PeduliLindungi Usability Evaluation Using Usability Scale (SUS)

[1]Kristophorus Hadiono, [2]Agnes Widyaningrum, [3]Uswatun Khasanah
[1,3]Information System, Information Technology and Industry Faculty
[2]Law and Language Faculty
Universitas Stikubank, Semarang, Indonesia

[1]kristophorus.hadiono@edu.unisbank.ac.id, [2]agneswidyaningrum@edu.unisbank.ac.id,
[3]uswatunkhasanah@mhs.unisbank.ac.id

Abstract — Technology advancement is inevitable. During COVID-19 pandemic, Indonesia was like other country, the government try to protect its people and still consider on how the economy can keep running. During that situation, the PeduliLindungi application is developed and used for monitoring and recording of people's healthiness. The PeduliLindungi application was used by broad range of people's, devices, and capabilities. In order to achieved its performance, it raises a need to see the usability of the application. One of popular test on usability is by implement the SUS method. This research got 260 respondents feedback using SUS questionaire and gives results of that fall into "GOOD", "OK", and "POOR" category. The SUS score was 49.24618 which fall into "OK" category. It can be said that the PeduliLindungi application can serve its purposes.

Keywords— Usability, Usability testing, HCI, PeduliLindungi, Covid-19.

I. INTRODUCTION

In daily activities, people almost always use technology to facilitate their work. One simple example is the internet, which is used by people to get information easily for helping their activities. The internet cause a convenience for people to obtained information [1].

At the end of the year 2019, the world was shocked by the COVID-19 pandemic, which caused global restrictions and the panic situation in some countries. At that time, there is no available cure for the pandemic virus. Facing this kind of situation, almost every country that affected by COVID-19 declared new rules by limiting their people's activities to prevent further transmission of COVID-19. Indonesia is one of the countries impacted by COVID-19, but the Indonesian government realizes that if they follow like other countries, the economic conditions will collapse. The Indonesian people will suffer a lot, and Indonesia is one of the biggest populations in the world. This will be a nightmare for Indonesian government.

In that situation, the Indonesian government created a new rule, which is still limiting people's activities by implementing imposition of restrictions on community activities (Pemberlakuan Pembatasan Kegiatan Masyarakat/PPKM). Not only creating PPKM, the Indonesian government also create an application (apps) named PeduliLindungi. This application has a purpose which is to help the government monitor how well is the people and record the people's vaccination data. This application is not only used for recording vaccination data and monitoring the healthiness of the people; it is also used as a tool for healthiness identification when entering public areas such as malls, hospitals, private offices, government offices, etc. [2]

The PeduliLindungi application was first released on March, 27th, 2020. By releasing the application, the Indonesian people debate on privacy violations. This debate makes sense because this application will record their movements, which can be seen as a private violation. Even though there are

SISFORMA: Journal of Information Systems (e-Journal)Vol. 11 | No. 1 |Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

71·

disagreeing and agreeing arguments, the Indonesian government insisted on using this application, surely it help the government to prevent sick people or COVID-19 carriers infected healthy people.

Seeing the purpose of the application, it is a must to make sure that the application is easy to use. The easiness of the application when used is important, especially since the application will be implemented in a broad range of ages, devices, and capabilities of people. It is common knowledge that older people or less educated people are the heavy obstacles related to digital stuff.

As stated in the previous paragraph, the main reason for this research is to know the easiness of the application when people use it. From previous research, it was known that the System Usability Scale (SUS) is one of the kind measurement to obtain how useable is a system. The SUS measurement is consisted of 10-Question questionnaire which offers a quick, cost effective, and accurate way to evaluate the usability of products and services.

The usability testing was conducted when a public health center (puskesmas) in Sidoarjo Region implemented a new queuing system based on Android platform application. There is an indication that the number of visiting patients is decreasing. After the SUS was implemented, the results indicated that the score of SUS was below the safe limit which is 66.5. The SUS result of the new queuing system should be above 68 points. The problem that happened with the new queuing system can be concluded that it was confusing the user. The results of the research is that the researchers give 4 recommendations like (1) separation of buttons on the main page by giving different colors or backgrounds; (2) Adding current queue information; and (3) providing better navigation buttons, so users can return to the main page; (4) remove the captcha feature with something similar [1].

Another research that uses SUS method to improve Android applications is named E-Suket from Kediri. From user feedback on the Google Play Store, users wrote errors when they tried the application to get what they needed. One of the errors that the user complained about was failing to submit the request for the letter they needed and some errors regarding the operation of the applications. The researcher conducted the research by using SUS method combined with user interviews, questionnaires, and requests and recording the user when they asked to do something with the application. Based on the result of the research, it was found 27 problems with the application. The researcher gives 28 guidelines to make the application better [3].

In the healthiness field, the SUS method is also used, as seen in the research on battling obesity in the United States. Some researchers have developed an application to enhance patient engagement to promote healthier behavior by using applications. The method of the research is using a two-cycle approach and then followed by a usability study in the primary care setting. The patients were then asked to give feedback for revision purposes. The feedback from the patients came from the SUS questionnaire. The research results were that in the first cylce; the patients feedback was 76.5 SUS score of the mWRAPPED application. After revision of the mWRAPPED application, the score increase into 80.5. The average of mWRAPPED application SUS score is 77.9. Seeing this results, the study will help to support promoting the use of the application in battling obesity [4].

Still related to the healthiness field, the online nurse test for Indonesian Nurse Competency was developed to help Indonesian Nurses learn their competency by simulation. This application was aimed as a helper for nurses when they're learn their competency through mobile application. The SUS method was used, because of the COVID-19 pandemic situation, the SUS testing was done unmoderated and remote [5]. The research results give information that the SUS method can be done remotely and unmoderated, also the respondents were able to complete the test without having obstacles or confusion.

SISFORMA: Journal of Information Systems (e-Journal)Vol. 11 | No. 1 |Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

72

The SUS method testing implementation was not limited to healthiness field. It is proven to be able to use in the mobile application systems. Like the research from [6] which applied to the Management Information Systems (MIS) of Sukamiskin Correctional Institution. The MIS mobile application was used mainly for internal exchange information such as daily absences, applying for leave and submit the daily journal work of the Ministry of Justice and Human Rights Employees. The researchers only able to have 20 respondent to be able to measure the effectiveness, efficiency, and user satisfaction. The respondents were all the employee of Sukamiskin Correctional Institution. The research results achievement were concluded that the effectiveness of the MIS mobile application was 100%, all respondents were satisfied with the effectiveness factor. The efficiency of the MIS mobile application gives different results. The respondent inform that the efficiency factor of the MIS mobile application need to be increase.

The banking field also able to prove that the SUS method can be implemented in their field. The Mobile Banking Applications (MBAPs) as one of the recent proof for banking institution ready to face the digital era. The MBAPs application permit the users to be able to exchange money and banking, related but limited, transactions. The objective of this research is to determine the degree of usability issues and experience that mobile banking users have. The researcher able to get 240 participants, and they assigned with 6 different tasks on the application. The experiment assesses the tasks' usability in terms of efficacy, efficiency, reliability, learnability, memorability, and satisfaction across a range of mobile banking apps. The research results it was found that the trust and privacy issues are come up when the respondent uses the application. Over all, the MBAPs will benefit if the developers and usability engineers can provide user-friendly MBAPs application more [7].

Another research that use SUS method was conducted by [8]. They build a website which has the same functionality, but the language they use is different. One is using English and the other is in Chinese. They conduct the research as they want to see if the culture of the user has an impact on the performance and satisfaction. The result of the research reveal that cultural preferences for website usability features vary, and that using certain web properties on culturally relevant websites can improve user satisfaction and performance. These connections are more intricate than conventional HCI research may have first suggested because some web components are genuinely multicultural. The results emphasize how crucial it is to take into account both cultural and HCI elements in order to enhance user performance and happiness on cross-cultural websites that use various content presentation and interaction methods.

Anther research was conducted by [9] which focusing on older people's (aged 65+). Conducting usability tests with this population raises a few key challenges, including managing ethical concerns regarding frail participants, adapting to their heterogeneous nature, and addressing their propensity to engage in impression management (i.e., present themselves in a positive light). The research gives insight that Usability testing plays a critical role in advancing technology and preventing unfavorable usability experiences from impeding uptake and views of it. It can be concluded that when dealing with older people's, the User Center Design (UCD) developer should improve their method and tailoring them to take into account also for older people's.

Usability has been defined as the degree to which a product may be utilized in a certain usage environment by specific users to effectively, efficiently, and satisfactorily accomplish specific goals. From that point of view, the [10] conducting a usabitliy testing by using crowdsourcing platform. The researchers found that discover that crowdsourcing has some significant drawbacks when compared to a formal lab setting, its usefulness and worth for usability

SISFORMA: Journal of Information Systems (e-Journal)Vol. 11 | No. 1 |Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

73

testing are undeniably demonstrated. It seems that crowdsourcing, which involves people from a variety of backgrounds, lives up to its reputation of being quicker, less expensive, and simpler to execute. Crowdsourcing lowers implementation obstacles, but it also brings new hazards that need to be properly controlled. Careful experimental design and controls are still necessary. Considering the cost when conducting the traditional usability test, an organization could combine the way the implement the usability testing. For a developing website or application design, a hybrid test plan that combines traditional and crowdsourced testing might be the most effective approach.

II. METHOD

This research is planned to be done like the following figure (Figure 1).
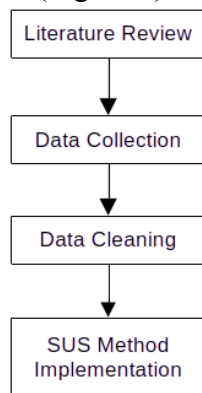

Figure 1. Research Method

Figure 1 describe how this research will be taken. The first step is doing the literature review. This steps will bring knowledge on how SUS method implemented and in what kind of things the SUS method can be applied. The second step was data collection. In this step, the data was collected from Information Technology and Industry students which the researcher believe almost all of them have the PeduliLindungi application. The sample was taken using simple random sampling technique. This sampling technique believe that each respondent will have same opportunity in the survey [11] The third step was cleaning the data, which is important to get clean and tidy data. The last step, the forth, was implement the SUS method by applying formula 1 and 2.

$$R = ((P1-1)+(5-P2)+(P3-1)+(5-P4)+$$
$$(P5-1)+(5-P6)+(P7-1)+(5-P8)+(P9-1)+$$
$$(5-P10))*2.5 \qquad (1)$$
$$\mu = \sum_{i=1}^{n} \frac{x_i}{n} \qquad (2)$$

Where R is the score from respondent; P1..P10 is the respondent answer; μ is the SUS score mean; X_i is the respondent answer; and *n* is the sum of the respondent. The SUS score interpretation must follow Table 1.

Table 1 SUS Score Category.

Category	Score Range
Worst Imaginable	1 - 10
Awfull	10 - 20
Poor	20 - 30
Ok	30 - 50
Good	50 -70
Excellent	70 - 80
Best Imaginable	80 - 90

III. RESULTS AND DISCUSSION

This research was conducted using the SUS questionnaire and then the researchers translated the questionnaire into Indonesian language. After spreading out the questionnaire, about 260 respondents returned the questionnaire. Then the data cleaning process begins. From 260 respondents answer, there is no missing value or empty value. Then it is time to implement the SUS method. Here is the process when implementing the SUS method.

The data was processed using R language. The first step is implementing the formula 1 by building two functions. From formula 1, it can be simplified as the value of the odd question must be reduced by 1. Then the value of even question must be subtracted from 5.

odd <- function(x) x-1
even <- function(x) 5-x

After having the odd and even function, then the data must be separate into odd and even category with this command

odd_data <- data_frame(lapply(df[c('P1', 'P3','P5','P7','P9')], odd))
even_data <- data_frame(lapply(df[c('P2', 'P4','P6','P8','P10')], even))

When the implementation of the odd and even function is finished, it is time to gather the data back and name as df variable and calculate the R score according to the formula

SISFORMA: Journal of Information Systems (e-Journal)Vol. 11 | No. 1 |Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

74

1. The R command language to get the R score is like this,

*df$R_score <- rowSum(df) * 2.5*

The second step is creating a function to interpret the formula 2. The function for interpreting the result of formula 2 should be followed like Table 1.

```
category <- function(x){
if(x<10){ p = 'Worst Imaginable'}
  else if(x<20){ p = 'Awful'}
  else if(x<30){ p = 'Poor'}
  else if(x<50){ p = 'OK'}
  else if(x<70){ p = 'Good'}
  else if(x<80){ p = 'Excellent'}
  else if(x<=90){ p = 'Best Imaginable'}
  else if (x<1 || x>90){ p = 'Invalid'}
return(p)
}
```

The *category* function then applied to the previous result from step one by using *lapply* function like this.

df$Rating <- lapply(df$R_score, category)

By implement the above command, now the data have the rating for each question of SUS method. The final step of this part is calculating the mean according to formula 2 using this command.

mean(df$R_score)

The mean score of this research is 49.24618 which means that the PeduliLindungi application is in "OK" category.

Based on the data, this research also present the visualization the differences between men and women towards the SUS category.
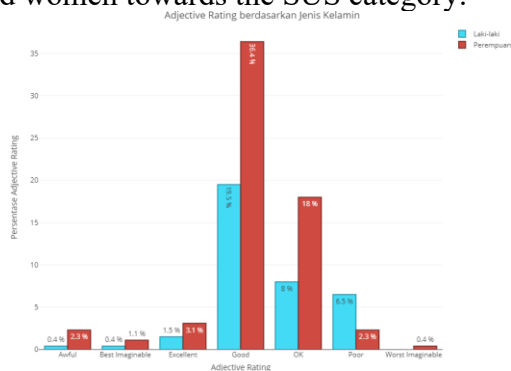

Figure 2. Differences between Man and Woman

In Figure 2, it can be seen that both man and woman have the same perception of the PeduliLindungi application. They give feedback in category "GOOD", "OK", and "POOR" as something more prominent if compared with "Awful", "Best Imaginable", and "Excellent" category.

Another comparison is done by seeing the device operating system, which can be seen in Figure 3.
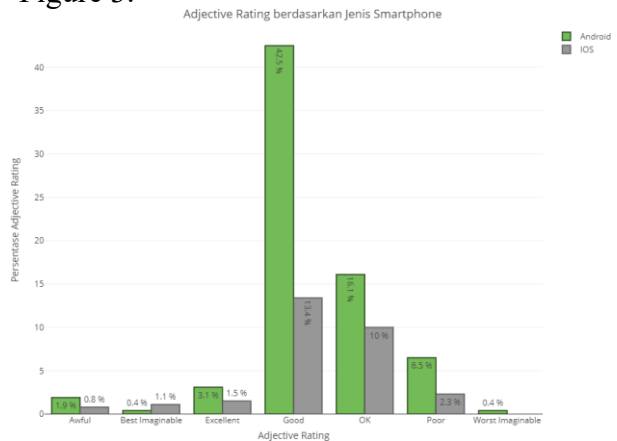

Figure 3. Differences outcome based on operating system devices.

The result of the comparison between the devices used by respondents can be seen in Figure 3. From that figure, it can be concluded that the majority of the respondents use Android devices (the green color). But those two operating devices fall in the same category, which is "GOOD" and "OK". The presentation of "GOOD" category from android reached 42.5% and from IOS reached 13.4%. The "OK" category from Android reached 16.1% and from IOS reached 10%. As, it can be concluded that more than half (58.6%) of the respondents were using an Android device when using PeduliLindungi application.
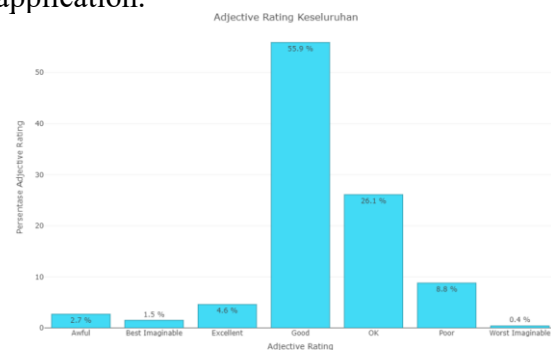

Figure 4. Graph SUS Score Category.

Figure 4 gives information that the PeduliLindungi application is to fall in "GOOD", "OK", and "POOR". Almost most respondents agree that the application is good, then followed by OK and the last one is POOR. This can be interpreted as the application is working as expected.

SISFORMA: Journal of Information Systems (e-Journal)Vol. 11 | No. 1 |Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

75

IV. CONCLUSION

From the research results, it can be seen that the SUS method can be used as a measurement of the usability of mobile application. Mobile application growth is linear with the need of mobile device. By seeing the growth of the mobile device, many developers are attracted to fill the device with their application. They can use the application as a solution to specific problems such as queuing tools, information systems, testing simulation, and checking or monitoring the movements and health of people. This also gives information that the PeduliLindungi application which developed by the Indonesian government achieved the purposes, which can be seen in Figure 4. Helping them monitor and prevent the spreading of the COVID-19 virus.

The application is able to gives their good performance on Android and IOS device, which can be seen in Figure 3. Figure 2 reflects the differences between men and women on the use of the application. Figure 2 gives information that most women see that the application is "GOOD". It means that woman that use the application not experience any difficulties and the application can fulfill their needs.

The PeduliLindungi application when measured with the SUS method got 49.24618 score which fall into "OK" category (see Table 1). The conclusion of this research is that the PeduliLindungi application can fulfill its purpose, and people whose use it feel the application can serve and do what it should be.

REFERENCES

[1] Muhammad Ulul Albab Iryanto, W. H. N. Putra, and A. D. Herlambang, "Evaluasi Usability Aplikasi SIAP TARIK Dengan Menggunakan Metode Usability Testing dan System Usability Scale (SUS) Pada Puskesmas Tarik Sidoarjo," *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, vol. 3, no. 7, pp. 7093–7101, Aug. 2019.

[2] L. Rahmi, "Evaluasi Usability Fitur Webshare pada Aplikasi ShareIt Menggunakan Metode Thinking-Aloud," *Ultima InfoSys : Jurnal Ilmu Sistem Informasi*, vol. X, no. 2, pp. 111–118, Jan. 2020, doi: 10.31937/si.v10i2.1199.

[3] I. Pahlevi, R. Rokhmawati, and L. Fanani, "Evaluasi Usability dan Perbaikan Antarmuka Pengguna pada Aplikasi E-Suket Kota Kediri Menggunakan Metode Usability Testing," *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer*, vol. 5, no. 6, pp. 2710–2717, 2021.

[4] T. Haggerty *et al.*, "Usability testing of an electronic health application for patient activation on weight management," *mHealth*, vol. 7, pp. 45–45, Jul. 2021, doi: 10.21037/mhealth-20-119.

[5] A. Relawati and Y. Primanda, "Unmoderated Remote Usability Testing: An Approach during Covid-19 Pandemic," *International Journal of Advanced Computer Science and Applications (IJACSA)*, vol. 13, no. 1, pp. 283–289, 2022.

[6] Hafidz. Firdaus and Azizah. Zakiah, "Implementation of Usability Testing Methods to Measure the Usability Aspect of Management Information System Mobile Application (Case Study Sukamiskin Correctional Institution)," *IJMECS*, vol. 13, no. 5, pp. 58–67, Oct. 2021, doi: 10.5815/ijmecs.2021.05.06.

[7] K. Hamid, M. W. Iqbal, H. A. B. Muhammad, Z. Fuzail†, Z. T. Ghafoor, and S. Ahmad, "Usability Evaluation of Mobile Banking Applications in Digital Business as Emerging Economy," *International Journal of Computer Science and Network Security*, vol. 22, no. 1, pp. 250–260, Feb. 2022, doi: 10.22937/IJCSNS.2022.22.2.32.

[8] R. Alexander, N. Thompson, T. McGill, and D. Murray, "The Influence of User Culture on Website Usability," *International Journal of Human-Computer Studies*, vol. 154, p. 102688, Oct. 2021, doi: 10.1016/j.ijhcs.2021.102688.

[9] R. Franz and B. B. Neves, "Usability Is Ageless: Conducting Usability Tests with

SISFORMA: Journal of Information Systems (e-Journal)Vol. 11 | No. 1 |Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

76

Older Adults," in *Ageing and Digital Technology*, B. B. Neves and F. Vetere, Eds., Singapore: Springer Singapore, 2019, pp. 99–114. doi: 10.1007/978-981-13-3693-5_7.

[10] D. Liu, R. G. Bias, M. Lease, and R. Kuipers, "Crowdsourcing for usability testing," *Proc of Assoc for Info*, vol. 49, no. 1, pp. 1–10, Jan. 2012, doi: 10.1002/meet.14504901100.

[11] A. Fatmawati, "Evaluasi Usability pada Learning Management System OpenLearning Menggunakan System Usability Scale," *Jurnal Inovtek Polbeng Seri Informatika*, vol. 6, no. 1, pp. 120–134, 2021.

SISFORMA: Journal of Information Systems (e-Journal) Vol. 11 | No. 1 | Th. 2024
ISSN 2442-7888 (online) DOI 10.24167/Sisforma

77