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Usability Analysis of Social Welfare Information System Next Generation Using McCall Method in Langkat District Social Service

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Abstract:- In meeting the basic needs of each citizen, the district/city local government is required to record the DTKS. In conducting DTKS data collection, Langkat District Social Service began to actively conduct data collection by implementing the SIKS-NG application in 2018. The application of SIK-NG is not only done in the Social Service environment but also applied in the village and urban village environment. This study aims to analyze offline-based SIKS-NG applications to determine the level of user satisfaction in operating SIKS-NG. The method applied to this study is the McCall method using usability factors that use measurements of operability metrics and training metrics. The results showed that the results of measurement of SIKS-NG quality offline version 2.5.0 obtained usability category "Good" with a score of 74% with standard deviation ± 0,745 for metric operability and the result of training metric obtained an average time of ± 404 seconds with standard deviation ± 538,900 seconds or equivalent to ± 7 minutes with standard deviation ± 8,982 minutes.

Keywords:- *SIKS-NG, McCall Quality Model, Usability, Operability Metric, Training Metric.*

I. INTORDUCTION

Social Service Langkat Regency of North Sumatra province is one of the local government agencies that have the task to carry out government affairs in the social field. Since 2018, social welfare integrated data collection activities conducted by the Social Service of Langkat Regency have implemented an information system used to process integrated data, namely the Next Generation Social Welfare Information System or familiarly known as SIKS-NG (Sistem Informasi Kesejahteraan Sosial Next Generation).

The application of SIKS-NG is not only applied in the Social Service environment but also applied in the village / urban village office environment to help accelerate data updates at the village / urban village level. The type of application applied in the environment in the Social Service of Langkat Regency is an online-based SIKS-NG operated by social service data operators, while for villages / urban villages using offline-based SIKS-NG operated by village / urban village operators.

Through innovations created by Pusdatin Kesos Kemensos, the implementation of integrated data collection of social welfare is now inseparable from the active role performed by all SIKS-NG operators. Therefore, through the initial survey that has been conducted by researchers on village / urban village operators, there are still some problems in the use of SIKS-NG application, among others 56% of village / urban village operators still find it complicated to use the application, 76% of village / urban village operators still find it difficult to get used to errors, 81% of village / urban village operators still need assistance handling from district operators in case of errors, and 70% of village / urban village operators still need to get used to it when operating an offline-based SIKS-NG application.

From the above problems, it is necessary to measure the quality of the software to know the level of user satisfaction in the offline-based SIKS-NG application. One of the quality models of software that can provide measurements between users and software is the McCall quality model. McCall's quality model is one of the most recognizable quality models in software engineering literature [1]. McCall model has software quality factor consisting of 11 factors grouped into 3 product quality categories/perspectives, namely product operation (correctness, reliability, efficiency, integrity, usability), product revision (maintainability, flexibility, testability), and product transition (portability, reusability, interoperability) and 23 quality criteria [2].

The McCall method has been widely used in research to measure usability factors as well as various other factors in measuring the quality of the software. Firna (2020), analyzing and testing the quality of Sulaman Mayang Information System software in Sulaman Mayang Industry, obtained the category "Good" on usability factor with a percentage value of 62% [3]. Research conducted by Christina et al. (2019) conducted an analysis and tested the quality of SIATA at the Bandung State Polytechnic, obtained the category "Good Enough" on the usability factor with a percentage value of 58.8% [4]. Another study conducted by Ahmad et al. (2018) conducted a software quality analysis of Bonus System at PT Surya Pratama Alam Yogyakarta, obtained a usability percentage of 74.72%, which belongs to the category of "Good" [5].

Therefore, this study aims to measure the quality of offline-based SIKS-NG applications by using McCall quality models on the usability factor to measure the level at which a product can be used by a particular user in order to achieve its goals.

II. RESEARCH METHOD

The stages of this study are problem definition, preliminary study, research instrument design, usability data testing and collection, and analysis of test results.

A. Defining Problems

The definition stage of a problem is the stage in finding a problem to describe or solve. Problem definition is done by conducting observations, interviews, and e-questionnaires. Observation is done by observing and understanding the implementation or use of offline-based SIKS-NG applications directly. Interviews are conducted with several stakeholders who are related to the object of the research. Meanwhile, the distribution of e-questionnaires was conducted to village / urban village operators in Langkat district.

B. Preliminary Studies

A preliminary study is a stage in understanding and collecting the data needed in research. This stage is done with 2 study models, namely library studies and research object studies. Library studies were conducted to understand theories relating to McCall's quality model.

C. Design of Research Instruments

Before the researchers collected usability data, the researchers made an instrument design in the form of questionnaires that will be distributed to village / urban village operators who include samples as users of SIKSNG applications offline. The research questionnaire was conducted referring to J.R. Lewis's usability questionnaire (1995) [6], which will be used for operability metrics.

While the questionnaire for training metric testing can be seen in Table I, where the preparation of the questionnaire based on the features in the SIKS-NG application is based offline version 2.5.0.

Table I. Training Questionnaire

No.	Activity Scenario	
	SIKS-NG Features	Menu Code
1.	Perbaikan Data	M2.1
2.	Pengusulan Data Baru	M2.2
3.	Cetak Prelist	M2.3
4.	Download Template MusDes	M2.4
5.	Ekspor Data	M2.5
6.	Perbaikan Data	M3.1
7.	Pengusulan Data Baru	M3.2
8.	Cetak Prelist	M3.3
9.	Download Template MusDes	M3.4
10.	Ekspor Data	M3.5
11.	Upload Berita Acara MusDes	M4
12.	Ubah Kata Kunci	M5
13.	Data Pengguna	M8

D. Testing and Collection of Usability Data

The initial stage of testing and collecting usability data is grouping cluster sampling. After that, the test was conducted by disseminating questionnaires as a research instrument to collect data from village / urban village operators located in Langkat district. The operator will fill out a questionnaire that is shared based on his/her experience in operating the SIKS-NG application offline. The operability questionnaire used a Likert scale.

Table II. Likert Scale

Scoring Scale	Information	Acronym
1	Sangat Tidak Setuju	STS
2	Tidak Setuju	TS
3	Netral	N
4	Setuju	S
5	Sangat Setuju	SS

E. Analysis of Test Results

Analysis of test results is a stage to perform data processing covering all aspects of the usability analysis of the McCall model. The analysis was conducted on two attributes of quality criteria in the usability factor, namely operability and training to determine the results and draw conclusions in this study. The formula used to measure software quality factors can be seen in Equation 1.

$$Fq = c1 \times m1 + c2 \times m2 + \cdots + cn \times mn \quad (1)$$

Information:
Fq = Total value of quality factor
mn = Weight on Scale
mn = Metrics affecting quality factors

The metric formula of operability and training used in the measurement of usability factors can be seen as follows:

1) Operability metrics, the formula used can be seen in Equation 2 below:

$$Operability = \frac{\sum skor}{\sum pernyataan \times \sum responden \times \sum skala\ likert} \times 100\% \quad (2)$$

2) Training metrics, the formula used can be seen in Equation 3 below:

$$Training = \frac{(\sum W \div \sum R)1 + (\sum W \div \sum R)2 + \ldots + (\sum W \div \sum R)n}{\sum pernyataan} \quad (3)$$

Information:
$\sum W$ = Amount of time required
$\sum R$ = Number of respondents

While the interpretation of the score for percentage interval can be seen in Table III.

Table III. Percentage Interval Value

Categories	Percentage
Sangat Baik	81% - 100%
Baik	61% - 80%
Cukup	41% - 60%
Tidak Baik	21% - 40%

Sangat Tidak Baik	<21%

F. Analysis Results

The results of the analysis will provide the results and conclusions of the tests that have been conducted on the attributes of the usability factor to the application SIKS-NG based offline.

III. LITERATURE STUDY

The literature study contains references used as references in this study that are sourced from previous research and materials related to the SIKS-NG application.

A. SIKS-NG Application

Based on the Ministerial Regulation of Social RI Number 28 of 2017 Article 1, Paragraph 8 defines the Next Generation Social Welfare Information System or abbreviated as SIKS-NG, is an information system consisting of several components in the form of collection and processing of social welfare data by utilizing information and communication technology implemented in stages and continuously.

Another definition, according to the Ministerial Regulation of Social RI Number 5 of 2019 Article 1 Paragraph 12, defines it as an information system that supports the integrated data processing process of social welfare. SIKS-NG application was developed by the Data and Information Center of the Ministry of Social Affairs in 2017.

SIKS-NG application is released with two types of platforms, namely offline-based SIKS-NG that can be used and distributed from the district level to the village / urban village level, and online-based SIKS-NG can only be accessed by district/city social service officers. The focus of the SIKS-NG application type in this study is offline-based SIKS-NG application with the scope of operation located in Langkat Regency.

B. Software Quality Model

A software quality model is a model used in determining the components involved in an assessment to assess the operation of software [7].

According to Habib and Aamir (2013), software quality models are a set of factors, and they are based on a set of different criteria for demonstrating the attributes that make software work properly [8].

C. Software Quality Factors

Software quality factors are factors in the software quality model used as an indicator of software quality measurement. In the final technical report factor in software quality volume I prepared by J. McCall (1977) explained there are 55 candidates software quality factors taken from some literature and then the software quality factors are normalized where the factors chosen as the name of the group are selected because they are the most descriptive, or if there is a hierarchical relationship in the group, then the higher members are chosen, then the evaluation and analysis of grouping factors into three software activities namely product operation, product revision, and product transition [9].

D. McCall Quality Model

McCall is one of the quality model software that can be used to perform software quality measurement. McCall quality model or also known as General Electrics Model 1977, was first presented by Jim McCall et al.

The McCall quality model has a structure consisting of three main perspectives for determining and identifying the quality of software products [1]. Each perspective has quality attributes defined as a hierarchy of user-oriented quality factors, software-oriented quality criteria, and quality metrics [10].

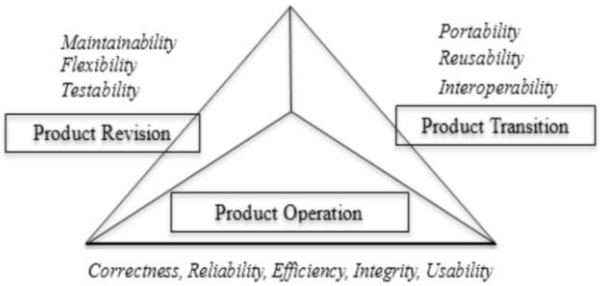

Fig. 1. McCall Quality Model

E. McCall Metrics

Simply put, metrics are defined as indicators of progress towards good quality. The metric, according to McCall (1977), is a quantitative measure of software attributes related to quality factors where the steps may be objective or subjective [11]. Another definition is the number of detailed requirements tracked divided by the total number of requirements detailed. On the McCall quality model, there are 41 metrics that have been set for 11 factors and 23 criteria.

F. Usability Definition

The usability attribute is one of the important factors in the quality of software products [12] [13] as well as one of the best factors that can balance technical and human aspects [14].

Usability can be defined as the extent to which a product or service is able to guarantee maximum satisfaction, efficiency, and effectiveness when used by different types of users [15]. Another explanation of usability is the study of the intersection between the system and the user, tasks, and expectations in the context of use [16].

Jim McCall (1977) defines it as a necessary effort to study, operate, prepare inputs, and interpret the output of a program [11].

IV. RESULT AND CONCLUSION

A. Grouping Sample by Cluster

In this study, samples obtained through Slovin's formula with an MoE percentage of 10% amounted to 73 representatives from the total population of 277. The number

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of samples obtained is grouped by the cluster, as seen in the bar graph in Figure 2.

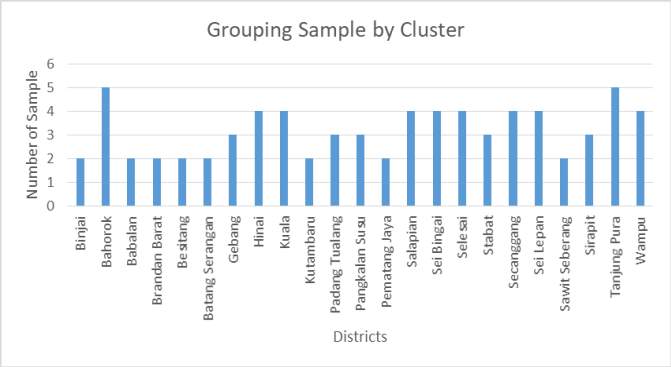

Fig. 2. Grouping Sample by Cluster

B. Operability Metric Data

Data on operability metrics obtained through disseminating e-questionnaire operability against 73 respondents using the J. R. Lewis questionnaire and using an assessment scale with the type of Likert scale can be seen in Table IV.

Table IV. Recapitulation of Operability Questionnaire

Question	Scoring Scale					Amount
	SS	S	N	TS	STS	
Q1	10	44	16	3	0	73
Q2	9	37	21	6	0	73
Q3	5	44	20	4	0	73
Q4	6	35	28	4	0	73
Q5	9	34	25	5	0	73
Q6	9	37	24	3	0	73
Q7	12	37	19	5	0	73
Q8	7	41	22	3	0	73
Q9	12	36	19	6	0	73
Q10	10	33	24	6	0	73
Q11	5	45	21	1	1	73
Q12	9	46	16	1	1	73
Q13	9	42	21	0	1	73
Q14	8	40	24	0	1	73
Q15	11	42	19	0	1	73
Q16	7	42	21	2	1	73
Q17	6	34	32	0	1	73
Q18	9	30	30	3	1	73
Q19	9	38	22	3	1	73
Total	162	737	424	55	9	1387

Based on the data obtained from the e-questionnaire operability in Table III, then calculate each category of Likert scale presented in Table V.

Table V. Likert Scale Calculation Results

Categories	Acronym	Scoring Scale	Category Score	Amount
Sangat Setuju	SS	5	162	810
Setuju	S	4	737	2948
Netral	N	3	424	1272
Tidak Setuju	TS	2	55	110
Sangat Tidak Setuju	STS	1	9	9
Total Score				5149

C. Descriptive Statistics of Operability Metrics

A summary of the data obtained from the operability metric can be seen in the descriptive statistical image of the operability metric presented in Figure 3, where quantitatively, these descriptive statistic provides an overview or summarizes from the data collection of operability metrics.

Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
P1	73	3	2	5	280	3.84	.083	.707	.500
P2	73	3	2	5	268	3.67	.094	.800	.640
P3	73	3	2	5	269	3.68	.080	.685	.469
P4	73	3	2	5	262	3.59	.085	.723	.523
P5	73	3	2	5	266	3.64	.092	.788	.621
P6	73	3	2	5	271	3.71	.086	.736	.541
P7	73	3	2	5	275	3.77	.095	.808	.653
P8	73	3	2	5	271	3.71	.082	.697	.486
P9	73	3	2	5	273	3.74	.098	.834	.695
P10	73	3	2	5	266	3.64	.096	.823	.677
P11	73	4	1	5	271	3.71	.079	.677	.458
P12	73	4	1	5	280	3.84	.083	.707	.500
P13	73	4	1	5	277	3.79	.083	.706	.499
P14	73	4	1	5	273	3.74	.083	.708	.501
P15	73	4	1	5	281	3.85	.084	.720	.519
P16	73	4	1	5	271	3.71	.086	.736	.541
P17	73	4	1	5	263	3.60	.082	.702	.493
P18	73	4	1	5	262	3.59	.095	.814	.662
P19	73	4	1	5	270	3.70	.093	.794	.630
Valid N (listwise)	73								

Fig. 3. Descriptive Statistics of Operability Metrics

D. Training Metric Data

Metric training data was obtained by disseminating e-training questionnaires to 73 respondents by referring to the features in the SIKS-NG application offline version 2.5.0. In training metric testing, the unit of time used to fill out the training e-questionnaire is seconds. The recapitulation of training metric data will also be converted into minutes that can be seen in Table VI.

Table VI. Training Questionnaire Recapitulation

No.	SIKS-NG Features	Amount of Time		Average	
		Seconds	Minutes	Seconds	Minutes
1.	M2.1	32144	536	440,3	7,3
2.	M2.2	44875	748	614,7	10,2
3.	M2.3	27428	457	375,7	6,3
4.	M2.4	14825	247	203,1	3,4
5.	M2.5	32130	536	440,1	7,3
6.	M3.1	35228	587	482,6	8
7.	M3.2	48296	805	661,6	11
8.	M3.3	26998	450	369,8	6,2
9.	M3.4	16674	278	228,4	3,8
10.	M3.5	36895	615	505,4	8,4
11.	M4	24179	403	331,2	5,5
12.	M5	21279	355	291,5	4,9
13.	M8	22873	381	313,3	5,2
Total Time		383824	6398	5257,9	87,5

E. Descriptive Statistics of Training Metrics

A summary of the data obtained from training metrics can be seen in the descriptive statistics of training metrics presented in Figure 4, where quantitatively, these descriptive statistics provide an overview or summarize from the

collection of information resulting from the acquisition of training metric data.

Descriptive Statistics

	N Statistic	Range Statistic	Minimum Statistic	Maximum Statistic	Sum Statistic	Mean Statistic	Mean Std. Error	Std. Deviation Statistic	Variance Statistic
T1	73	1770	30	1800	32144	440.33	54.066	461.942	213390.529
T2	73	3570	30	3600	44875	614.73	79.999	683.509	467184.646
T3	73	3597	3	3600	27428	375.73	63.279	540.652	292304.452
T4	73	1785	15	1800	14825	203.08	31.619	270.156	72984.465
T5	73	2390	10	2400	32130	440.14	55.391	473.264	223978.453
T6	73	3570	30	3600	35228	482.58	77.973	666.202	443824.970
T7	73	3570	30	3600	48296	661.59	101.525	867.427	752429.468
T8	73	2997	3	3000	26998	369.84	54.468	465.374	216573.084
T9	73	1785	15	1800	16674	228.41	34.275	292.844	85757.662
T10	73	3580	20	3600	36895	505.41	83.946	717.233	514423.440
T11	73	3590	10	3600	24179	331.22	72.069	615.757	379156.979
T12	73	3570	30	3600	21279	291.49	54.198	463.066	214430.392
T13	73	3599	1	3600	22873	313.33	57.148	488.270	238407.446
Valid N (listwise)	73								

Fig. 4. Descriptive Statistics of Training Metrics

F. Operability Metric Test Results

From the results of the e-questionnaire operability data that has been done, further tests of operability metrics based on the data that have been presented in Table IV using Equation 2 as follows:

$$Operability = \frac{5149}{19 \times 73 \times 5} \times 100\% = \frac{5149}{6935} \times 100\% = 74\%$$

From the final results of operability metric testing that has been conducted, the satisfaction level of village / urban village operators when operating the SIKS-NG application offline is 74%, with an average standard deviation of ± 0,745.

G. Training Metric Test Results

The results of the e-questionnaire data acquisition training that has been conducted will then be undertaken training metric testing based on the data that has been presented in Table V using Equation 3 as follows:

$$Training = \frac{5257{,}9}{13} \times 404{,}45 = 404\ seconds$$

Based on the results of training metrics tests that have been conducted against village / urban village operators with SIKS-NG application offline version 2.5.0, the results obtained for the time required by village / urban village operators in operating the SIKS-NG application offline have an average time of ± 404 seconds with an average standard deviation of ± 538,900 seconds.

If the test results of the training metrics are converted into minutes of time, then the results that will be obtained from the metric training test are as follows:

$$Training = \frac{87{,}5}{13} \times 6{,}7 = 7\ minutes$$

From the test results of the training metric above by converting units of time into minutes, the acquisition of time required by village / urban village operators in operating the SIKS-NG application offline has an average time of ± 7 minutes with an average standard deviation of ± 8,982 minutes.

H. Conclusion

Conclusions that can be drawn from the results of testing the quality of SIKS-NG applications offline in Langkat District using the McCall method on the usability factor are as follows:

1) The results showed that the results of measurement of offline SIKS-NG quality on operability metrics obtained a value of 74% with a standard deviation of ± 0,745, whereas the results of this metric operability test obtained the category "Good".
2) The results of training metric tests that have been conducted against 73 village / urban village operators using SIKS-NG application offline version 2.5.0 obtained an average time of ± 404 seconds with a standard deviation of ± 538,900 seconds or equivalent to ± 7 minutes with a standard deviation of ± 8,982 minutes. Based on the results of metric training testing with village / urban village operators obtained the following information:

a) Data obtained from the training e-questionnaire on the "Ubah Kata Kunci" feature obtained test results on the feature obtained a percentage of 52%. This means that 48% of village / urban village operators do not perform the "Ubah Kata Kunci" feature correctly, where they provide a record of time outside of the time limit that should be exceeded to perform the function of the feature to try to re-enter the SIKS-NG application offline by using the new Keywords.
b) In the "Data Pengguna" feature, the data obtained from the training e-questionnaire concludes the test results that there are only 5% of village / urban village operators who know and understand the feature with certainty both in terms of layout and function.

3) From the results of the second test of usability metrics, it can be concluded that offline SIKS-NG applications have usability values that fall under the category of "Good". It's just necessary to do a little review back to the village / urban village operator about the overall features in the SIKS-NG application offline, especially in the features "Ubah Kata Kunci" and "Data Pengguna" so that both features can be known with certainty and can be functionalized as they should be.

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