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Development of the Internal Quality Assurance Information System Prototype at Syiah Kuala University

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ABSTRACT

Quality Assurance System of Higher Education requires educational institution to have a system which capable of assuring the quality of academic activities implementation. Information systems are used to manage information and data in the university environment and aim to improve the efficiency and effectiveness of university management in achieving its goals. There are 22 information systems in Syiah Kuala University, but it does not mean that it facilitates the quality assurance processes there. This because the system is not connected each other. This condition makes the distribution data is very difficult to be monitored and caused unsystematic audits activity. This study aims to design a Quality Assurance Information System that can be integrated with all the existing system in USK University. The method used in designing the prototyping system is the Prototype Model. Based on the results of interviews regarding to the Internal Quality Assurance System in USK University, the function of information system that is built must be able to meet the needs of several parties involved, not only to guarantee the overall quality required by the university, but also to the level of study programs that can provide benefits from the system built. The result of designing system that successfully created is the quality assurance system can be integrated to the existing system in USK University. System performance testing is carried out using the System Usability Scale and obtains the SUS value of 77 which mean that the quality assurance information system designed has a fairly good usability level.

Keywords: Information System, Internal Quality Assurance System, Quality, Prototype, System Usability Scale.

INTRODUCTION

Higher Education has the main responsibility in implementing a quality and reliable education system as an effort, so that the good quality education can be maintained inseparable from the implementation of Quality Assurance Information System of Higher Education. Those implementations require educational institution to have a system which capable of guaranteeing the quality of academic activities implementation, including the availability of work standardization, the accountability of higher education, and the capability to compete both nationally and internationally (Wibowo & Azimah, 2016).

In order to achieve the quality of higher education, the standards set must be met and it would be better to exceed the target. The government has regulated this standard through the Minister Regulation of Research, Technology, and Higher Education of the Republic of Indonesia No. 62 of 2016 concerning the Quality Assurance System of Higher Education, in general terms it states that there are 2 standards of Higher Education, namely the National Standard of Higher Education and the standard of higher education which has determined by the institution itself. Therefore, the quality of

higher education should be in the appropriate level between higher education and the standard itself.

The process of implementing the quality of higher education must be carried out by a good plan, autonomous, and sustainable manner. Therefore, a quality assurance system is needed, so that these activities can run systematically as stipulated in Minister Regulation of Research, Technology, and Higher Education No. 62 of 2016 concerning the Quality Assurance System of Higher Education which emphasizes that tertiary institutions must implement an Internal Quality Assurance System (IQAS). The main goal of IQAS is to support quality education and ensure the fulfilment of higher education standards in a systematic and sustainable manner so that a culture of quality growth and development (Kemenristekdikti, 2018). It also has an important role to answer problems regarding to the education as tools to analyse the challenge of education in Higher Education (Arifudin, 2019). The result of the system will lead us to the External Quality Assurance System which carried out through accreditation to determine the eligibility of the study program or tertiary institution (Rokhmat et al., 2023).

Syiah Kuala University has established the basis for the implementation of the Internal Quality Assurance System which is contained in the Statutes of USK University Chapter V concerning IQAS. In its implementation, USK University run the system autonomously to control and improve the implementation of higher education in a planned and sustainable manner. IQAS of Syiah Kuala University is carried out by the Education Development and Quality Assurance Institute whose mission is to provide an effective and easily accessible Quality Assurance Information System. Information system tools to support Academic and Non-Academic activities have also been established by USK. There are 22 systems that have been built, but those systems have not been integrated, so that the evaluation process does not run optimally. Therefore, it is needed to have a system which is able to integrate data of existing systems. The system is designed to make it easier for USK University in running the Internal Quality Assurance System.

LITERATURE REVIEW

1. Total Quality Management

Higher education institutions have the autonomy to manage their own institutions as the center for implementing the Tridharma. Higher education management autonomy is implemented based on the principles of: accountability, transparency, non-profit, quality assurance and effectiveness and efficiency (Sulaiman & Wibowo, 2016). In line with that, universities as non-profit organizations in carrying out their activities implement general management functions consisting of planning, organizing, implementing and supervising (Abbas, 2008). These functions determine the role of the university in society.

Quality is the fulfillment of standards, specifications, requirements (Moss et al., 2009). Quality must be consciously managed to meet the demands of the community (Nabila, 2022). Community demands on universities are not only limited to the ability to produce graduates that can be measured academically, but all higher education programs and institutions must be able to prove high quality supported by existing accountability. Evidence of achievement, assessment, quality certification, absorption of graduates in the job market in accordance with their fields of science, and evaluation results are also needed to obtain recognition from the community. The better the efforts to manage universities that are oriented towards the satisfaction of their stakeholders, the greater the optimism of achieving an educational institution that is credible, acceptable and successful both in output and outcome.

In the field of management known as the concept of Total Quality Management (TQM), the concept of TQM adopts the view that quality in education actively involves the interaction and satisfaction of stakeholders who can make a significant difference in the

academic environment (Putu Ayub Darmawan et al., 2021). In addition, the model adopts principles for improving academic quality that allow one to follow clear goals and objectives, make continuous improvements in teaching, learning and assessment methods, as well as a willingness to be assessed by others. TQM is a very useful strategy in higher education institutions because it involves all stakeholders and brings out the best in it and improves the quality of education (Samad & Thiyagarajan, 2015). Thus, the concept of Total Quality Management (TQM) is in line with the demands of higher education management and government regulations. A great governance system becomes very important for the effective operation and accountability of the College. Therefore, SK University really needs to implement TQM in ensuring the quality of its education. By implementing TQM, SK University is expected to guarantee and regulate overall quality by covering products, services, performance, processes, and human resources. In its application, quality management with TQM combines the quality trilogy, namely planning, controlling, and improving quality. For SK University, the implementation of TQM is a must to ensure the quality of the organization, thus a technique or way is needed so that the implementation of TQM can be maximized at SK University.

2. Internal Quality Assurance System of Syiah Kuala University

The Basic Policy of Quality Assurance System at Syiah Kuala University is to ensure the direction of fulfillment and continuous improvement of the quality of higher education, which is carried out by Syiah Kuala University to realize its vision and mission, as well as to meet the needs of stakeholders through the implementation of the Tridharma of Higher Education,

The Basic Policy of Quality Assurance System at Syiah Kuala University includes the implementation of the internal quality assurance cycle carried out synergistically with external evaluation needs and within the scope of the Tridharma field and supporting elements of higher education, namely: (1) Education; (2) Research; (3) Community Service; (4) Student Services; (5) Cooperation; and (6) Governance. Based on this concept of higher education quality, Syiah Kuala University is declared qualified if it can set and realize the vision through the implementation of a mandated mission and can meet the expectations of stakeholders. Therefore, as the main reference for compiling internal quality assurance system documents is the vision, mission, goals and values of Syiah Kuala University.

To be able to ensure the achievement of the goals and objectives of Internal Quality Assurance System at Syiah Kuala University and in line with Article 5 paragraph (3) of Minister Regulation of Research, Technology, and Higher Education of the Republic of Indonesia No. 62 of 2016 concerning Quality Assurance System of Higher Education, Internal Quality Assurance System at Syiah Kuala University is implemented in all fields of higher education activities, namely the fields of: (1) Academic aspects, including education, research, community service, and student services; and (2) Non-academic aspects, including human resources, finance, facilities and infrastructure, and cooperation.

3. Information Management System

Higher Education Management Information System is an information system used to manage information and data in the university environment. Davis in Alfatul Hisabi et al. (2022) mentions that Management Information System consists of various components, such as hardware, software, data, procedures, and the people involved in using the system. Management Information Systems have an influence on the level of education quality (Rahmadi et al., 2022). Higher Education Management Information System aims to improve the efficiency and effectiveness of higher education management in achieving its goals.

MATERIALS & METHODS

The development of information systems in this study was carried out using the Prototype Method. This method is a software development method in the form of a physical model of the work of a system and is an early version of the system (Purnomo, 2017). The Prototype method is used because it can save time and development costs, implementation becomes easier because both users and system owners already have an idea of the system, and the quality of the resulting system is also good (Mulyani, 2017). The stages of research using the Prototype Method are depicted in the diagram below:

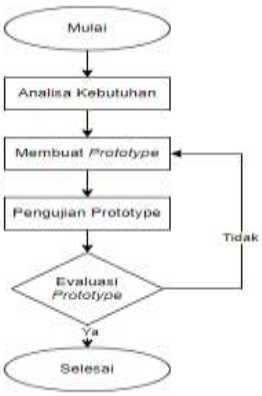

Figure 1. Prototype Research Method

The evaluation is carried out jointly with parties involved in the Internal Quality Assurance System at Syiah Kuala University. This aims to adjust the tools to what is desired and also needed by the user to produce an appropriate system prototype.

The system testing phase in this study uses the Black Box and System Usability Scale (SUS) test forms. Black Box testing is carried out to find out whether every process in the system is as expected or not (Agustine Bacsafra &; Mustika Kusumawardani, 2022), while the System Usability Scale (SUS) is one of the most popular tests because of its ease with using questionnaires to measure the usability level of a product or system (Kaya et al., 2019). SUS is consisting only 10 items on a five-point scales ranging from strongly disagree to strongly agree, including which five are positive statements and the rest are negatives (Katsanos et al., 2012). Usability evaluation is an important aspect in developing a product, this requires to be able to provide a reliable questionnaire. As SUS was made originally in the English version, it requires adaptation to other language as needed to provide optimal testing (Sharfina & Santoso, 2016).

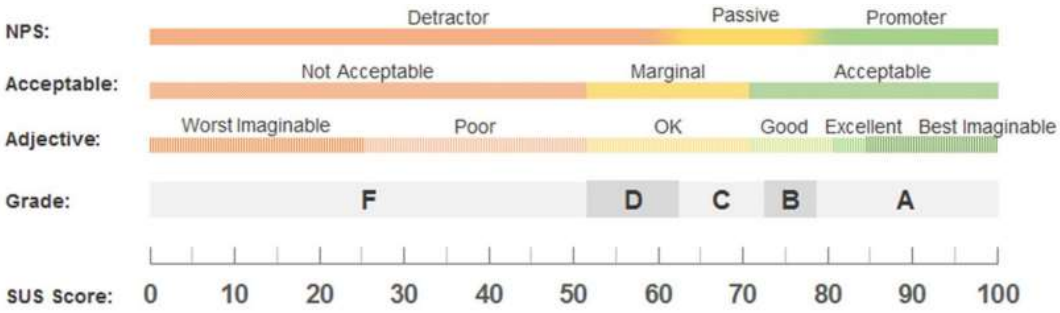

Figure 2. Interpretation SUS Score (Kesuma, 2021)

RESULT

1. Requirement Analysis

This prototype of the quality assurance information system was developed to facilitate the quality control process at Syiah Kuala University which will lead to the study program accreditation process. Broadly speaking, system needs analysis is divided into four parts, namely input needs analysis, process needs analysis, output needs analysis, and interface. The roles in this system are divided into 2, namely:

1. Admin

   Admin in the prototype system developed has the highest access rights,

which can manage data and manage other users.
2. Users other than admins involved in the system. Broadly speaking, there are 4 user classifications consisting of LP3M, Dean of the Faculty, and Study Program.

Table 1. Parties Involved

No	Party	Scope of Work
1	Rector	Responsible for USK's integrated quality management and Quality Assurance functions
2	Chairman of Education Development and Quality Assurance Institute	Determining the direction of developing the quality of education, learning, Internal Quality Assurance System of SK University, and guaranteeing its achievements
3	Dean	Faculty level Total Quality Control function
4	Faculty Quality Assurance Unit	Function of Total Quality Control at the Department/Study Program level
5	Supporting Systems	Information systems that already exist to support data needs both Academic and Non-Academic

Table 1. Requirements Analysis Mapping

Input Requirements	Process Requirements	Output Requirements	Interface Requirements
1. 1. Enter the system, the data entered by the user is in the form of NIP and Password from each account that has been created by the Admin. 2. Manual data from Work Units that do not yet have a system to be integrated with the prototype made. 3. Automatic data from existing systems that have been integrated with prototypes created.	1. Admin • Login • Upload Data • Edit Data • Delete Data 2. User • View Data • Download Data	Research data, including: 1. Publications 2. Citations 3. Research collaboration 4. Students involved in the research 5. Standard documents	1. Login interface design 2. Dashboard design 3. Research Menu interface design 4. Research Sub Menu interface design

2. Designing System

- Data Flow Diagram Level 0

DFD Level 0 has 5 terminators and 1 process, where this process includes the entire process of the prototype system developed. Admin has assessment rights to manage research data, while users have access rights to view and download research data.

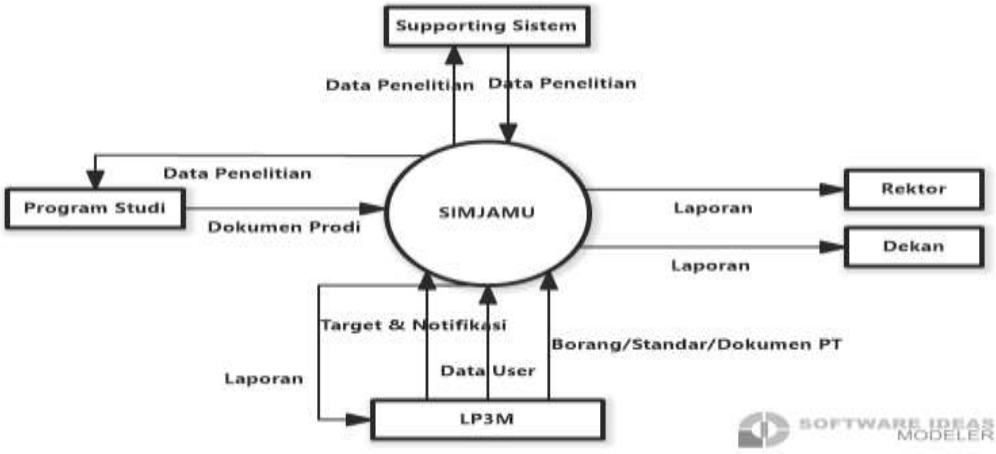

Figure 3. Diagram Context USK Internal Quality Assurance System

- Data Flow Diagram Level 1

DFD Level 1 is a development of DFD Level 0 (context diagram). In DFD Level 1, there are processes including:

1. The user process accesses and downloads data in the publication sub-menu, article citations, research collaborations, student affairs, and research standard documents.
2. Admin process to manage the data needed by users.

DFD Level 1 is described in the following:

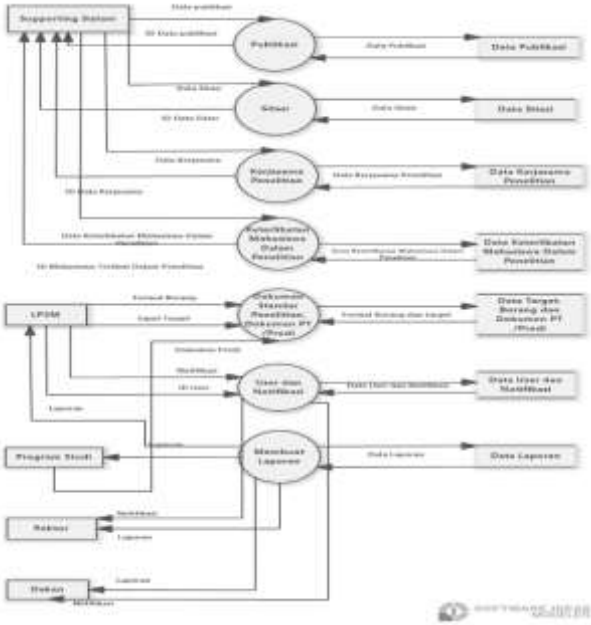

Figure 4. DFD Level 1

- Activity Diagram

Activity diagrams are used to model the flow of activities from a series of menus or processes in the system (Kurniawaty et al., 2023). Here is an example of an activity diagram from a prototype created:

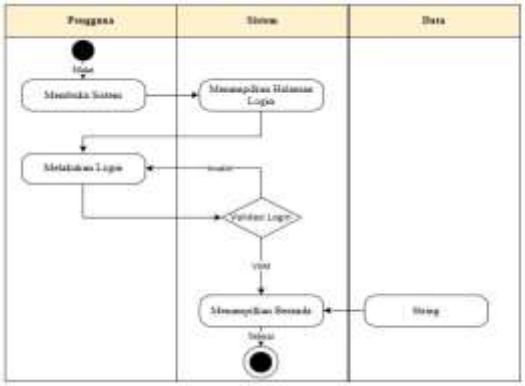

Figure 1. Activity Diagram Login Page

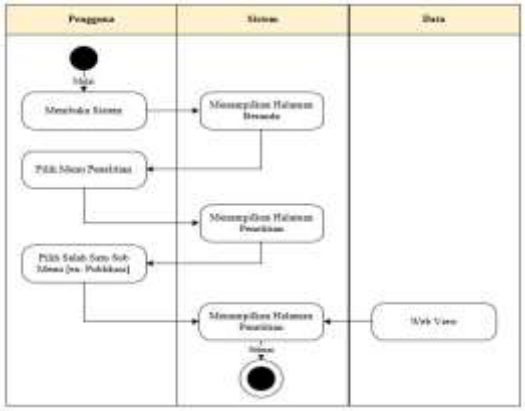

Figure 2. Activity Diagram Research Menu Page

3. Implementation

Interface is a shutter used in a system for interaction between users and the operating system. An interface will determine the way the user interacts with the system, some of the results of the implementation of the system interface in the following figures below:

Figure 7. Display of Login Page

Figure 8. Display of Research Data Page

4. Testing / Verification

- Black Box Testing

In the process of designing a Quality Assurance System prototype, trials were carried out using the black-box testing method. This method is used to observe the results of the system execution through testing data and check the functionality of the software without knowing the detailed process that occurred. The data in the current system is only research data, while the other data is not yet contained in the system. Therefore, the black box testing is only carried out on the research data menu. The test result can be seen in the following table below:

Table 3. Black Box Testing Results

No	Trials	Case	Expected Result	Testing Result
1	Login	Input NIP and Password	Successfully login	Done
2	View the research menu list	Click menu "research"	List is successfully displayed	Done
3	View the number of publications	After user click the "research" menu, it will displaying the new menu, then click "publication type"	The publication data per year and the targets that have been achieved are successfully displayed	Done
4	View the data of citation articles	After user click the "research" menu, it will displaying the new menu, then click "citation articles"	The number of citation data is successfully displayed	Done
5	Research collaboration data	After user click the "research" menu, it will displaying the new menu, then click "collaboration data"	The research collaboration data is successfully displayed	Done
6	Student engagement data	After user click the "research" menu, it will displaying the new menu, then click "student affairs"	Student engagement data in research is successfully displayed	Done
7	View the standard document of research study	After user click the "research" menu, it will displaying the new menu, then click "document"	The list of research study standard document are successfully displayed	Done

- System Usability Scale

The testing of the Quality Assurance Information System prototype was carried out in April and May 2023 by implementing the SUS Method. Total Respondent who took part in the testing process is 140 Respondents. All the Respondent filled out the questionnaires. The result of collecting Respondent data refer to the elaboration of the following table below:

Table 4. SUS Testing Result

No	Respondent	Position	Score		No	Respondent	Position	Score
1	Respondent 1	Rector	72,5		71	Respondent 71	TPMA 37	77,5
2	Respondent 2	Vice of Rector I	92,5		72	Respondent 72	TPMA 38	75
3	Respondent 3	LP3M	70		73	Respondent 73	TPMA 39	85
4	Respondent 4	LP2M	70		74	Respondent 74	TPMA 40	72,5
5	Respondent 5	Head of PPSMM	77,5		75	Respondent 75	TPMA 41	92,5
6	Respondent 6	Head of Audit Center	75		76	Respondent 76	TPMA 42	70
7	Respondent 7	Head of The Information System	70		77	Respondent 77	TPMA 42	70
8	Respondent 8	Vice of Dean 1	85		78	Respondent 78	TPMA 43	70
9	Respondent 9	Vice of Dean 2	72,5		79	Respondent 79	TPMA 44	77,5
10	Respondent 10	Vice of Dean 3	92,5		80	Respondent 80	TPMA 45	75
11	Respondent 11	Vice of Dean 4	70		81	Respondent 81	TPMA 46	92,5
12	Respondent 12	Vice of Dean 5	65		82	Respondent 82	TPMA 47	70
13	Respondent 13	Vice of Dean 6	77,5		83	Respondent 83	TPMA 48	70
14	Respondent 14	Vice of Dean 7	75		84	Respondent 84	TPMA 49	77,5
15	Respondent 15	Vice of Dean 8	85		85	Respondent 85	TPMA 50	75
16	Respondent 16	Vice of Dean 9	72,5		86	Respondent 86	TPMA 51	85
17	Respondent 17	Vice of Dean 10	80		87	Respondent 87	TPMA 52	72,5
18	Respondent 18	Vice of Dean 11	77,5		88	Respondent 88	TPMA 53	72,5
19	Respondent 19	Vice of Dean 12	52,5		89	Respondent 89	TPMA 54	72,5
20	Respondent 20	Vice of Dean 13	72,5		90	Respondent 90	TPMA 55	97,5
21	Respondent 21	Vice of Dean 14	72,5		91	Respondent 91	TPMA 56	77,5
22	Respondent 22	SJMF 1	77,5		92	Respondent 92	TPMA 57	92,5
23	Respondent 23	SJMF 2	75		93	Respondent 93	TPMA 58	70
24	Respondent 24	SJMF 3	85		94	Respondent 94	TPMA 59	70
25	Respondent 25	SJMF 4	72,5		95	Respondent 95	TPMA 60	77,5
26	Respondent 26	SJMF 5	92,5		96	Respondent 96	TPMA 61	75
27	Respondent 27	SJMF 6	70		97	Respondent 97	TPMA 62	85

28	Respondent 28	SJMF 7	65		98	Respondent 98	TPMA 63	72,5
29	Respondent 29	SJMF 8	85		99	Respondent 99	TPMA 64	70
30	Respondent 30	SJMF 9	72,5		100	Respondent 100	TPMA 65	70
31	Respondent 31	SJMF 10	92,5		101	Respondent 101	TPMA 66	77,5
32	Respondent 32	SJMF 11	70		102	Respondent 102	TPMA 67	75
33	Respondent 33	SJMF 12	85		103	Respondent 103	TPMA 68	85
34	Respondent 34	SJMF 13	72,5		104	Respondent 104	TPMA 69	92,5
35	Respondent 35	SJMF 14	92,5		105	Respondent 105	TPMA 70	70
36	Respondent 36	TPMA 1	70		106	Respondent 106	TPMA 71	70
37	Respondent 37	TPMA 2	65		107	Respondent 107	TPMA 72	77,5
38	Respondent 38	TPMA 3	70		108	Respondent 108	TPMA 73	75
39	Respondent 39	TPMA 4	70		109	Respondent 109	TPMA 74	85
40	Respondent 40	TPMA 5	77,5		110	Respondent 110	TPMA 75	72,5
41	Respondent 41	TPMA 6	75		111	Respondent 111	TPMA 76	75
42	Respondent 42	TPMA 7	85		112	Respondent 112	TPMA 77	85
43	Respondent 43	TPMA 8	72,5		113	Respondent 113	TPMA 78	72,5
44	Respondent 44	TPMA 9	92,5		114	Respondent 114	TPMA 79	92,5
45	Respondent 45	TPMA 10	70		115	Respondent 115	TPMA 80	70
46	Respondent 46	TPMA 11	70		116	Respondent 116	TPMA 81	70
47	Respondent 47	TPMA 12	77,5		117	Respondent 117	TPMA 82	77,5
48	Respondent 48	TPMA 13	75		118	Respondent 118	TPMA 83	75
49	Respondent 49	TPMA 14	85		119	Respondent 119	TPMA 84	85
50	Respondent 50	TPMA 15	92,5		120	Respondent 120	TPMA 85	72,5
51	Respondent 51	TPMA 16	70		121	Respondent 121	TPMA 86	72,5
52	Respondent 52	TPMA 17	70		122	Respondent 122	TPMA 87	92,5
53	Respondent 53	TPMA 18	77,5		123	Respondent 123	TPMA 88	70
54	Respondent 54	TPMA 19	75		124	Respondent 124	TPMA 89	70
55	Respondent 55	TPMA 20	85		125	Respondent 125	TPMA 90	77,5
56	Respondent 56	TPMA 21	72,5		126	Respondent 126	TPMA 91	75
57	Respondent 57	TPMA 22	72,5		127	Respondent 127	TPMA 92	85
58	Respondent 58	TPMA 23	80		128	Respondent 128	TPMA 93	72,5
59	Respondent 59	TPMA 24	92,5		129	Respondent 129	TPMA 94	75
60	Respondent 60	TPMA 25	70		130	Respondent 130	TPMA 95	85
61	Respondent 61	TPMA 26	70		131	Respondent 131	TPMA 96	72,5
62	Respondent 62	TPMA 27	77,5		132	Respondent 132	TPMA 97	80
63	Respondent 63	TPMA 28	75		133	Respondent 133	TPMA 98	77,5
64	Respondent 64	TPMA 29	85		134	Respondent 134	TPMA 99	52,5
65	Respondent 65	TPMA 30	72,5		135	Respondent 135	TPMA 100	72,5
66	Respondent 66	TPMA 31	72,5		136	Respondent 136	TPMA 101	72,5
67	Respondent 67	TPMA 32	72,5		137	Respondent 137	TPMA 102	97,5
68	Respondent 68	TPMA 33	97,5		138	Respondent 138	TPMA 103	72,5
69	Respondent 69	TPMA 34	92,5		139	Respondent 139	TPMA 104	80
70	Respondent 70	TPMA 35	70		140	Respondent 140	TPMA 105	78
Average Score								77

DISCUSSION

The design of Syiah Kuala University's Internal Quality Assurance System which was built using the Prototype Method has produced a system that can be integrated with existing systems. After the system prototype is built, the important thing that needs to be done is testing the system. System testing is carried out to ensure that the designed system has met the needs needed in the system itself (Jacob &; Prasanna, 2016). In Black Box testing, trials are carried out only on the "research" menu, this is because other data has not been loaded in the system. From the test results, all cases have met the expected results. Keep in mind that in this test, the user only concentrates on what the system does when given commands, not focusing on how the system can do it (Mall, 2018). While in the SUS test, as many as 140 respondents filled out the questionnaire that had been provided related to the usefulness of the system developed. The SUS scale has a range of values between 0 to 100, where the higher the score obtained, the better the level of usefulness of the system. The SUS test obtained an average score of 77. This score is then converted into percentile ranks and letter grades so that the SUS results obtained can be interpreted (Nugroho et al., 2022). The following table shows the results of the interpretation of SUS testing on the Internal Quality Assurance System at Syiah Kuala University:

Table 5. Interpretation of SUS Score

Description	Result
SUS Score	77
Percentile Ranks	76,53%
Grade Letter	B
Adjective Ratings	Good
Acceptability Range	Acceptable
NPS	Promotor

In this case, usability assessment is highly subjective and may vary between users/respondents. A score of 77 is the average score, which means some users may give a higher or lower score. Overall, an average score of 77 on the System Usability Scale (SUS) Evaluation indicates that the quality assurance information system has a good level of usability, but there is still room for improvement and improvement based on user feedback.

CONCLUSION

The prototype system design that has been successfully created is a quality assurance system that can integrate data from information systems that have existed previously at Syiah Kuala University. In this prototype system, there are 2 roles that can access the system, namely Admin and User. Admins can manage all data such as uploading data, changing data, to deleting data. While Users can only view data and download data. This prototype contains research data which includes many other processes, such as presenting publication data, citating articles, research collaborations, student affairs, to research standard documents. The prototype also displays data updated every day and users can download the data needed. System performance assessment is carried out using the System Usability Scale method with the evaluation results showing that the system obtained an SUS value of 77, meaning that the quality assurance information system gets a fairly good level of usability while still paying attention to the room for improvement that may be made to perfect the design.

Declaration by Authors

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