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Quality Analysis of PeduliLindungi Application using ISO 25010:2011

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Abstract**—** *Indonesia is one of the nation that infected by COVID-19. Various attempts have been made by the government to deal with the spread of this virus. For example is by creating an app called "PeduliLindungi". This app was developed to help government traces the spread of COVID-19. The following study conducts quality test of PeduliLindungi by utilizing ISO 25010:2011. Testing process includes 6 characteristics and 21 sub-characteristics. This study uses Black-Box testing, questionnaire and observation as testing method. Test result shows 4.6 score for Functional Suitability, 5 score for Performance Efficiency and Compatibility, 4 score for Usability, 4.4 score for Security, and 4.5 score for Portability. Total assessment of PeduliLindungi shows score of 4.58 out of 5.*

Keywords**—** *Quality Analysis; PeduliLindungi; ISO 25010*.

I. INTRODUCTION

Coronavirus Disease (COVID-19) pandemic that was occurring in late 2019 causes panic around the globe, including Indonesia. Various attempts have been made by government to deal with the spread of the virus. For example is by creating an app called "PeduliLindungi". This app was developed to help government to trace the spread of COVID-19. PeduliLindungi relies on public participation by sharing their location when they are travelling so their interaction history with the person who get infected by COVID-19 can be tracked. By using PeduliLindungi, users will receive a notification when they are in a crowded place or in the Red zone, an area with the most Covid-19 infection or Patient under Surveillance.

PeduliLindung was created to help with the COVID-19's prevention in Indonesia. However, problems appear such as user's privacy which make public questioning about the app's security. Furthermore, there is a rumor that 230.000 test data has been sold at RaidForum [1]. Although Ministry of Communication and Information provided information on handling this incident by cooperating with the National Cyber and Cryptography Agency (BSSN) to evaluate the data center. public still afraid to send their personal information to PeduliLindungi despite it was also initiated by Ministry of Communication and Information.

Software or application testing standard is varies, among them are McCall's quality model, Boehm's quality model, or International Organization for Standardization (ISO) model such as 9126-1, 25010:2011 [2], and many more. ISO 25010:2011's model includes all previous quality factor model such as McCall, Boehm, and 9126-1 [3]. Thus, this model can be used as base model for software quality testing [4].

This study utilizes ISO 25010:2011 as base model for quality testing of PeduliLindungi app. The test utilizes six of eight characteristics and twenty one of thirty one sub-characteristics in ISO 25010:2011. This study uses Blackbox testing, questionnaire and observation as testing method. In order to validate questionnaire's Validity and Reliabiliy, author uses "SPSS" as supporting software which is used on this study.

II. LITERATURE REVIEW

Several studies discuss the analysis of application or software quality. Among them are Halodoc app analysis study [5]. The following study tested Halodoc's quality by covering eight characteristics and twenty nine sub-characteristics. This research used Blackbox testing, Stress testing, and by handing questionnaires to 100 respondents as testing method. Halodoc got total score 4.515 out of 5. Another study about app's quality are PeduliLindungi's Usability analysis based on Nielsen's model. In this study, factors that affect the quality of app's usability are Learnability, Memorability, Efficiency, Errors, and User's Satisfaction. Overall, PeduliLindungi's Usability are good enough and can provide information that meet user's expectation.

Another study was a test on android app by testing two characteristics, Compatibility and Performance Efficiency by utilizing ISO 25010 model [6]. The following study utilized Research and Development (R&D) method with ADDIE development model which produce high quality analog electronics learning media app. Data gathering conducted by only utilizing cloud testing and direct testing, not the rest characteristic such as Functional Suitability. Usability, and other characteristics which was a drawback on this study.

Study of Information System Management measurement utilizing ISO 25010 by using Black-box and USE Questionnaire that tested 2 characteristics, Functional Suitability and Usability [7]. The Functional Suitability test involved 5 respondents, while Usability test involved 17 respondents. The drawback of this study is lack of respondents.

Study of Website quality measurement as research subject that testing 5 characteristics by utilizing PIECES method [8]. This method consist of 6 characteristics that tested by handing questionnaire to 20 respondents. The drawback of this study is lack of respondents.

There is a study of Academic Information System quality measurement by utilizing ISO 25010 method [9]. by using the same subject, there's another study which done the measurement by using McCall method [10], [11]. These studies was conducted by handing questionnaire to several respondents. However, McCall's doesn't take software functionality into consideration as application functionality which becomes a flaw in this model.

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Completing the research of PeduliLindungi's Usability analysis [12], and by how many of characteristic varieties in ISO 25010:2011, author's analysis toward PeduliLindungi's app quality uses ISO 25010:2011 by using 6 characteristics and 21 sub-characteristics.

III. Research Methodology

"Analysis PeduliLindungi App's Quality Using ISO 25010:2011" is a quantitative research. Quantitative research according to [15] is a research to analyze a population or specific sample. Data or sample collection carried out by using research instrument and statistical data analysis. The flow of conducted research included:

A. Literature Review

In this phase, literature review was carried out which studied several scientific paper which related to app quality analysis measurement and other study.

B. Method Selection and Characteristic

The utilized ISO 25010:2011 consist of six characteristics such as Functional Suitability, Performance Efficiency, Compatibility, Usability, Security, and Portability [13][14]. Detail of characteristics and sub-characteristics that utilized was shown in Table 3.1.

TABLE 3.1. Characteristics and Sub-Characteristics of ISO 25010:2011

No	Characteristic	Sub-Characteristic
1	Functional Suitability	Functional Completeness
		Functional Correctness
		Functional Appropriateness
2	Performance Efficiency	Time Behaviour
		Resource Utilization
		Capacity
3	Compatibility	Co-Existence
		Interoperability
4	Usability	Appropriateness Recognisability
		Learnability
		Operability
		User Error Protection
		User Interface Aesthetics
		Accessibility
5	Security	Confidentiality
		Integrity
		Non-repudiation
		Accountability
		Authenticity
6	Portability	Adaptability
		Installability

Other two characteristics and nine sub-characteristics (Reliability and Maintainability Characteristic) on ISO 25010:2011 model were excluded since those characteristics require related company permission while this research only use public data. On the other side, Replaceability Sub-Characteristic can't be tested as there's no similar app or software as PeduliLindungi app.

C. Data Collecting

On the data collecting phase, direct observation was carried out on PeduliLindungi app, and by handing questionnaire to some app users using google form.

This questionnaire distribution carried out handing 21 questions that include multiple choices. The respondent was asked to choose an answer which the respondent most considered in accordance with their opinion. In order to obtain each sub-characteristic score, the questions are based on Likert Scale (1 to 5 scale), with each response specify level of agreement typically in five points as the following table:

TABLE 3.2. Likert Scale

Answer	Score
Strongly Disagree (SD)	1
Disagree (D)	2
Neither Agree or Disagree (N)	3
Agree (A)	4
Strongly Agree (SA)	5

D. Scoring and Data Analysis

Based on collected data, scores from each characteristic was counted. The following analysis utilized SPSS tools to perform validation and reliability testing on the questionnaire result.

Test result then calculated until the final index from each characteristic is collected. The final index formula was shown in formula 3.1.

$$I = \frac{Total}{highest\ score x N x number\ of\ questions} x100 \qquad (3.1)$$

Which I stands for final index score. Total stands for a sum of weight. N stands for correspondent number. Highest score is 5.

E. Result

After analyzing and collecting the result of every characteristics, a conclusion could be drawn completely from this study. After making conclusion, suggestion and review can be made for PeduliLindungi app based on the application quality test result by utilizing ISO 25010:2011. The recommendation given was based on the smallest score of test result, so that the developer can find out the shortcomings of the PeduliLindung application.

IV. Result and Discussion

A. Functional Suitability, Performance Efficiency and Compatibility Testing

The test conducted by using total 46 test case specified scenario shown in table 4.1.

TABLE 4.1. Total Score Functional Suitability Characteristic

Sub-Characteristic	Testing Step
Functional Completeness	User download PeduliLindungi app on apps store or playstore
	Test Case 1 done successfully. Action : User open the app.
	Test Case 2 done successfully. Action : User Login on the app.
	Test Case 3 done successfully. Action : User open the main page.
	Test Case 4 done successfully. Action : User open the Account Menu.
	Test Case 5 done successfully. *Action* : User open Notification Menu.
	Test Case 6 done successfully.

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Sub-Characteristic	Testing Step
	Action : User open Scan QR Code Menu.
	Test Case 7 done successfully. *Action* : User open Vaccine Certificate Menu.
	Test Case 8 done successfully. Action : User open Covid-19 Test Result Menu.
	Test Case 9 done successfully. Action : User open EHAC Menu.
	Test Case 10 done successfully. Action : User open Travel Regulation Menu.
	Test Case 11 done successfully. Action : User open Telemedicine Menu.
	Test Case 12 done successfully. Action : User open Healthcare Facility Menu.
	Test Case 13 done successfully. Action : User open Covid-19 Statistic Menu.
	Test Case 14 done successfully. Action : User open Get Vaccine Menu
Functional Correctness	Test Case 15 done successfully. *Action* : User conduct Scan QR Code to *check in* and *check out* in public space.
	Test Case 16 done successfully. *Action* : User see vaccine certificate result on Vaccine Certificate menu.
	Test Case 17 done successfully. *Action* : User see Covid-19 result on Covid-19 Test Result Menu.
	Test Case 18 done successfully. *Action* : Users create e-HAC when going on a long trip.
	Test Case 19 done successfully. *Action* : User see e-HAC's result.
	Test Case 20 done successfully. *Action* : User see information about traveling regulation.
	Test Case 21 done successfully. *Action* : User see PCR antigen test list or other health facilities.
	Test Case 22 done successfully. *Action* : User see Covid-19 case statistic data on nearby location.
	Test Case 23 done successfully. *Action* : User signed in for vaccination.
Functional Appropriateness	Test Case 24 done successfully. Action : User find out number of visitors in some public area.
	Test Case 25 done successfully. Action : User download vaccine certificate.
	Test Case 26 done successfully. Action : User adjust certificate format according to overseas certificate.
	Test Case 27 done successfully. Action : User download overseas format certificate.
	Test Case 28 done successfully. Action : User see various location in Indonesia to find out how safe the location.
	Test Case 29 done successfully. Action : User signed in for vaccine according to the specific time and location.
Resource Utilization	Test Case 30 done successfully. Action : User open device setting menu and find out how much app's RAM consumption.
Capacity	Test Case 31 done successfully. Action : User open device setting menu
	and find out PeduliLindungi app's size.
Co-existence dan Interoperability	Test Case 32 done successfully. Action : User enter PeduliLindungi app through Grab app.
	Test Case 33 done successfully Action : user open PeduliLindungi app through Tokopedia app.
	Test Case 34 done successfully Action : User open PeduliLindungi app through Traveloka app.
	Test Case 35 done successfully Action : User enter PeduliLindungi app through Tiket.com app.
	Test Case 36 done successfully Action : User open PeduliLindungi app through DANA app.
	Test Case 37 done successfully Action : User open PeduliLindungi app through LinkAja app.
	Test Case 38 done successfully Action : User open PeduliLindungi app through Jaki app.
	Test Case 39 done successfully Action : User open PeduliLindungi app through SHOPEE app.
	Test Case 40 done successfully Action : User open PRIXA through PeduliLindungi.
	Test Case 41 done successfully Action : User open Grab Health through PeduliLindung.
	Test Case 42 done successfully Action : User open Halodoc through PeduliLindungi app.
	Test Case 43 done successfully Action : User open Prosehat app through PeduliLindungi app.
	Test Case 44 done successfully Action : User open Telkomedika app through PeduliLindungi app.
	Test Case 45 done successfully Action : User open Alodokter app through PeduliLindungi app.

Time Behaviour sub-characteristic tested by counting testcase per second as table 4.1.

Based on test result, obtained values shown on table 4.2.

TABLE 4.2. Total Score

No	Sub-Characteristic	Score
1	Functional Completeness	5
2	Functional Correctness	5
3	Functional Appropriateness	4
4	Time Behaviour	5
5	Resource Utilization	5
6	Capacity	5
7	Co-existence	5
8	Interoperability	

B. Usability and Portability Test

The following tests were done by handing out questionnaire with 21 questions to the 156 users of PeduliLindungi app as respondents. The handing out of the questionnaire was done using google form to ease the data collection process.

After the 156 respondents were acquired, validity and

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reliability tests were done as following:

Discovered that the total data (n) is 156. Then, df (Degree of freedom) is 154, which is data decreased by 2. With α equals to 0.05, r of the table was found to be 0.1572 according to the r table of df and α also with two sided (two tailed) test.

Table 4.3 shows the questionnaire validity test from PeduliLindungi app gained from the comparison of r count and r table calculation.

TABLE 4.3. Validity Test Result

Variables	Item	r Count	r Table	Notes
Usability				
Appropriateness Recognisability	X11	0,608	0.1572	Valid
	X12	0,637	0.1572	Valid
Learnability	X21	0,609	0.1572	Valid
	X22	0,761	0.1572	Valid
	X23	0,669	0.1572	Valid
Operability	X31	0,631	0.1572	Valid
	X32	0,670	0.1572	Valid
	X33	0,650	0.1572	Valid
User Error Protection	X41	0,598	0.1572	Valid
	X42	0,657	0.1572	Valid
User Interface Aesthetics	X51	0,800	0.1572	Valid
	X52	0,716	0.1572	Valid
	X53	0,734	0.1572	Valid
	X54	0,676	0.1572	Valid
Accessibility	X61	0,714	0.1572	Valid
	X62	0,708	0.1572	Valid
	X63	0,499	0.1572	Valid
	X64	0,787	0.1572	Valid
	X65	0,821	0.1572	Valid
Portability				
Adaptability	X71	0,598	0.1572	Valid
Installability	X81	0,588	0.1572	Valid

Based on the validity test on the main questionnaire of Usability and Portability of PeduliLindungi App on the Table 4.3, it was shown that the output value of r Count was bigger than r Table (r Count > r Table), which indicated that every question items on the questionnaire was valid.

Table 4.4 was test resul gained from the reliability test on the main questionnaire of Usability and Probability characteristics of PeduliLindungi app using SPS23 software.

TABLE 4.4. Reliability Test Result

Case Processing Summary			
		N	%
Cases	Valid	156	100.0
	Excluded[a]	0	.0
	Total	156	100.0

Reliability Statistics	
Cronbach's Alpha	N of Items
.938	21

The result obtained based on Table 4.4 indicated that Cronbach's alpha value was bigger than 0.6 (α > 0.6), therefore all of the variables could be declared as reliable or trustable. Furthermore, every variables have Cronbach's alpha value bigger than 0.8 (α > 0.8) therefore all of the variables could be declared as very reliable.

The variable used was Appropriateness Recognizability as X1, Learnability as X2, Operability as X3, User Error Protection as X4, User Interface Aesthetics as X5, Accessibility as X6, Adaptability as X7, and Installability as X8. The questionnaire test result based on the eight variables was as shown in the Table 4.5.

TABLE 4.5. Questionnaire Test Result

Notes	Weight	Total Weighted Result							
		X1	X2	X3	X4	X5	X6	X7	X8
SD	1	8	15	15	11	19	34	6	0
D	2	74	64	52	70	58	134	20	4
N	3	237	300	330	312	330	444	129	27
A	4	544	884	772	452	1064	1380	248	276
SA	5	260	500	620	245	1000	930	175	380
Total		1123	1763	1789	1090	2471	2922	578	687

Total weighted result was the result obtained based on the sum total of the response for all of the questions and each of the criteria times weight score. After calculation of weighted result and total, the next step was to calculate it against the last index score with Formula 3.1. Then, the score obtained as shown in the following Table 4.6.

TABLE 4.6. Total Score of Usability and Portability Characteristics

No	Sub-characteristics	Total Score	Score
1	Appropriateness Recognizability	71,98 %	4
2	Learnability	75,34 %	4
3	Operability	76,45 %	4
4	User Error Protection	69,87 %	4
5	User Interface Aesthetics	79,2 %	4
6	Accessibility	74,92 %	4
Total Usability		**74,63 %**	**4**
7	Adaptability	74,1 %	4
8	Installability	88,07 %	5
Total Portability		**81,08 %**	**4,5**

C. *Security Characteristics Test*

This study used 5 sub-characteristics on Security to test PeduliLindungi app: Confidentiality, Integrity, Non-repudiation, Accountability and Authenticity. This test was done with several observation tests.

Based on the test result, the score obtained shows in Table 4.7 as following.

TABLE 4.7. Security Characteristics Total Score

No	Sub-characteristics	Score
1	Confidentiality	5
2	Integrity	5
3	Non-Repudiation	3
4	Accountability	5
5	Authenticity	4
Total		4,4

V. CONCLUSION AND RECOMMENDATION

A. *Conclusion*

Quality Analysis of PeduliLindungi App using ISO 25010:2011 model has been successfully done. Based on the tests that was done, there are several conclusions that could be drawn:

1. The result of the valuation and testing on each sub-characteristics by using blackbox testing, questionnaire and observation was that PeduliLindungi obtained 4.58 as app's score with "Very Good" category.
2. Quality level based on 6 characteristics and 21 sub-

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characteristics based on ISO 25010:2011 model shown in the following table 5.1:

TABLE 5.1. Total Score Result of Quality Analysis Test on PeduliLindugi App

No	Characteristics	Sub-Characteristics	Score	Total Score
1	Functional Suitability	Functional Completeness	5	4,6
		Functional Correctness	5	
		Functional Appropriateness	4	
2	Performance Efficiency	Time Behaviour	5	5
		Resource Utilization	5	
		Capacity	5	
3	Compatibility	Co-Existence	5	5
		Interoperability		
4	Usability	Appropriateness Recognizability	4	4
		Learnability	4	
		Operability	4	
		User Error Protection	4	
		User Interface Aesthetics	4	
		Accessibility	4	
5	Security	Confidentiality	5	4,4
		Integrity	5	
		Non-repudiation	3	
		Accountability	5	
		Authenticity	4	
6	Portability	Adaptability	4	4,5
		Installability	5	
TOTAL				4,58

B. *Recommendation*

Further research of quality analysis on PeduliLindungi app could be carried out with other various test tools. The quality analysis of PeduliLindungi app should also be done with another two characteristics, which are maintainability and reliability. The reason of doing so was to gain a better result to improve the quality of PeduliLindungi app.

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