

Evaluation of Library Information System Quality Using the McCall Method

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Abstract

The Inlis application at the West Sumatra Provincial Archives and Library Service is used to manage the process of borrowing and returning books carried out by each library member. With this library system, it can help librarians to find out the flow of books in and out and the delay in returns made by library members to determine the fines that must be paid by members. Based on this, the author will measure the quality of the Library Information System because in this system the level of system quality is not yet known, so as to identify the accuracy, completeness and quality of the software in the Inlis Application. The measurement method in this study is the McCall Method. The McCall Method is a software testing method that bridges the gap between users and developers that focuses on a number of software quality factors. Software quality can be interpreted as an effective process that is realized in the form of a product that can provide benefits and can be measured. The results of the study based on the McCall Method show that the quality of the Inlis Application is good with a percentage value of 72%, with the best indicator value, namely reliability with a result of 80% and the worst indicator value, namely integrity with a result of 44%.

Keywords: McCall, Inlis Application, Quality Measurement, System, Information,

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1. Introduction

INLISLite is a library information system built and developed officially by the National Library of the Republic of Indonesia. INLISLite version 3 is a further development of the library automation application software INLISLite version 2.1.2 which was built and developed by the National Library of the Republic of Indonesia since 2011. INLISLite version 3 was developed as a one-stop software for library managers to implement library automation while developing digital libraries / managing digital collections [1]. INLISLite is an initiative of the National Library in order to provide supporting facilities to help develop library automation throughout Indonesia, as a digital library tool to manage full text and multimedia collections, assist in the formation of MARC-based electronic catalogs for Indonesia (INDOMARC), implementing national programs mandated to the National Library to collect national collection data in a National Master Catalog (KIN) and Indonesian National Bibliography (BNI) [2].

The INLIS application at the West Sumatra Provincial Archives and Library Service is used to manage the process of borrowing and returning books carried out by each library member. With this library system, it can make it easier for librarians to find out the flow of books in and out and the delay in returning books

made by library members to determine the fines that must be paid by members [3][4].

A system is a collection of objects, ideas, elements, which have inter-related relationships (inter-relation), and influence each other in carrying out joint activities to achieve a goal [5]. Information is data that has been processed into a form that is more useful for the recipient [6][7]. An information system is a collection or set of elements, components or variables that are organized, interact with each other, depend on each other, and are integrated. A system consists of parts or components that are integrated for one purpose [8][9][10].

McCall method is a software testing method that bridges the gap between users and developers that focuses on a number of software quality factors [11][12]. McCall has three interrelated aspects, namely: Product Operation, Product Revision, and Product Transition. Product Operation: Correctness Reliability Usability Integrity Efficiency, Product Transition: Portability Reusability Interoperability and Product Revision: Maintainability Flexibility Testability [13][14].

Previous research on the feasibility test of the Academic Information System is very important to

identify deficiencies and errors in the application. The findings from this testing process can be the basis for improvements to create a more optimal and quality academic information system. Based on the respondents' assessment, the lowest score was 60.9 and the highest score was 77.5. The average overall value given by respondents was 68.02 , which is included in the fairly good category.[15]

Another study conducted at SMK Muhammadiyah 1 Bantul tested the feasibility of the Website-Based School Health Unit Information System using McCall's quality factors. Research data were collected through questionnaires filled out by a number of respondents to assess the feasibility of the software that had been developed. The results of the analysis show that the level of feasibility on the *Correctness* indicator reached 78% and was included in the feasible category. The *Reliability* indicator also obtained a percentage of 78% with the same category . For the *Efficiency* and *Integrity* indicators, each obtained a value of 76%, which was also included in the feasible category. Meanwhile, the *Usability* indicator obtained the highest value with a percentage of 81% and was declared very feasible[16]

Further research discusses the measurement of the quality of the asset inventory information system at the Muhammadiyah University of Bengkulu using the McCall method. From the results of the study, several conclusions were obtained, including: in the quality factor *correctness*, the system obtained a score of 66% which is categorized as good. For the *usability* factor, a value of 58% was obtained and is categorized as quite good. The *integrity* factor showed a result of 42.2 % with a fairly good category, while *reliability* got a value of 49.2% which is also quite good. Meanwhile, in the *efficiency* factor, the system obtained the highest score of 81% and was categorized as very good [17].

The purpose of this study is to determine and improve the quality of the Inlis library information system to determine the extent of the shortcomings and weaknesses of the Inlis Library information system. Software quality testing is a process used to identify the accuracy, completeness and quality of software. The results of this study are expected to be one of the references for managers in developing applications in the future that are more effective and efficient .

2. Research methodology

The research instrument used is a questionnaire which will be given to users using a *Likert scale* (1-5) in table 1, with the quality or weight of the assessment used for each quality factor and the matrix weight in table 2 [8]

Table 1. Likert Scale

Rating Scale	Information
1	Strongly disagree
2	Don't agree
3	Neutral
4	Agree
5	Strongly agree

Table 2. Quality Factor Quality and Matrix

Rating Scale	Information
0.4	Very important
0.3	Important
0.2	Quite important
0.1	Not important

Table 3. Percentage of Quality Factors

Category	Presentation
Very good	81%-100%
Good	61%-80%
Enough	41%-60%
Not good	21%-40%
Very bad	<21%

The stages in calculating quality testing using the McCall method are as follows [9] :

1. Determine the criteria used in measuring quality factors.
2. Determine the weight (w) of each quality factor criteria ($0 \leq w \leq 1$).
3. Determine the criteria assessment scale based on the questionnaire used.
4. Enter the value for each criterion resulting from the respondent's assessment.
5. Calculate the total value.

formula :

$$f\alpha = w_1c_1 + w_2c_2 + \dots + w_nc_n \quad (1)$$

Where

F α : Total value of factor α

w i : Weight for criterion i

c i : value for criterion i

3. Results and Discussion

The next activity is to collect data by distributing questionnaires online . Data obtained from filling out a questionnaire by 51 respondents. Criteria data will be viewed based on a Likert scale derived from the questionnaire data filled out by the respondents.

Table 4. Criteria Values

No	Indicator	Statement	Weight	Criteria Value
1	<i>Correctness</i> (Accuracy) 0.3	a. <i>Completeness</i>		
		1. This application is capable of processing data on borrowing and returning books optimally.	0, 3	3.86
		2. book borrowing and returning features contained in this system are functioning optimally	0, 3	3.69
		b. <i>Consistency (Consistency)</i>		
		3. Features and design of the tab membership has met the needs.	0.2	3.75
		4. The features, form designs and buttons on <i>the back office dashboard</i> already meet the needs.	0.2	3.65
		5. The language used is consistent on each page .	0, 2	3.94
		6. The features, form design and buttons in the report meet the needs.	0.2	3.90
		7. Features and design of the tab borrowing and returning books has met the needs.	0.2	3.84
		c. <i>Traceability (Tracking)</i>		
8. Can track borrowing and returning books .	0.4	3.47		
2	<i>Usability</i> 0.3	d. <i>Communicativeness</i>		
		9. The language used is easy to understand	0, 2	3.75
		10. The writing on each page can be read clearly.	0, 2	3.76
		11. The function of each button is clear and works as it should.	0, 2	3.65
		e. <i>Operability</i>		
		12. The menu options and buttons on the system are easy to use .	0.4	3.84
		13. Users can easily understand the existing book coding system .	0.4	3.57
		14. The application is easy to operate because there are modules.	0.4	3.82
		f. <i>Training</i>		
		15. There is a hint service provided by the system to help new users .	0.4	3.78
16. Availability of a contact menu so that new users can contact the application to get further information.	0.4	3.75		
3	<i>Integrity</i> 0.3	g. <i>Security</i>		
		17. The login process can run correctly and according to expectations.	0.3	3.65
		18. This application can control user access by limiting access rights.	0, 3	3.65
4	<i>Reliability</i> 0.2	h. <i>Accuracy</i>		
		19. Ease of inputting <i>member</i> data.	0, 3	3.76
		20. This application can display book data with user needs precisely according to the keywords searched .	0, 3	3.78
		21. This application provides data and book information that suits the user's needs precisely .	0, 3	3.67
		22. The information from the catalog is accurate and error-free .	0, 3	3.67
		23. Users can obtain information on borrowing the books they need in a timely manner .	0, 3	3.71
		i. <i>Error Tolerance</i>		
		24. Access to applications and data cannot be used by parties who are not authorized to use them.	0.4	3.65
		25. The level of damage to the application is low when the application encounters a system failure.	0.4	3.78

No	Indicator	Statement	Weight	Criteria Value
		j. <i>Simplicity</i> (simplicity)		
		26. The information in the lending feature is easy to understand without any difficulty.	0.3	3.84
		27. The menu on <i>the dashboard</i> can be easily understood without any difficulty .	0.3	3.78
		28. The process of borrowing and returning books is well structured so that it does not affect other processes.	0.3	3.98
		k. <i>Execution Efficiency</i> (Ease of Execution)		
		29. The service menu functions and data are in accordance with needs .	0.3	3.84
5	<i>Efficiency</i> 0.2	30. The function of the services in the system accommodates the delivery of all information about the library.	0.4	3.75

Quality Factor Value

The calculation of each quality factor is done as follows:

a. Correctness

$$\begin{aligned}
 \text{Completeness} &= w_1c_1 + w_2c_2 \\
 &= (0.4 \times 3.86) + (0.4 \times 3.69) \\
 &= 1.16 + 1.11 = 2.27
 \end{aligned}$$

$$\begin{aligned}
 \text{Cosistency} &= w_3c_3 + w_4c_4 + w_5c_5 + w_6c_6 \\
 &\quad + w_7c_7 \\
 &= (0,2 \times 3,75) + (0,2 \times 3,65) \\
 &\quad + (0,2 \times 3,94) + (0,2 \times 3,90) \\
 &\quad + (0,2 \times 3,84) \\
 &= 0,75 + 0,73 + 0,79 + 0,78 \\
 &\quad + 0,77 = 3,8
 \end{aligned}$$

$$\begin{aligned}
 \text{Consistency} &= (w_3c_3 + w_4c_4 + w_5c_5 + w_6c_6 + w_7c_7) \\
 &= (0.2 \times 3.75) + (0.2 \times 3.65) + (0.2 \times 3.94) \\
 &\quad + (0.2 \times 3.90) + (0.2 \times 3.84) = 0.75 + 0.73 + 0.79 + 0.78 + 0.77 = 3.82
 \end{aligned}$$

$$\begin{aligned}
 \text{Traceability} &= (w_8c_8) \\
 &= 0.4 \times 3.47 = 1.39
 \end{aligned}$$

So the value of Fa1 is solved in the following way :

$$\begin{aligned}
 \text{Fa1} &= (\text{Completeness} + \text{Consistency} + \text{Traceability}) / 3 \\
 &= (2.26 + 3.82 + 1.39) / 3 = 2.50
 \end{aligned}$$

From the results obtained from the calculation, the quality factor value is then changed into a percentage using the equation:

$$\begin{aligned}
 \text{Percentage} &= (\text{Value obtained}) / (\text{Maximum Value}) \times 100\% \\
 &= 2.47 / 5 \times 100\% = 55\%
 \end{aligned}$$

b. Usability

$$\begin{aligned}
 \text{Communicativeness} &= (w_1c_1 + w_2c_2 + w_3c_3) \\
 &= (0.4 \times 3.75) + (0.4 \times 3.76) + (0.4 \times 3.65) \\
 &= 0.75 + 0.75 + 0.73 = 2.23
 \end{aligned}$$

$$\text{Operability} = (w_4c_4 + w_5c_5 + w_6c_6)$$

$$\begin{aligned}
 &= (0.4 \times 3.84) + (0.4 \times 3.57) + (0.4 \times 3.82) \\
 &= 1.54 + 1.43 + 1.53 = 4.49
 \end{aligned}$$

$$\begin{aligned}
 \text{Training} &= (w_7c_7 + w_8c_8) \\
 &= (0.4 \times 3.78) + (0.4 \times 3.75) \\
 &= 1.51 + 1.50 = 3.01
 \end{aligned}$$

So the value of Fa2 is solved in the following way :

$$\begin{aligned}
 \text{Fa2} &= (\text{Communicativeness} + \text{Operability} + \text{Training}) / 3 \\
 &= (2.23 + 4.49 + 3.01) / 3 = 2.87
 \end{aligned}$$

From the results obtained from the calculation, the quality factor value is then changed into a percentage using the equation:

$$\begin{aligned}
 \text{Percentage} &= (\text{Value obtained}) / (\text{Maximum Value}) \times 100\% \\
 &= 2.87 / 5 \times 100\% = 57\%
 \end{aligned}$$

c. Integrity

$$\begin{aligned}
 \text{Security} &= (w_1c_1 + w_2c_2) \\
 &= (0.3 \times 3.65) + (0.3 \times 3.65) \\
 &= 1.09 + 1.09 = 2.19
 \end{aligned}$$

So the value of Fa3 is solved in the following way :

$$\begin{aligned}
 \text{Fa3} &= \text{Security} / 1 \\
 &= 2.19 / 1 = 2.19
 \end{aligned}$$

From the results obtained from the calculation, the quality factor value is then changed into a percentage using the equation:

$$\begin{aligned}
 \text{Percentage} &= (\text{Value obtained}) / (\text{Maximum Value}) \times 100\% \\
 &= 2.19 / 5 \times 100\% = 44\%
 \end{aligned}$$

d. Reliability

$$\begin{aligned}
 \text{Accuracy} &= (w_1c_1 + w_2c_2 + w_3c_3 + w_4c_4 + w_5c_5) \\
 &= (0.3 \times 3.76) + (0.3 \times 3.78) + (0.3 \times 3.67) + (0.3 \times 3.67) \\
 &\quad + (0.3 \times 3.71) \\
 &= 1.13 + 1.14 + 1.10 + 1.10 + 1.11 = 5.58
 \end{aligned}$$

$$\begin{aligned}
 \text{Error Tolerance} &= (w_6c_6 + w_7c_7) \\
 &= (0.4 \times 3.65) + (0.4 \times 3.78) \\
 &= 1.46 + 1.51 = 2.97
 \end{aligned}$$

$$\begin{aligned}
 \text{Simplicity} &= (w_8c_8 + w_9c_9 + w_{10}c_{10}) \\
 &= (0.3 \times 3.84) + (0.3 \times 3.78) + (0.4 \times 3.98) \\
 &= 1.15 + 1.14 + 1.19 = 3.48
 \end{aligned}$$

So the value of Fa4 is solved in the following way :

$$Fa4 = (Accuracy + Error\ Tolerance + Simplicity) / 3$$

$$= (5.58 + 2.97 + 3.48) / 3 = 4.01$$

From the results obtained from the calculation, the quality factor value is then changed into a percentage using the equation:

Percentage

$$= (Value\ obtained) / (Maximum\ Value) \times 100\%$$

$$= 4.01 / 5 \times 100\% = 80\%$$

e. Efficiency

$$Execution\ Efficiency = (w1c1) + (w2c2)$$

$$= (0.3 \times 3.84) + (0.4 \times 3.75)$$

$$= 1.15 + 1.50 = 2.65$$

So the value of Fa5 is solved in the following way :

$$Fa5 = (Execution\ Efficiency) / 1$$

$$= 2.65 / 1 = 2.65$$

From the results obtained from the calculation, the quality factor value is then changed into a percentage using the equation:

Percentage

$$= (Value\ obtained) / (Maximum\ Value) \times 100\%$$

$$= 2.65 / 5 \times 100\% = 53\%$$

functional aspect of the questionnaire results obtained from 51 respondents was calculated as a percentage using the following formula equation.

Percentage of Functionality

$$= (Value\ obtained) / (Maximum\ Value) \times 100\%$$

$$\sum = ((0.3 * Fa1) + (0.3 * Fa2) + (0.3 * Fa3) + (0.2 * Fa4) + (0.2 * Fa5)) / (Maximum\ Value) \times 100\%$$

$$= ((0.3 * 2.26) + (0.3 * 2.87) + (0.3 * 2.19) + (0.2 * 4.01) + (0.2 * 2.65)) / 5 \times 100\%$$

$$= (0.75 + 0.86 + 0.66 + 0.80 + 0.53) / 5 \times 100\%$$

$$= 3.60 / 5 \times 100\% = 72\%$$

The percentage results above are then compared with the Likert scale, which is a scale used to measure the attitudes, opinions, and perceptions of a person or group of people about an event. The grouping of the percentage level is according to the eligibility category which can be seen from the data in Table 3. So it can be concluded that the Inlis Application as a whole is at a level between 81% - 100% = 72% and is included in the GOOD category.

System Implementation

Admin Main Menu Page View

The Admin Home Page display is the page that will be displayed first after logging into the quality measurement system with the McCall method. This page contains the menu options that will be used by the admin in running the system.



Figure 1. Admin Main Menu Page View

Final report

This view will display the final calculation report from the McCall calculation process and recommendations.

LAPORAN DATA HASIL				
Diponegoro nmr 4, Belakang Tangsi, Kec. Padang Bar., Kota Padang, Sumatera Barat 25118				
NO.	INDIKATOR	BOBOT INDIKATOR	PERSENTASE	KATEGORI
1	Efficiency	0,2	53%	Cukup Baik
2	Reliability	0,2	80%	Baik
3	Integrity	0,3	44%	Cukup Baik
4	Usability	0,3	57%	Cukup Baik
5	Correctness	0,3	50%	Cukup Baik
Total Akhir			72,00%	Baik

HASIL

Maka dapat disimpulkan bahwa aplikasi inlis pada Dinas Kearsipan dan perpustakaan secara total berada pada level antara 61 % Sampai 80 % dengan nilai persentase 72,00 dan termasuk dalam kategori Baik.

Padang, 01 Juli 2022
Pimpinan

Dinas Kearsipan dan Perpustakaan

Figure 2. Final Report View

4. Conclusion

Based on the research that has been conducted, it can be concluded that the McCall method can be applied and used as a benchmark for evaluating the quality of the Inlis library information system. This method has the most complete and in-depth criteria. The results of the evaluation of the quality of the Inlis library information system using the McCall method based on the product operation aspect are as follows: the value for the correctness quality factor with a value of 55%, usability 57%, Integrity 54%, reliability 80% and efficiency 53%. Overall, based on the product operation category, the Inlis library information system has good quality with a value of 72% .

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