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Usability Level Evaluation of Village Innovation Applications Using System Usability Scale

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Abstract

Usability is one of the important factors in an application. Village Innovation Application is a Knowledge Management System (KMS) that provides services to help village managers share innovation management knowledge with other villages. To that end, the study proposes evaluating the level of useability of applications using the System Usability Scale to see the feasibility of the applications provided for use. The usability scale system has ten statements as an evaluation instrument and three assessment indicators, namely acceptability, grade scale, and adjective rating. Each statement becomes an indicator to see the level of usefulness of the application. Evaluation of usability Application Innovation village using System Usability Scale method can be drawn to the conclusion that the village Innovation application is categorized as meeting usability standards evidenced from the value of usability to aspects of acceptability, grade scale, and adjective rating with a final value of 68.3 meaning that the application can already be used directly by village devices.

Keywords: Application, Village Innovation, Usability, System Usability Scale, Application Evaluation

1. Introduction

Village is a unit of community that has the authority to regulate its territory based on the rights of origin and customs that apply in national government and are in the district area. Indonesia is a village-based country, because 82.3% of Indonesia's territory is rural and still about 50% of Indonesia's population still lives in rural areas. Based on the *Badan Pusat Statistik* Indonesia (Central Statistics Agency of Indonesia) the number of villages in Indonesia in 2018 amounted to 83,931. While the number of villages / villages in Central Java in 2018 was 8,559 and in 2019 increased to 8,562. The government issued Presidential Regulation No. 131 of 2015 on The Determination of Disadvantaged Areas 2014-2019. There are 122 districts categorized as disadvantaged areas. An area is said to be lagging behind if the level of economic development of the community, human resources, facilities and infrastructure, regional financial capabilities, accessibility and regional characteristics are very low. The program of handling disadvantaged areas requires a special and specific approach in order to be able to trigger the acceleration of development. The acceleration of development is desired to reduce the level of gap between disadvantaged areas and other regions getting solvent (Mardiansjah et al., 2018)(Statistics, 2020)(Ratnadila, 2018). As stated in (Handoyo, Hidayatina, dan Purwanto 2021), Indonesian government has shown strong effort to leverage impartial development of village, including reducing poverty and inequality.

Village development activities and disadvantaged areas must be able to give birth to creative and innovative habits. The habit of innovation will grow if the cycle of transformation of knowledge and good practices from one village to another, one region to another – especially villages / regions that have similar conditions and problems, can run smoothly. Village Innovation is an application that serves as a medium to share knowledge about the utilization of village funds through the government innovation narrative. This application can be run on android devices with a minimum API of 21 or with the Lollipop system. Village Innovation application is a Knowledge Management System (KMS) based application, because in applications can exchange existing knowledge, such as adding, taking, increasing collaboration, placing knowledge sources, capturing and using knowledge.(Wardhana, Nurhadryani, et al., 2020)

The system that has been created needs to be assessed or evaluated its performance to see the extent of its success rate in achieving the initial goals and objectives that have been set. Along with the success rate, it is necessary to pay attention to several aspects that affect user interest to keep using the system in accordance with user expectations. User experience is the result of user interaction with a product, system, or service. When the user has a good relationship with the system, then the user's loyalty to the system will increase. So as a medium used to interact with users, a system must have a good user experience.(Sadnyana et al., 2017)(Wardhana, Fans, et al., 2020)(Karyono et al., 2019)(Budiman et al., 2020)(Zarour & Alharbi, 2017)

Usability testing is a software testing or evaluation, usablity testing itself is a method of evaluating software or systems by testing the device by involving the user directly. The level of usability is used as a benchmark for the extent to which a product or service can be used by users to achieve its goals and convenience when used. According to Jacob Nielson Usability testing has five main components, namely learnability, efficiency, memorability, errors and satisfaction. Usability testing on village innovation applications is done using the System Usability Scale (SUS) (Widodo, 2017)(Adnan et al., 2017)(To and al., 2018)(Handiwidjojo & Ernawati, 2016) is a questionnaire used to measure the usability of the system from the user's point of view subjectively.(HN et al., 2015a)(Kaya et al., 2019)

SUS has several advantages, among which is 1) the evaluation process is easier for respondents to understand, 2) it can involve a small sample but can describe maximum results, and 3) it can clearly distinguish between usable and unusable applications. SUS also has a clear means of calculation instruments in conducting application evaluations. Thus, the resulting evaluation value has the value of truth and can be accounted for (usability.gov, 2018)(Kurniawan et al., 2020). For this reason, in evaluating the level of usability of village innovation applications, SUS is used as an evaluation model. This is done in the hope that it can clearly describe the true level of usefulness and become an input for the development of village innovation applications on future improvements.

2. Literature Review

2.1. Village Innovation Application

Village Innovation is an application that serves as a medium to share knowledge about the utilization of village funds through the government innovation narrative. This application can be run on android devices with a minimum API of 21 or with the Lollipop system. The Village Innovation application has several features, including adding innovation, displaying innovation in accordance with existing categories, discussing innovation, giving ratings, and seeing recently published innovations. (Kartiko et al., 2021)There are several goal requirements in the application (Figure 1) that focus on the replication of knowledge. The application is also available and can be downloaded on the playstore (Figure 2).

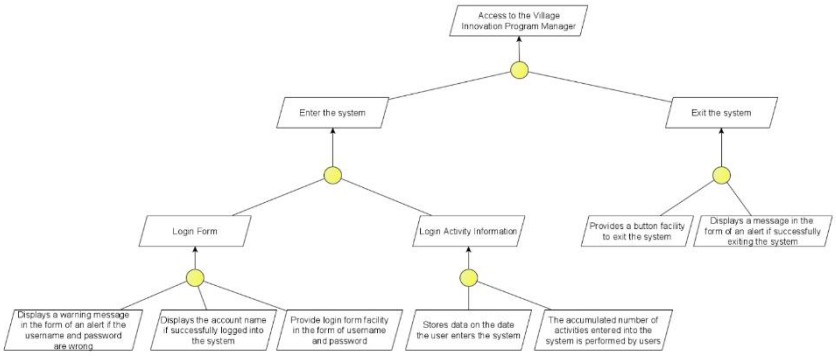

Figure 1: Goal Requirement Village Innovation Application [26]

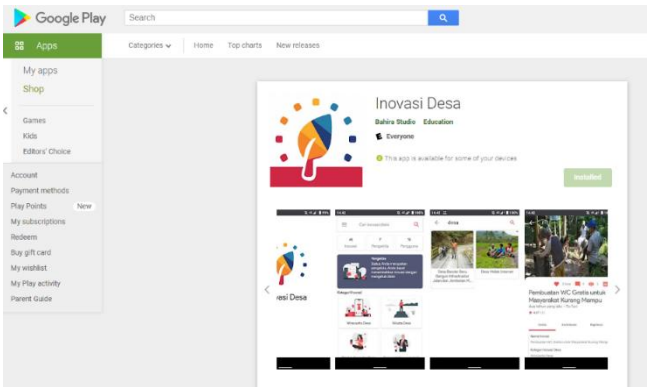

Figure 2: Village Innovation App on Playstore

2.2. Usability Testing

Usability testing is one way that is used to be able to know all the functions that can work in a system interface, namely by paying attention directly when a system user is using it. Usability testing is one of the testing methods to assess whether users can use the application easily, how effective and efficient an application is in helping users achieve their goals, and whether the user is satisfied with the application that has been used. Usability testing can be done on small and large and(Carroll & Hertzum, 2020)multi-platform software such as desktop-based, web, and mobile.

2.3. System Usability Scale

System Usability Scale (SUS) is a questionnaire that can be used to measure the usability of a computer system according to the subjective point of view of the user. SUS was developed by John Brooke in 1986. Until now, SUS is widely used to measure usability and has several advantages, among others: SUS can be used easily, because the result is a score of 0-100, SUS is very easy to use, does not require complicated calculations, SUS is available for free, requires no additional costs and SUS proves valid and reliability, although with a small sample (Lewis 2018) (HN et al., 2015b) size. SUS in the form of a questionnaire consisting of 10 question items as shown in Table 1:

Table 1: Questions on SUS

Code	Question
Q1	I will often use this system.
Q2	I feel like this system is too complicated.
Q3	I find this system easy to use.
Q4	I need technical help to use this system.
Q5	I feel the function in the system is well integrated.
Q6	I think there are inconsistencies in the system.
Q7	I feel like most people will easily use this system quickly.
Q8	I find this system complicated when used.
Q9	I feel very confident using this system.
Q10	I need to learn a lot of things before I can use the system properly.

Table 2: Respondent's answer description

Shoes	Information
1	Sangat Tidak Setuju (STS/Very Disagree)
2	Tidak Setuju (TS/Disagree)
3	Ragu-Ragu (RG/Doubt)
4	Setuju (S/Agree)
5	Sangat Setuju (SS/ Strongly Agree)

The overall SUS score is obtained from the average SUS score of respondents individually and then accumulated from the total respondents. Based (Lewis, 2018), a formula has been provided for calculating *the* System Usability Scale (SUS).

$$SUS = 2{,}5\ x\ [\sum_{n=1}^{5}(U_{2n-1}) + (5 - U_{2n})] \quad (1)$$

After getting an average of individual SUS scores, the next is to calculate the average of the accumulation of all respondents. The application can be said to be good and can be used by users if the average SUS score reaches a minimum of 67 with *a grade* of C. *The grade* is calculated based on the Suaro-Lewis scoring scale (Table 3).

Table 3: Suaro-Lewis curve scoring scale

SUS Score Range	Grade
84.1 – 100	A+
80.8 84.0	A
78.9 – 80.7	A-
77.2 – 78.8	B+
74.1–77.1	B
72.6–74.0	B-

71.1–72.5	C+
65.0–71.0	C
62.7–64.9	C-
51.7–62.6	D
0.0–51.6	F

3. Materials and Methods

3.1. Materials

This research object is a Village Innovation Application where this application can be installed in the playstore with the current version of 1.0.1.4. In running this application requires an android device with a minimum API of 21 or with a Lollipop system. Then, the location of this study is located in the Pagubugan Hall of Melung Tourist Village, Kedungbanteng, Banyumas. This study was conducted on Wednesday, October 13, 2021 at 09.00 to 14.00 WIB. The targets of this study include Melung Village, Kalibagor Village, Karangnangka Village, Kemutug Lor Village, Dermaji Village, Kaliori Village, Kejawer Village, Ajibarang Village Wetan, Beji Village, and Pangebatan Village. Then, in 11 villages each village sends two village representatives and respondents who attend and fill out SUS questionnaires with targets. 22 respondents.

3.2. Methods

This research object is a village Innovation Application where this application can be installed in the playstore with the current version of 1.0.1.4. In running this study divided usability testing into three parts consisting of preparations, execution and analysis as in (Figure 3). (Carroll & Hertzum, 2020)

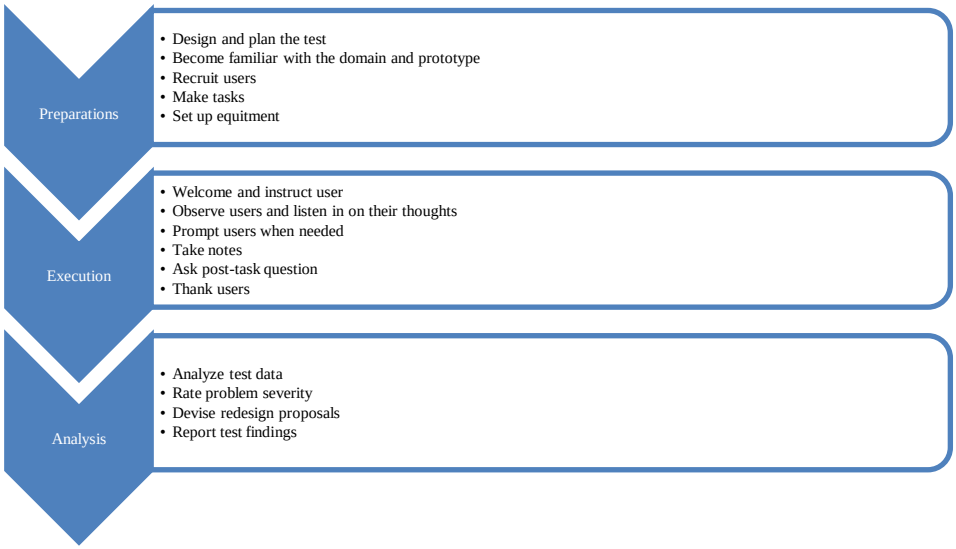

Figure 3: Usability Testing Step by Step

3.2.1. Preparations

At this stage is a process before testing the design of Village Innovation Application. In this stage the main activities that will be carried out such as conducting design and usability test design, familiarize themselves with domains & prototypes, find users, conduct tests, and the preparation of equipment to be used during testing.

3.2.2. Execution

In this stage, the development of Village Innovation Application is carried out. The main activities include giving a speech and giving instructions to the user, observing the user and listening to their thoughts, asking the user when it is needed, records every activity, asks post-task questions, and then thanks the user.

3.2.3. Analysis

In this stage, Village Innovation Application is tested by the user. In addition, its main activities will be analysis of testing, assessing the severity of the problem, designing redesigns, and reporting testing.

4. Results and Discussion

4.1. Preparations

4.1.1. Design and plan the test

Before testing the village innovation application, some preparation is needed such as what activities will be carried out, the target respondents, the time and place of testing and the techniques that will be used at the time of testing. Target the village who will be the respondent to take part in the testing of village innovation application (Table 4).

Table 4: Respondent Village Target

Village name	Target Number of Respondents
Kalibagor Village	2
Karangnangka Village	2
Kemutug Village	2
Dermaji Village	2
Melung Village	2
Kaliori Village	2
Kejawar Village	2
Ajibarang Wetan Village	2
Beji Village	2
Pangebetan Village	2

Of the ten villages (Table 4) will be represented by at least one respondent from each village to participate in socialization activities and village innovation application workshops with the Ministry of Villages, PDT, and Transmigration (Table 5) which aims to test the feasibility of using innovation applications. the village.

Table 5: Village Innovation Application Testing Schedule

Location of Activities	:	Melung Tourism Village Paguyuban Hall, Kedungbanteng, Banyumas, Central Java
Date of Implementation of Activities	:	Wednesday, 13 October 2021
Time of Implementation of Activities	:	09.00 - 14.00 WIB
Testing Techniques	:	Forum Group Discussion

The reason for testing village innovation applications using *Forum Group Discussion* techniques is because the target respondents are people who joined the Paguyuban in Melung Village, Banyumas Regency, Java. Middle so that when there is one respondent who experiences obstacles can discuss with other respondents. With careful preparation before testing village innovation applications, it is expected to facilitate the accumulation of village innovation application assessment so that it can be determined whether the village innovation application is feasible or not to use.

4.1.2. Become familiar with the domain and prototype

From the results of village innovation application testing, respondents are advised to run village innovation applications on condition that they have a minimum device specification api 21 or lollipop android system. In order for respondents to be more familiar with village innovation applications, in testing every feature in village innovation applications need to be done Knowledge Management System (KMS) which is divided into 3 processes, among them are knowledge discovery, knowledge capture, and knowledge sharing (Table 6).

Tabel 6: Knowledge Management System (KMS)

KMS Process	Application Features
Knowledge Discovery	View newly published innovations, Display innovations according to existing categories
Knowledge Capture	Add innovation
Knowledge Sharing	Discussing innovation, providing an online rating of existing innovations

4.1.3. Recruit users

Respondents were taken at least two representatives from the ten villages (Table 3). The total overall target of respondents amounted to 20 respondents. From the series of activities (Table 4), the total respondents who can participate in socialization activities and village innovation application workshops with the Ministry of Villages, PDT, and Transmigration in accordance with the series of activities (Table 4) totaled 18 respondents from the target respondents were 22 people. The list of respondents who participated in the activity is spelled out in **Table 5.**

Table 6: List of Respondents

Respond	Age	Gender	Position	Village
1	< 50	M	Sekdes	Karangnangka
2	< 40	M	Kaur Umum	Kaliori
3	< 40	M	Kadus	Kalibagor
4	> 50	M	Kadus	Kaliori
5	< 50	M	Kadus	Kemutug
…	…	…	…	…
18	< 50	F	-	Pengebatan

It can be concluded (Table 6) bahwa respondents are dominated by people between the ages of 40 to 50 years and male. Based on the target village that follows the activities, it can be concluded that the entire village (Table 4) can send representatives with at least one respondent.

4.1.4. Make task

So that respondents can better understand the flow in running the inovillage application then before respondents are given a survey filling form based on SUS (Table 1), respondents are given an explanation in advance about some features (Table 7)**.**

Table 7: Village innovation application task

Application Features
Add innovation
Display innovations according to existing categories
Discussing innovation
Give a rating of existing innovations
See recently published innovations

Testing by respondents is carried out on every detail of the feature (Table 7) so that respondents can fill in ten SUS questions (Table 1) and get a satisfactory score so that users can use easy application of village innovation.

4.1.5. Set up equipment

At this stage, several moderated testing equipment was prepared that was conducted in a forum group discussion (FGD). Each respondent using their respective smartphones installed village innovation applications and create new accounts before testing. Figure 4 describes the scheme of equipment in testing the usability of village innovation applications.

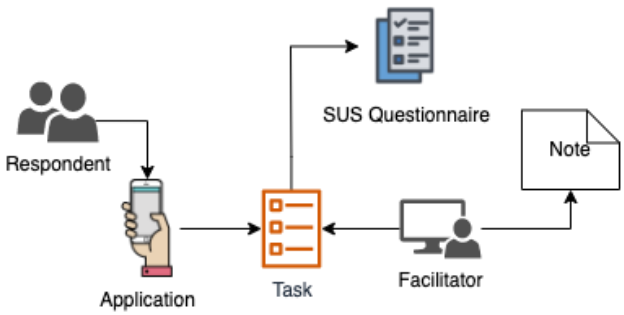

Figure 4. Set up equipment

4.2. Execution

(a) (b)

Figure 5. Usability testing activities of village innovation applications

At this stage, the usability testing process is carried out in accordance with the tasks and equipment designed at the previous stage. Respondents did several tasks, after which was done filling out SUS questionnaires related to village innovation applications such as figure 5.

4.3. Analysis

At this stage, the test is carried out using the System Usability Scale (SUS) which consistsof 10 questions as already spelled out (Table 1). The question was shared with 18 respondents as prospective users of village innovation applications. Based on lewis formula calculations, village innovation applications can be said to be quite good and can be used in general by users if they have reached an average of 67 (class C). After all respondents were collected and tested village innovation applications, respondents were given ten questions (Table 1) and then obtained respondent answers (Table 8).

Table 8: Respondents' answer results

Respond	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	3	2	4	4	4	4	4	3	4	5
2	3	2	4	1	4	2	4	2	4	4
3	5	2	4	1	4	1	4	1	4	1
4	4	2	5	3	4	4	4	2	5	4
5	4	2	4	4	4	3	3	2	4	3
…	…	…	…	…	…	…	…	…	…	…
18	3	2	4	2	3	2	4	3	3	2

From the respondent's answer (Table 8), it can be concluded that most respondents answered ten SUS questions with the number 4 which means "Agree" based on the respondent's assessment score (Table 2). In determining the SUS Score an application requires the number of odd questions (odd items) and even questions (Even items) which are then done summing between odd items and even items from the result then multiplied by 2.5 to get the Average SUS Score. After getting the respondent's answer, the score was calculated on average individually and then accumulated the overall average of respondents based on the Lewis assessment scale (Table 3) so that the average score was obtained - an average of 68.3 who were in grade C (65 - 71). Determination of application evaluation results using acceptance, rating scales, and adjective ratings is based on recapitulation of values in the form of the instrument's total average score, not the value for each evaluation instrument (Figure 5).

Based on the determination of the results of the utilization evaluation with SUS on village Innovation Application (Figure 5) it can be known that the level of usability through three parameters, namely 1) Acceptability based on application recipients to users of usability evaluation results show that village Innovation Applications are categorized as high, 2) Grade Scale based on satisfaction levels of village Innovation Applications results of usability evaluation shows that Grade scale is in category C, Adjective Rating based on the usability rating level of village Innovation Application results showed that village Innovation Application falls into the ok category. Therefore, it can be concluded that the village Innovation Application is suitable for use by users.

5. Conclusion

Evaluation of usability Village Innovation Application using System Usability Scale method can be drawn to the conclusion that village Innovation application is categorized as meeting usability standards because it has been proven starting from calculations The survey is based on the number of respondents determined using the Lewis assessment scale and then the results of the assessment are seen from the value of usability to aspects of acceptability, grade scale, and adjective rating so that it is obtained The final value of 68.3 which has a grade C scale. Based on the results of the assessment, it can be concluded that the application can already be used directly by users, especially village devices.

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