JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

ANALYSIS OF SOFTWARE QUALITY USING THE FURPS+ MODEL

Safriya Murni Puspita[1*], Alvina Waihda Ardhani[1], Dea Ayu Retnaningrum[1], Afreza Restu Firmansyah[1], Dwi Rolliawati[1]
[1]Information System, UIN Sunan Ampel Surabaya
email: *safriyamurni@gmail.com

Abstract: Software quality analysis is essential to ensure applications are reliable, efficient, and meet user needs. The FURPS+ model (Functionality, Usability, Reliability, Performance, Supportability, plus) provides a comprehensive framework for evaluating software quality. This study analyzes the implementation of Software Quality Assurance (SQA) in the SKEK UINSA application, a Learning Management System (LMS) designed to record extracurricular activities of UINSA students. With 100 respondents (lecturers, students, and alumni), the research employs a quantitative approach to examine both functional and non-functional aspects. The results show that functionality and usability aspects scored an average of 71%, reliability 66%, performance 61%, supportability 79%, and additional factors (plus) 64%. Overall, the SKEK UINSA application demonstrates good quality in terms of functionality, ease of use, performance, and flexibility.

Keywords: FURPS+; Reliability; SKEK; Validity; Quantitative Method

Abstrak: Analisis kualitas perangkat lunak penting untuk memastikan aplikasi andal, efisien, dan sesuai kebutuhan pengguna. Model FURPS+ (Functionality, Usability, Reliability, Performance, Supportability, plus) menawarkan kerangka komprehensif untuk evaluasi kualitas perangkat lunak. Penelitian ini menganalisis penerapan Software Quality Assurance (SQA) pada aplikasi SKEK UINSA, aplikasi semacam LMS (Learning Management System) untuk mencatat kegiatan ekstrakurikuler mahasiswa UINSA. Dengan 100 responden (dosen, mahasiswa, dan alumni), penelitian menggunakan pendekatan kuantitatif untuk mengkaji aspek fungsional dan non-fungsional. Hasilnya, aspek functionality dan usability memiliki persentase rata-rata 71%, reliability 66%, performance 61%, supportability 79%, dan faktor tambahan (plus) 64%. Secara keseluruhan, aplikasi SKEK UINSA menunjukkan kualitas baik dalam fungsi, kemudahan penggunaan, kinerja, dan fleksibilitas.

Kata kunci: FURPS+; Metode Kuantitatif ; SKEK; Validitas; Reliabilitas

INTRODUCTION

Digitalization has become essential to streamline business processes across various sectors [1]. One such initiative is the digitalization of student extracurricular activity records through a web-based application called SKEK UINSA. This application is designed to support the administrative management of both internal and external student activities, which are requirements for graduation [2].

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

However, despite being in use since 2014, several issues persist in its implementation. The application is considered insufficiently informative, contains bugs, and lacks effective features, negatively impacting system performance [3]. These issues highlight the importance of evaluating the quality of the SKEK UINSA information system to ensure that the software meets user needs [4]. SQA encompasses testing, validation, verification, and continuous monitoring [5]. One approach to measure Software Quality Assurance is through various models, such as FURPS [6].

Previous studies used as references for the first research conducted by [7] which evaluated software quality using ISO 9126 in the Informatics Engineering Program at UIKA Bogor, where the study found that the software demonstrated high reliability, although its efficiency required improvement.

Secondly, study conducted by [6] analyzed the production process of Mayang Embroidery, revealing the need for quality assessment due to an insufficiently informative application that delayed customer service. Using the McCall method, the study emphasized evaluating correctness, reliability, and usability to enhance the system.

This study aims to evaluate the quality of the SKEK UINSA application using the FURPS+ model, providing a reference for future improvements and system development to address existing deficiencies. [8]. FURPS+ divides software requirements into two categories: operational requirements (inputs and outputs) [9] and non-operational requirements, which include Functionality, Usability, Reliability, Performance, and Supportability [10].

METHOD

This research employs a quantitative approach through the use of questionnaires designed based on the FURPS+ model. The software quality assessment focuses on two aspects: functional requirements, which include the functions or features of the software, and non-functional requirements, which cover quality, performance, security, and user experience (Usability, Reliability, Performance, Supportability, and additional factors). The stages of the research are illustrated in Figure 1.

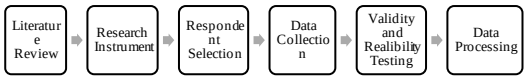

Figure 1. Research Flow

Literature Review

The approach involves gathering information from various literature sources relevant to the research topic. In this case, the focus is on studies related to software quality assurance models.

Research Intrument

The research instrument is aligned with the SQA FURPS+ model, which encompasses functional and non-functional requirements. Table 1 contains the questionnaire statements used to measure software quality.

Respondent Selection

The target respondents for this study consist of a combination of 100 participants, including students, lecturers, and alumni from UIN Sunan Ampel Surabaya.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 1. Questionnaire Statement

Indicator	Code	Statement
Functionality	*x1*	A helpdesk feature is available to assist with issues when using SKEK UINSA.
	x2	SKEK UINSA can be accessed by all campus members.
	x3	SKEK UINSA's security system can detect data manipulation.
	x4	You frequently hear about SKEK UINSA.
Usability	*x5*	While using SKEK, I find its design, language, color scheme, and font consistently applied.
	x6	The types of documents provided in SKEK UINSA are varied.
Reliability	*x7*	Uploading documents in SKEK UINSA has never failed.
	x8	SKEK UINSA provides error notifications when issues occur during uploads.
	x9	I do not feel confused when navigating SKEK UINSA.
	x10	There is a guide for uploading documents in SKEK UINSA.
Performance	*x11*	Uploading documents in SKEK UINSA is consistently successful.
Supportability	*x12*	SKEK UINSA can operate on various devices (Gadget, Tablet, PC).
Plus (+)	*x13*	The interface of SKEK UINSA is easy to understand and use.

Data Collection

The data collection technique employed in this research is an online survey conducted via Google Forms.

Data Processing

The respondent data is collected using a Likert scale (1-5) to measure agreement from "strongly disagree" to "strongly agree." The analysis includes validity and reliability tests, average score calculations, percentage of scores for each indicator, and descriptive analysis.

Validity and Reliability Testing

The purpose of the validity test is to measure the accuracy of the questionnaire. Data is considered valid if the calculated correlation coefficient r.hitung > r.tabel [11]. The reliability test evaluates the consistency of the questionnaire. Data is deemed reliable if the Cronbach's Alpha value exceeds 0.60 (Cronbach's Alpha > 0.60) [12].

The formula to calculate Cronbach's Alpha is as follows:

$$\frac{n}{n-1} * (1 - \frac{a}{b}) \quad (1)$$

n = Number of items (statement)
a = Variance of each item
b = Total variance of all items

Average Score Calculation

The data scores for each indicator, where each indicator consists of one or more statement items, are calculated using the following formula:

$$Avg\ Score\ Total = Frequency\ Respondent * score \quad (2)$$

To determine the maximum Likert scale score based on the number of items for each indicator, the following formula is used:

$$Max\ Score = Number\ of\ Score * 100 * Number\ of\ Items \quad (3)$$

Percentage of Average Scores

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

After obtaining the total average score and the maximum score for each indicator, the percentage of the average score can be calculated using this formula:

$$Percentage\ Avg\ Score = \frac{x}{y} * 100\% \quad (4)$$

x = Total score across all Likert scale levels
y = Maximum score

RESULTS AND DISCUSSION

Demographics

A total of 100 respondents completed the survey, consisting of 53 males (53%) and 47 females (47%). Based on the respondents' occupations, there was 1 lecturer (1%), 3 alumni (3%), and 96 students (96%).

Table 2. Respondent Distribution

Occupation	Number	Percentage
Lecturer	1	1%
Graduates	3	3%
Students	96	96%

Table 3 Respondents by Gender

Gender	Number	Percentage
Laki-laki	53	53%
Perempuan	47	47%

Table 4. Respondent Usage Frequency

Frekuensi	Number	Percentage
<1 bulan	65	65%
>1 bulan	19	19%
1 bulan	16	16%

Table 5. Respondents by Age

Age	Number	Percentage
18	12	12%
19	30	30%
20	40	40%
21	11	11%
22	3	3%
23	3	3%
>30	1	1%

Uji Validitas

The critical value r.tabel is determined at a 5% significance level, which is 0.195 (df = 98). An indicator is considered valid if *r.hitung* exceeds *r.tabel*. Table 6 demonstrates that all 13 statements are valid.

Table 6. Validity Test Results

Code	*r*.hitung	*r*.tabel	Validity	Item Variance
x1	0,53	0,195	Valid	1,28
x2	0,64	0,195	Valid	1,67
x3	0,75	0,195	Valid	0,88
x4	0,61	0,195	Valid	0,97
x5	0,70	0,195	Valid	0,86
x6	0,69	0,195	Valid	0,86
x7	0,48	0,195	Valid	0,81
x8	0,66	0,195	Valid	0,76
x9	0,65	0,195	Valid	0,91
x10	0,67	0,195	Valid	0,85
x11	0,62	0,195	Valid	0,76
x12	0,73	0,195	Valid	0,87
x13	0,71	0,195	Valid	0,88

Realibility Test

The instrument is deemed reliable as the Cronbach's Alpha value is 0.86, exceeding the minimum threshold of 0.60. Based on Table 6, the total item variance recorded is 12.36,

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

with a total variance of 59.87. The reliability test results by aspect show that the Cronbach's Alpha for functional requirements is 0.67, while for non-functional requirements it is 0.82. Both aspects are considered reliable.

Based on Table 7, all indicators are declared valid and reliable. This ensures that the questionnaire instrument is consistent and accurate for measuring the quality of the SKEK UINSA system.

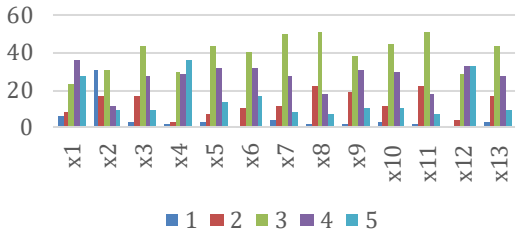

Figure 2. Data Collection Results

FURPS+ Aspect: Functional Require ments Functionality

The functionality data shows 81 respondents strongly agree, 122 agree, 148 are neutral, 34 disagree, and 15 strongly disagree.

FURPS+ Aspect: Non-Functional Requirements Usability

The usability data indicates 29 respondents strongly agree, 70 agree, 84 are neutral, 13 disagree, and 4 strongly disagree.

Reliability

The reliability data reveals 41 respondents strongly agree, 110 agree, 180 are neutral, 60 disagree, and 9 strongly disagree.

Performance

The performance data shows 7 respondents strongly agree, 18 agree, 51 are neutral, 22 disagree, and 2 strongly disagree.

Supportability

The supportability data indicates 33 respondents strongly agree, 33 agree, 29 are neutral, 4 disagree, and 1 strongly disagree.

Aspect (+)

The "+" aspect data shows 9 respondents strongly agree, 27 agree, 44 are neutral, 17 disagree, and 3 strongly disagree.

Test Results

Table 8. Average Score Criteria

Percentage	Criteria
0-20	Very Weak
21-40	Weak
41-60	Moderate
61-80	Strong
81-100	Very Strong

FURPS+ Aspect: Functional Require ment Functionality

The functionality test analyzes whether the SKEK UINSA website meets user needs, based on four statement items from 100 respondents.

Table 9. Functionality Test Results

Functionality					
Code Item	Num of item	Score	Freq	Avg Score	%
x1, x2, x3, x4	4	SS(5)	81	405	29%
		S(4)	122	488	34%
		N(3)	148	444	31%
		TS(2)	34	68	5%
		STS(1)	15	15	1%
Total			400	1420	100%
Max Score				2000	
Avg Percentage				71%	
Category				Strong	

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

FURPS+ Aspect: Non-Functional Requirements Usability

Usability testing involved two statement items for 100 respondents, aligned with the FURPS+ model.

Table 10. Usability Test Results

Usability					
Code Item	Num of item	Score	Freq	Avg Score	%
x5, x6	2	SS(5)	29	145	21%
		S(4)	70	280	40%
		N(3)	84	252	36%
		TS(2)	13	26	4%
		STS(1)	4	4	1%
Total			200	707	100%
Max Score				1000	
Avg Percentage				71%	
Category				Strong	

Reliability

Reliability testing measures the consistency of SKEK UINSA's perfor mance using four questionnaire items from 100 respondents.

Table 11. Reliability Test Results

Reliability					
Code Item	Num of item	Score	Freq	Avg Score	%
x7, x8, x9,x10	4	SS(5)	41	205	15%
		S(4)	110	440	33%
		N(3)	180	540	41%
		TS(2)	65	130	10%
		STS(1)	9	9	1%
Total			405	1324	100%
Max Score				2000	
Avg Percentage				66%	
Category				Strong	

The reliability results indicate that SKEK UINSA achieved a strong usability level at 66%.

Performance

Performance testing evaluates the system's ability to handle an increasing number of users without compromising service quality or response time.

Table 12. Performance Test Results

Performance					
Code Item	Num of item	Score	Freq	Avg Score	%
x11	1	SS(5)	7	35	11%
		S(4)	18	72	24%
		N(3)	51	153	50%
		TS(2)	22	44	14%
		STS(1)	2	2	1%
Total			100	306	100%
Max Score				500	
Avg Percentage				61%	
Category				Strong	

The performance results indicate that SKEK UINSA achieved a strong usability level at 66%.

Supportability

Supportability testing ensures the application operates on both desktop and mobile browsers.

Table 14. Supportability Test Results

Supportability		
Search Engine	Gadget	Desktop
Chrome	OK	OK
Firefox	OK	OK
Safari	OK	OK
Internet Explorer & Edge	OK	OK

The results of the supportability test can be found in Table 14.

JURTEKSI (Jurnal Teknologi dan Sistem Informasi) ISSN 2407-1811 (Print)
Vol. XI No 1, Desember 2024, hlm. 131 – 138 ISSN 2550-0201 (Online)
DOI: http://dx.doi.org/10.33330/jurteksi.v11i1.3233
Available online at http://jurnal.stmikroyal.ac.id/index.php/jurteksi

Table 14. Supportability Count Results

Supportability					
Code Item	Num of item	Score	Freq	Avg Score	%
x12	1	SS(5)	33	165	42%
		S(4)	33	132	34%
		N(3)	29	87	22%
		TS(2)	4	8	2%
		STS(1)	1	1	0%
Total			100	393	100%
Max Score				500	
Avg Percentage				79%	
Category				Strong	

Plus (+)

The "+" aspect in the FURPS+ model focuses on design interface quality.

Table 15. Plus Test Results

(+)					
Code Item	Num of item	Score	Freq	Avg Score	%
x13	1	SS(5)	9	45	14%
		S(4)	27	108	34%
		N(3)	44	132	41%
		TS(2)	17	34	11%
		STS(1)	3	3	1%
Total			100	322	100%
Max Score				500	
Avg Percentage				64%	
Category				Strong	

The design interface of SKEK UINSA is rated strong with a percentage of 64%.

Aspect Test Results

The analysis results indicate that the Functional Requirement aspect was measured through the Functionality indicator (x1, x2, x3, and x4). For the Non-Functional Requirement aspect, the indicators include Usability (x5 and x6), Reliability (x7, x8, x9, and x10), Performance (x11), Supportability (x12), and Plus (+) (x13).

Table 16. Aspect Percentage Results

Aspek	Aspect Percentage
Functional Requirement	71%
Non-Functional Requirement	68%

CONCLUSION

The testing of research instruments demonstrated valid and reliable results, making them suitable for use. The Software Quality Assurance (SQA) analysis using the FURPS+ model on the SKEK UINSA application indicates the application's feasibility, with a score of 71% for the functionality requirement aspect and 68% for the non-functionality requirement aspect. Among the six indicators, the scores fall within the 61-80% range, categorized as "strong." Sequentially, the indicator results are as follows: functionality 71%, usability 71%, reliability 66%, performance 64%, and supportability 74%. The SKEK UINSA application is assessed as meeting quality standards in terms of functionality, ease of use, performance, flexibility, and support for both mobile and desktop platforms, complemented by a strong interface design.

BIBLIOGRAPHY

[1] Z. Romadhonie, "Implementasi Kurikulum ISMUBA (Islam Muhammadiyah Bahasa Arab)

Dalam Imtak dan Iptek di SMA Muhammadiyah Pangkalpinang Implementation of ISMUBA Curriculum (Islam Muhammadi yah and Arabic Language) In Imtak and Science and Technolo gy at SMA Muhammadiyah Pan," *JBES (Jurnal Basic Educ. Ski.*, vol. 2, no. 1, pp. 26–34, 2024, doi: 10.1234/jbes.

[2] S. Kumalasari, T. Septiana Eka Putri, W. Widiatry, and V. H. Pranatawijaya, "Analisis Kualitas Dan Penerapan Software Quality Assurance Menggunakan Model Iso/Iec 9126 Pada Website Objek Wisata Di Kabupaten Gunung Mas," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 8, no. 4, pp. 7630–7635, 2024, doi: 10.36040 /jati.v8i4.9833.

[3] D. Yanti Laily and T. Triase, "Implementasi Quality Assurance Dalam Pengembangan Aplikasi Ourticle Berbasis Android," *SIBATIK J. J. Ilm. Bid. Sos. Ekon. Budaya, Teknol. dan Pendidik.*, vol. 2, no. 3, pp. 793–804, 2023, doi: 10.54443/sibati k.v2i3.664.

[4] X. Hou *et al.*, "Large Language Models for Software Engine ering: A Systematic Literature Review," vol. X, no. December, pp. 1–79, 2023, [Online]. Available: http://arxiv.org/abs/2308.10620

[5] S. Pargaonkar, "Synergizing Requirements Engineering and Quality Assurance: A Comprehe nsive Exploration in Software Quality Engineering," *Int. J. Sci. Res.*, vol. 12, no. 8, pp. 2003–2007, 2023, doi: 10.21275/sr23 822112511.

[6] F. Yenila and E. Rianti, "Analisis Sistem Informasi Kualitas Produ ksi Sulaman Mayang Dengan Menggunakan Metode Mc Call," *JURTEKSI (Jurnal Teknol. dan Sist. Informasi)*, vol. 6, no. 3, pp. 259–268, 2020, doi: 10.33330 /jurteksi.v6i3.623.

[7] L. Pratama, "Pengukuran Kualit as Perangkat Lunak Prodi Teknik Informatika Uika Bogor Menggunakan Iso 9126," *J. Inov. Inov. Teknol. Inf. dan Inform.*, vol. 3, no. 1, p. 49, 2020, doi: 10.32832/inova-tif.v3i1.4062.

[8] S. Anugrah and A. E. Putra, "Analisis Kualitas ISO 25010 Aplikasi Artificial Intelligence Troubleshooting Komputer dengan FURPS," *E-Tech J. Ilm. Teknol. Pendidik.*, vol. 6, no. 2, 2019, doi: 10.24036/et.v2i2.10 1342.

[9] H. Asfa, T. J. Gandomani, and S. Member, "Research Trends in Improving the Quality of Soft ware Products with a Focus on Team Characteristics," *Interne tworking Indones. J.*, vol. 14, no. 1, pp. 3–7, 2023.

[10] L. Villafuerte, "User-Centered Analysis on the Existing Online Enrollment Platform of Mapúa University (myMapúa)," vol. 6, no. 11, pp. 416–422, 2023.

[11] M. Salman Wijaya and R. Arlan Tjahyadi, "Pentingnya Keahlian dan Kepercayaan dalam Membangun Loyalitas," *J. Ilmu Manaj. dan Bisnis1*, vol. 14, no. 1, pp. 22–28, 2023.

[12] O. Robertson and M. Scott Evans, "Just how reliable is your internal reliability? An overview of Cronbach's alpha (α)," *PsyPag Q.*, vol. 1, no. 115, pp. 23–27, 2020, doi: 10.53841/bpspag.2020.1.115.23.