polson and Lewis[33][34]. Researchers have been using CW to emulate the ability to resolve user problems and detect system deficiencies. For systems or applications with little knowledge or adequate cognitive support and reaction, this is particularly important.

The process starts with an analysis phase wherein experts determine the sequence of actions to be taken by a user to achieve a specific aim and the system's responses. The software designers and developers then take the steps as a group and evaluate the product, guided by four specific questions. Responding to these specific questions identifies usability problems for each subtask action. The information is collected through predefined forms, and a list of possible major issues is provided after the session[33]–[35].

The CW's ability to produce results faster and cheaper than other usability techniques is considered valuable. Naïve users can also use CW on new systems. The method's early use

during the product design phase is another advantage[36]. The primary disadvantage includes a lack of real users, a long evaluation process, and the frequency with which minor interface design problems are not always user-related[25,30,31]. The research report discusses current CW concerns.

TABLE I. CW METHOD ENHANCEMENTS QUICK RECAP[6]

Components	Description
User involvement	Targeted in this instance but has users who have the disease and who have varying levels of the condition, various genders, along with varying degrees of computer competence, for that shortens to target (ideally 5 to 8 users per session)
Facilitator for dual-domain	have a double specialist that is both a moderator and a patient coach during the entire assessment
Process for task development	measure validity with an acceptable word count. Hold tasks developed to address self-specific (including validating usability) for the particular disease/disorder while utilizing HLJ/Health care paradigms in the development of their long-specific guidelines
Concentrate on higher tasks	Use a collaborative and individual assessment. First, individual answers, then group debates on the solution
Question for assessment	Two step-by-step simplified test questions adapted from Spence[37] Add these to the plan as "call to action" elements
Captured data digitally	The evaluation session uses digital recording for data collection and all other sections of the CW
Consistent coding, classification, and problem assessment	Perform content analysis, coding, classification, and evaluation issues for digital data collection/recording materials with purely Digital Domain Experts and the use of Quality Data Analysis Software, Data Control Sheets (QDAS)

III. METHODOLOGY

This study's method consists of several stages: cognitive walkthrough testing, analysis of test results, and recommendations for improvements to the Android-based mobile application interface.

A. Cognitive Walkthrough Testing

The usability test with the cognitive walkthrough method consists of two stages: preparation (preparation) and execution stage (execution). The preparation stage includes literature study, studying the system to be tested, determining respondents, and compiling task scenarios that respondents must do. The execution stage consists of a walkthrough sequence of actions and problem recording (Jacobsen and John 2000)[38].

B. Respondents

This study's Respondents included ten users who were the main targets of the mobile-based Pamckasan Smart application, namely the general public, academics and students, and business people. The technique used in determining the sample is stratified random sampling. This technique takes samples by paying attention to the strata (levels) in the population. The selected respondents are users who are used to using mobile-based applications downloaded from the Play store. Other considerations are the knowledge, skills, and frequency of respondents using an android mobile-based application. The number of respondents is determined based on the provisions made by Nielsen (2012), which states that the number of test participants in the usability study is a minimum of five participants[39]. This allows the study to find nearly as many usability problems using a larger number

of test participants. Usability testing with five participants is almost always close to the ratio between the maximum benefits and usability testing costs.

C. Task Scenario

Task scenario is a collection of tasks done by the respondent when using the Pamekasan Smart mobile-based application. According to Tullis and Albert (2008), the number of task scenarios should be between five and sixteen task scenarios[40]. This study uses 16 (sixteen) task scenarios relevant to the menus in the Pamekasan Smart application. Table 1 describes the task scenario that the respondent must do.

TABLE II. USABILITY TEST TASK SCENARIOS

Task Codes	Purpose
ST1	account login
ST2	search for the existence of a healthy car on the e-health feature
ST3	Search for info about education on educational features
ST4	observes the writing of the address of higher education at the Islamic University of Madani
ST5	looks for social rehabilitation addresses on public facility features
ST6	makes complaints to agencies through the public service feature
ST7	observes the writing on the address of K.I.A Pakong on government features
ST8	is looking for tourism events and shopping tours in tourism features
ST9	is looking for resorts and lodgings in inn features
ST10	looks for a cake shop address on the restaurant feature
ST11	observes plantation logos on potential regional features
ST12	observes the writing of the address of the banana plantation in the village of Luncar Larangan
ST13	observes the writing of the address of a tobacco plantation in Mertajih vilage
ST14	uses the help feature
ST15	reports events via the SOS feature
ST16	sells online via the e-tapak feature

D. Usability Test Results Analysis

At this stage, an analysis of user success is carried out, namely the percentage of task scenarios completed correctly by the respondent, the time for completing the task, and the number of errors made by the respondent. Effectiveness relates to the completion of task scenarios by respondents to achieve goals in using the website. Efficiency relates to the amount of time it takes the respondent and the number of mistakes the respondent makes in achieving the goal. This error rate can prioritize problems and measure the task scenario's difficulty level compared to other task scenarios (George, 2008)[41]. The results can show the obstacles faced by users when interacting with the Pamekasan Smart mobile-based application.

E. Problem Identification and Recommendation for Improvement

After analyzing the usability test results, respondents' problems were identified using the Pamekasan Smart mobile-based application. Issues that arise in each task scenario will be given recommendations for priority improvements to be carried out immediately.

IV. RESULT AND DISCUSSION

A. Task Scenario Completion Rate

The task completion level is a measure of completion completed by the respondent for each task[41]. The completion of task scenarios is measured based on the respondent's percentage of task scenarios completed correctly. Six task scenarios were completed correctly by all respondents, namely task scenario 1 (account login), task scenario 2 (looking for the existence of a healthy car on the e-health feature), task scenario 5 (looking for the address of social rehabilitation in the facility feature). General) task scenario 8 (looking for tourism events and shopping tours on tourism features), task scenario 9 (looking for resorts and lodgings in lodging features), and task scenario 10 (looking for cake shop addresses on restaurant features). At the same time, some respondents cannot. The solution is respondent 1, respondent 2, and respondent 4 (Figure 2). Some respondents cannot complete the task scenario correctly and are described in the picture below.

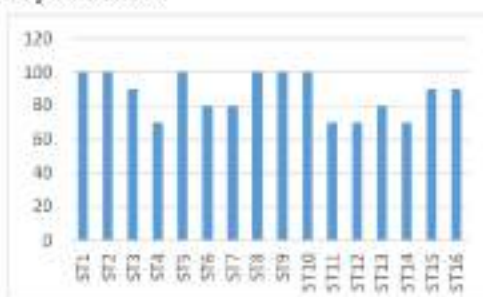


Fig. 2. Percentage of task scenarios completed by respondents

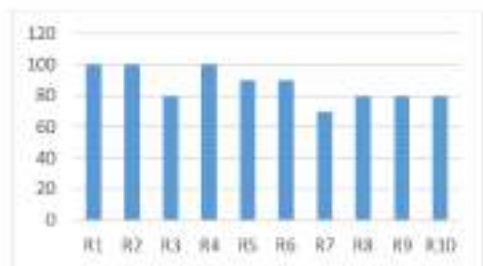


Fig. 3. Percentage of respondents who completed task scenarios

B. Amount of Time Required to Complete Task Scenarios

The task scenario completion time is the amount of time the respondent takes to complete the task scenario. When each task scenario is recorded or recorded, this completion time is successful or unsuccessful[41]. The amount of time is calculated based on the number of seconds it takes for the respondent to complete the task scenario. When the application loads are not taken into account, the time calculation is not biased. Therefore, the loading time is cut. The respondent's amount of time to complete all task scenarios can be seen in the following table. The results of the calculations shown in table 2 show that respondents' fastest time to complete the task scenario is 908 seconds.

Meanwhile, the longest amount of time used by the respondent to complete the task in 1044 seconds. Task scenario 3, task scenario 10, and task scenario 16 were the task

scenario with the least amount of time. In contrast, task scenario seven and task scenario 14 were the task scenario with the longest time.

TABLE III. RECAPITULATION OF TOTAL TIME FOR COMPLETION OF TASK SCENARIOS

Respondents	ST1	ST 2	ST 3	ST 4	ST 5	ST 6	ST 7	ST 8	ST 9	ST 10	ST 11	ST 12	ST 13	ST 14	ST 15	ST 16	Total (second)	Average (second)
R1	76	90	25	75	34	64	64	43	67	89	35	56	56	35	67	89	965	60.3
R2	43	64	45	78	54	63	52	56	89	54	39	87	43	50	89	54	1000	62.5
R3	43	76	66	67	43	56	66	60	67	82	36	59	37	91	67	82	1016	63.5
R4	56	65	78	56	43	45	45	67	43	45	89	67	67	54	43	45	908	56.8
R5	43	67	89	35	56	56	35	89	90	54	45	78	43	89	90	54	1013	63.3
R6	56	89	54	39	87	83	50	45	87	75	56	78	34	45	87	75	1040	65.0
R7	60	67	82	36	59	57	91	76	90	25	75	74	84	64	90	25	966	62.2
R8	67	43	45	89	67	67	58	43	64	45	78	54	43	52	64	45	940	58.8
R9	89	90	54	48	78	43	80	43	76	65	67	43	56	65	76	65	1044	65.3
R10	45	87	75	56	78	34	45	56	65	78	56	43	45	45	65	78	951	59.4
Average	57.8	73.8	61.2	57.6	59.9	56.8	59.9	58.8	73.8	61.2	57.6	59.9	56.8	59.9	61.2	61.2	987.2	61.7
min	43	43	25	35	34	34	35	43	43	25	35	34	34	35	43	25	908	56.8
max	89	90	89	89	87	83	91	89	90	89	89	87	83	91	90	89	1044	65.3

C. Repair Issues and Recommendations

The explanation of the task and error scenarios' completion level parameters shows users' problems when using the

Pamekasan Smart mobile-based application. With these various problems, it is necessary to make improvements. Problems and improvement recommendations can be explained in Table 3.

TABLE IV. PROBLEMS AND RECOMMENDATIONS FOR IMPROVING THE PAMEKASAN SMART APPLICATION INTERFACE

Task Codes	Purposes	Problems	Improvement Recommendations
ST1	account login	No problem were found when logging into accounts on the Smart City Pamekasan application	no improvement recommendations
ST2	looking for a healthy car presence on the e-healthy feature	can not find the address where the car is healthy	include the address of the fit car or the number that can be contacted when a healthy vehicle is needed
ST3	looking for info about education on educational features	the display is blank, and there is no information about education	filled with news or a brief description of education
ST4	observing the writing of the address of higher education Madara Islamic University	there is an error writing the address of higher education Madara Islamic University, namely "Baset"	pay attention to writing the address, namely "Bettet."
ST5	looking for addresses of social rehabilitation on public facility features	blank data	does not include places that are not in Pamekasan Regency
ST6	make complaints to agencies through the public service feature	directed to the website address	direct services are provided to the agency that is the destination of the complaint
ST7	observing the writing of K.U.A. Pakong's address on government features	there is no punctuation/separator in writing the address	given punctuation/separator in writing addresses such as periods and commas
ST8	looking for tourism events and shopping tours on tourism features	blank data	does not include places that are not in Pamekasan Regency
ST9	looking for resorts and lodgings in inn features	blank data	does not include places that are not in Pamekasan Regency
ST10	lookup the cake shop address in the restaurant feature	blank data	does not include places that are not in Pamekasan Regency
ST11	Observe plantation logos on potential regional features	a plantation logo looks more like a football image	customized logo with service name
ST12	observing the writing of the address of the business plantation in the village of Lantar Lantang	there is no punctuation/separator in writing the address	given punctuation/separator in writing addresses such as periods and commas

ST13	observing the writing of the address of a tobacco plantation in Martajah village	there is an error in writing the address of the martajah village tobacco plantation, namely "mrtajah"	pay attention to writing the address, namely "Martajah"
ST14	use the help feature	features are directed to a number	Help feature contains guidelines for using the website
ST15	report events via the SOS feature	the slow response sometimes even no response	complaints via the SOS feature are directly directed to the emergency number
ST16	make online sales through the e-lapak feature	the feature cannot be used	speed up feature completion

V. CONCLUSION

The results of the usability test show that the problems faced by users when using a mobile-based smart regency application are that there are still quite some features that have not been completed and are running well, such as healthy mobile features, educational info, public facility features, tourism events and shopping, lodging, resorts, restaurant features, and sales activities on the e-stall feature. Recommendations for improvements to the mobile-based smart regency application interface based on the results of the analysis, namely including the address of a healthy car or a number that can be contacted when a healthy car is required to fill in with info or a brief description of education, include a valid address on features of public facilities, tourism features, resorts and lodging on the inn features, restaurant features, fixing and completing the sales activity feature on the e-stall feature. It would be best if you double-checked the naming on the application header and footer so that it suits your needs.

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