

# Usability Testing for Mobile Application as an e-Government Service

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**Abstract-** Industrial Revolution 4.0 changes the pattern of user needs of application. A survey by Indonesian Internet Service Provider Association (APJII) in 2017 showed that the percentages of smart phone/tablet ownership and computer/laptop ownership were 50.08% and 25.72%, respectively, in the survey population. To answer the pattern of user needs and percentage of ownership of smart phone/tablet, the government provides and enhances e-government services in mobile-based applications. After planning, analysis, design and implementation stages, the purpose of the present study was to examine the usability of the implemented mobile applications.

The focus of the research survey was usability testing of *Cek BPOM* electronic services which is provided by the National Agency of Drug and Food Control of the Republic of Indonesia. Usability Testing was implemented through questionnaire for respondents, which is processed using System Usability Score (SUS). The average SUS score which is 67.25 indicates that the *Cek BPOM* application is in a marginal high position. It means that application is not yet really usable but still needed for respondents as an e-government service. The highest SUS score was 92.5 means it's useable and the lowest was 42.5 means it's not really useable.

**Keywords :** usability testing, e-government, mobile application, system usability scale.

## I. INTRODUCTION

Industrial Revolution 4.0 shows that very rapid technological development changes user needs of software very quickly. Users now actively look for information via easily accessible application to solve problems around them, particularly information on drugs and food which put health at risk.

Presidential Instruction No 3 of 2003 states that the utilization of communication and information technology in governance (*e-government*) will improve efficiency, effectiveness, transparency and accountability of governance[1]. To enhance effective and efficient public

services, the National Agency of Drug and Food Control (BPOM) should develop e-government. The National Agency of Drug and Food Control, here in after BPOM, is a non-ministerial government institution which govern drug and food supervision[2].

The survey by Indonesian Internet Service Provider Association – Asosiasi Penyelenggaraan Jasa Internet Indonesia (APJII) in 2017 showed that the percentages of smart phone/tablet ownership and computer/laptop ownership were 50.08% and 25.72%, respectively, in the survey population[3]. Based on the data of smart phone/tablet ownership percentage, the government, particularly BPOM, provides and improves e-government services as mobile applications for the public called *Cek BPOM*.

## II. LITERATUR REVIEW

### A. *Cek BPOM* Mobile Application

*Cek BPOM* is a duplicate of web-based services on <https://cekbpom.pom.go.id> which are provided as Android-based play store apps for smart phones/tablets. The application provides data of Registration Numbers of (Nomor Izin Edar-NIE) drug and food products registered in BPOM. The drugs and food consists of medicines, medicine materials, narcotics, psychotropic, precursor, addictive substances, traditional medicines, health supplements, cosmetics, and processed food.

Registration Number (NIE) is registration approval for medicines, traditional medicines, cosmetics, food supplements, and food released by the National Agency of Drug and Food Control of the Republic of Indonesia so that a product can be legally distributed in Indonesian territory. *Cek BPOM* shows Registration Numbers of national products and import products which are registered / legal to distribute in Indonesian territory. The *e-government* service is expected to be a reference for the public to verify products they will consume. To use the application, one only has to enter

registration number of product name to check and *Cek BPOM* will display information whether the product is consumable, legal or not[4]. But, is *Cek BPOM* consistent with its usability?

### B. E-Government

According to the World Bank, e-government is the implementation of information technology-based governance to improve government performance in relation to the community, business community and other related groups towards good government.

E-government is aimed for: (a) governments that use technology, especially web-based internet applications to improve access and delivery / government services to the public, business partners, employees and other governments; (b) a reform process in the way the government works, various information and provide services to internal and external clients for the benefit of the government, community and business people; and (c) utilization of information technology such as Wireless Area Network (WAN), internet, world wide web, computers in government agencies is used to reach communities, businesses. And every government branches have to improve services to the public, improve services to the business and industrial world, empower the community through access knowledge and information, and make the government work more efficiently and effectively[5].

### C. Usability Testing

According to International Standard Organization (ISO), usability is “*The Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*”. Usability measurement must cover the following three aspects 1) Effectiveness which shows accuracy and perfection achieved by user when performing certain task, 2) Efficiency which shows resources used related with the accuracy and perfection achieved by user when performing certain task, and 3) Satisfaction which shows user’s freedom from discomfort and positive behavior to product usage[6].

There is a study on Usability Testing on web-based employment application in the Department of Agriculture Bandung[7]. The employment software has the advantages of showing rank history, educational background, years of service, and employee assignment. The usability testing uses System Usability Testing (SUS) on 5 respondents which has adequate result, considering small sample, time and cost. The score for the application is 73.4. The score has B index, indicating that it’s applicable in the department of agriculture Bandung Regency.

Usability Testing on *Palembang Guide* which is a supporting media for Asian Games XVIII involves 10 respondents. *Palembang Guide* is software which provides information on supporting facilities of Asian Games XVIII

which contains information on sport venues, transportation facilities, tourist attractions, restaurants, stores (malls), hotels, gas stations, health facilities, security posts, government offices and educational institutions on *smart phone*. The result of interface test of Palembang Guide using SUS shows that the assessment score is 83, meaning that *Palembang Guide* is acceptable and in grade A and B with excellent rating[8].

SDLC (System Development Life Cycle) is a system development method or stages which must be performed by software developer to produce a software which can be used by user[9]. Phases in SDLC include planning, requirement analysis, design, implementation, testing and evolution. Usability testing is a part of the testing phase of SDLC.

The study of usability testing is a part of Human Computer Interaction (HCI). The main objective of creating various human computer interaction is making it easier for people to operate computer and get necessary feedback while working on a computer system. To design a user-friendly system, designers must understand the psychological aspects of users because every user have unique characteristics and habits when working on a computer system[10].

A study of usability testing conducted on a web portal, shows that usability is divided into five factors, namely content, ease of use, promotion, made of the medium and interactivity. The results reveal that the case study is low in usability when compared to user requirements and user perceptions[11].

Usability testing conducted on the web portal of the Government Agency of the Ministry of Education Malaysia (Ministry of Education Malaysia-MOE) with pre-usability and post-usability that testing focuses on effectiveness, efficiency, learning, controllability, attractiveness, helpfulness and satisfaction. Questionnaires were given to 70 respondents, pre-usability testing was carried out in the initial stages of the imitation site displayed to users before the actual site was launched and then continued with post-usability testing. The main purpose of post-usability testing is to evaluate the usefulness of the MOE web portal after the improvement. Post-usability testing was carried out on the MOE web portal prototype. The results of post-usability testing showed usability testing improvement on all usability attributes increased to a good level of usefulness[12].

This research is the initial part of a thesis about information service of BPOM’s registration number. To achieve the maximization result of the service, usability testing was tested on users of the *Cek BPOM* application to obtain an overview the impact of the application to the user.

## III. RESEARCH METHODOLOGY AND DISCUSSION

The research methodology used is the System Usability Scale (SUS). The following step is carried out to get an overview of the impact of using the BPOM check application as shown in Figure 1.

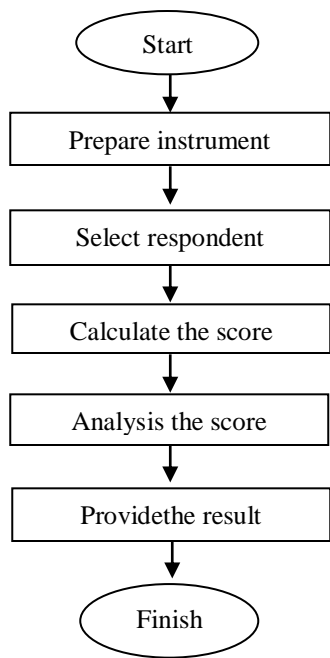


Figure 1 Step of research

A. Prepare Instrument

Primary data collection is done by distributing questionnaires through the survey media to obtain data. In each question the Likert scale is used because it is the easiest to use. The Likert scale uses a scale of 1 to 5 with several questions in measuring user interaction by responding to five choices in each question item, which is strongly agree, agree, neutral, disagree, and strongly disagree. Instrument for usability testing is SUS that shown in table 1.

Table 1 Instrument Usability Testing by SUS

Code	Statement	Scale
P1	I think that I would like to use this system frequently	1 to 5
P2	I found the system unnecessarily complex.	1 to 5
P3	I thought the system was easy to use	1 to 5
P4	I think that I would need the support of a technical person to be able to use this system.	1 to 5
P5	I found the various functions in this system were well integrated	1 to 5
P6	I thought there was too much inconsistency in this system	1 to 5
P7	I would imagine that most people would learn to use this system very quickly	1 to 5
P8	I found the system very cumbersome to use	1 to 5
P9	I felt very confident using the system	1 to 5
P10	I needed to learn a lot of things before I could get going with this system	1 to 5

B. Select Respondents

The instrument was given to 30 respondents through survey media. The proper sample size in the study is between 30 and 500 respondent [13]. The instrument is only given to

the age above the late adolescence, which according to the Ministry of Health aged between 17-45 years. This is because basically awareness of the use of medicinal and food products began to appear at that age. Respondent consists of 19female and 11 male aged between 17-45 years who usually use mobile application.Characteristics of respondents can be seen in table 2

Table 1 Characteristics of respondents

	Gender	Age (year)	
Male	11	17 – 25	3
		26 – 35	7
		36 – 45	1
Female	19	17 – 25	5
		26 – 35	14
		36 – 45	0
Total	30	30	

C. Calculate the score

The process of calculating the SUS value is by giving weight to each statement ranging from 1 to 5. Weight calculation for each statement follows the following rules:

- For statements with an odd number of 1,3,5,7, and 9, the value obtained is the scale position in the questionnaire is reduced by 1.
- For even numbered statements, 2,4,6,8 and 10, the value obtained is 5 minus the scale position on the questionnaire.

Then subtract the value obtained for each statement and do the calculation process of the total value of the amount multiplied by 2.5 to get the overall value of the SUS score [14]. Mathematically written as follows:

$$\text{Value Score} = ((P1-1)+(5-P2)+(P3-1)+(5-P4)+(P5-1)+(5-P6)+(P7-1)+(5-P8)+(P9-1)+(5-P10)) * 2.5$$

The average results of calculations with the SUS Score formula above, for 30 respondents the results obtained are 67.25 by using this formula:

$$\text{Average SUS} = \sum_{i=1}^n \frac{X_i}{N} \dots \dots (1)$$

which Xi: value respondent score  
N: total respondents

D. Analysis the score

To determine the grade of assessment there are 2 (two) ways that can be used [15].

- The first determination is seen in terms of user acceptance level, grade scale and rating adjective. User acceptance level consists of three categories, namely not acceptable, marginal and acceptable.

While in terms of the level grade scale there are six scales, namely A, B, C, D, E and F, then from the rating adjective consists of worst imaginable, poor, ok, good, excellent and best imaginable as shown in Figure 2.

- The second determination is seen from the side of the percentile range (SUS score) which has a rating grade consisting of A, B, C, D and F. Rank percentages have the following provisions: a) Grade A with a score greater than or equal to 80, 3; b) Grade B with a score greater than 74 and smaller 80.3; c) Grade C with a score greater 68 and smaller 74; d) Grade D with a score greater than 51 and smaller 68; and e) Grade F with a score smaller than 51.

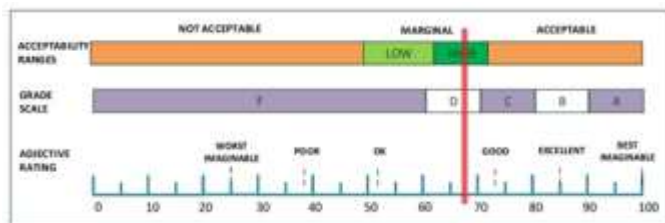


Figure 2 The Average Value of *Cek BPOM*[16]

E. Provide the result

1. The average value of the SUS score is 67.25. That has been obtained from the results of the questionnaire testing is analyzed based on the determination of the above assessment results, it can be stated that:
  - For assessment in terms of user acceptance level, grade scale and rating adjunct as shown in Figure 2, the *Cek BPOM* application is at a marginal high position. In terms of grade scale is in position D and in terms of adjective rating is in a position between ok and good.
  - In the assessment of the percentile range, the *Cek BPOM* application is in Grade D.
2. The highest value of the SUS score is 92.5, it can be stated that:
  - For assessment in terms of user acceptance level, grade scale and rating adjunct as shown in Figure 2, the *Cek BPOM* application is at a acceptable position. In terms of grade scale is in position A and in terms of adjective rating is in a position best imaginable.
  - In the assessment of the percentile range, the *Cek BPOM* application is in Grade A.
3. The lowest value of the SUS score is 42.5, it can be stated that:
  - For assessment in terms of user acceptance level, grade scale and rating adjunct as shown in Figure 2, the *Cek BPOM* application is atnot acceptable position. In terms of grade scale is in position F

and in terms of adjective rating is in a position between poor and ok.

- In the assessment of the percentile range, the *Cek BPOM* application is in Grade F.

IV. RESULT

The results of usability testing will be used as the initial data in developing *Cek BPOM* Application. The average SUS score which is 67.25 indicates that *Cek BPOM* application is in a marginal high position. It means that application is not yet really useable but still needed for respondents as an e-government service. The highest SUS score was 92.5 means it's useable and the lowest was 42.5 means it's not useable.

To get accurate information, interviews are conducted with respondents with the highest scores and lowest scores. The highest score respondent were female aged between 26 - 35 years who had previously used *Cek BPOM* application. The score given is high because according to respondent, *Cek BPOM* application helps her to see the registration number of a product. While respondents who have the lowest score are those female aged 26-35 years who did not know the *Cek BPOM* application before. According to respondent, the interface of application needs to be changed.

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A glimpse of the author, Irawaty Evalina Sitanggang was born on September 26, 1986 in Tarutung City, North Tapanuli Regency, North Sumatera Province. The author is the third child of 4 siblings, with an elementary school education background of SD N 173105 in Tarutung City, and junior high school in SMP N 2 Tarutung. In 2001 she continued to SMA N 1 Tarutung as senior high school and was declared graduated in 2004. After graduating from senior high school, the author resumed her studies at the University of North Sumatra by taking a Computer Science Department. In June of 2009, the author completed her thesis in order to meet the Bachelor's requirements with her research entitled Application Design of Diabetes Mellitus Diagnosing System Using Decision Support System Based on Analytical Hierarchy Process (AHP) Method and finally holds a Bachelor of Computer. From December 2010 until now, the author has joined as a public servant at the National Agency for Drug and Food Control in Medan.