Development Of The Middle Accreditation Assessment Model For Computer Associated Vocational School

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ABSTRACT: *The long-term goal of this research is to produce a school accreditation assessment application at the Vocational High School level, this application is called the Vocational High School Accreditation Assessment Application (APA-SMK). In addition, this research is also expected to produce an accreditation assessment model for the 2013 curriculum (national curriculum). This research will be carried out at the National Accreditation Board for Schools/ Madrasas (NAB S/ M) through the Provincial Accreditation Board (PAB) in South Sulawesi and the computer laboratory of the Department of Electrical Engineering UNM with the object of research being senior assessors and young assessors at PAB South Sulawesi. In order to achieve the goals and targets that have been set, this research was designed in three stages of activities. predetermined, this research was designed in three stages of activities. The first stage: a survey was conducted through a preliminary test of the existing assessment model in PAB South Sulawesi using a needs analysis approach. Based on the needs analysis data, it is continued in the second stage of this research, which is developing a product in the form of an alpha version of APA-SMK. The results of this second phase of research were then continued in the third stage by conducting expert validation tests and analysis of user responses which were then revised. The results of the analysis of the application quality using the ISO 9126 standard, namely: Functionality, Reliability, Usability, Efficiency, Maintainability and Portability shows that the application has a very good average result and is suitable for use in the Vocational High School Accreditation Assessment Application.*
Keywords:Application, Accreditation, Vocational School

I. INTRODUCTION

In the 21st century global era, the challenges facing the Indonesian people are enormous. Human resource readiness is a key word in facing these global challenges. Various efforts have been made by the Government of Indonesia in order to prepare quality human resources. One of the efforts made is to give priority to the education sector.

In order to improve the quality of education in Indonesia the government has set National Education Standards. National Education Standards have certain objectives. The purpose of the NES is to guarantee the quality of national education in the context of developing the intellectual life of the nation.

National Education Standards have certain objectives. The purpose of NES is to guarantee the quality of national education in the context of educating the nation's life (PP No. 19 of 2005). The NES was developed by BNES subsequently determined by the Ministry of National Education in the form of the Ministry of Education. The defined NES is used as a reference to be achieved or exceeded by each education unit. In this regard, the Government has formed a body called the National Accreditation Board for Schools / Madrasas (NAB S/ M) through the Minister of Education and Culture Regulation Number 59 of 2012. NAB S/ M is a body that evaluates independently by determining the appropriateness of a program or unit of education for basic and secondary education in the formal path by referring to national education standards. In implementing school / madrasah accreditation, NAB S/ M is assisted by the Provincial School / Madrasah (PAB-S / M) accreditation body established by the Governor, in accordance with Government Regulation No. 19 of 2005 concerning National Education Standards (NAB S/ M, 2014).
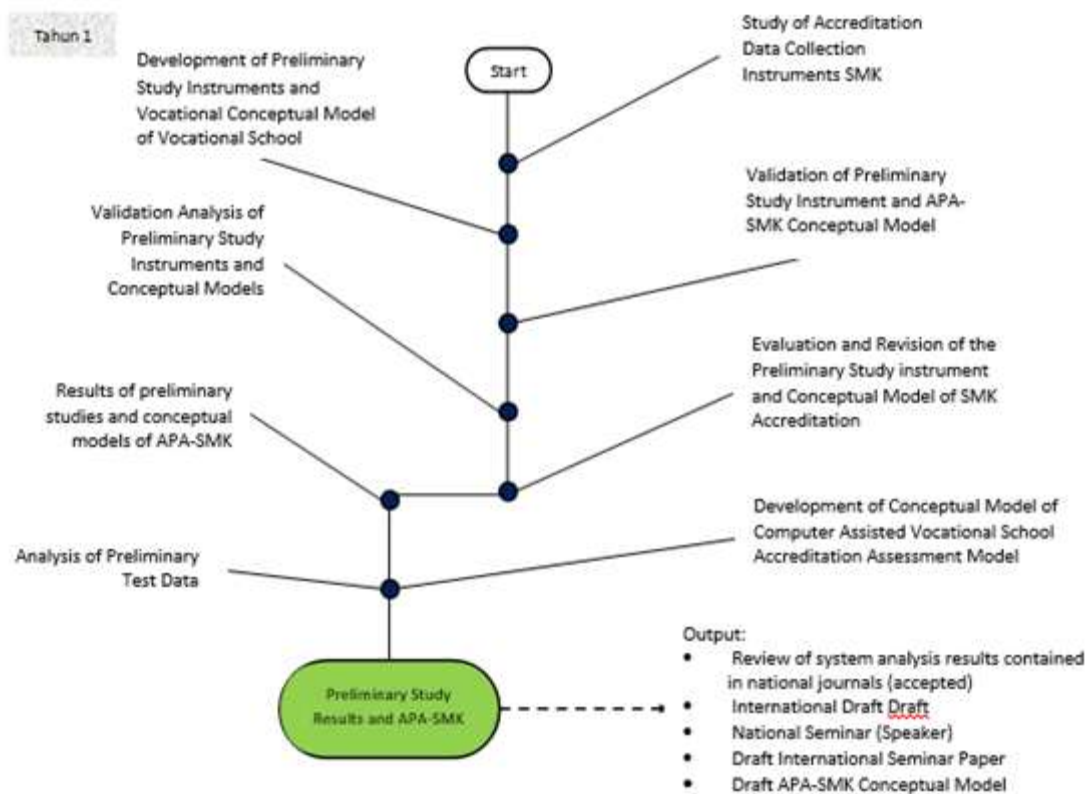
In carrying out the accreditation process at the education unit level, NAB S/ M through PAB assigns assessors to conduct visitations. Visitation activities are carried out by visiting designated schools in accordance

with the assignments of each assessor. After conducting a visitation, the assessors filled out the assessment instruments that had been prepared by NAB S/ M through PAB. The instrument was filled in as a report to the PAB of each province.

The process of filling out the school accreditation instruments currently being implemented is still largely manual. The filling process still uses a table processing format that has not been automatically integrated with an online system. The process of filling instruments manually often has weaknesses (anonymous, 2011). Weaknesses that occur have an impact on the ineffective and inefficient use of existing resources, resulting in waste in each process.

In addition, the accreditation process at SMK has a high level of work complexity in the assessment and processing assessment process. The appraisal process requires a lot of criteria that must be met in the Vocational School assessment conducted by the assessor. So many stages that must be passed to get optimal results.

These stages make that the work carried out has a high level of complexity especially because it is done manually. The complexity caused by the implementation of a manual system can result in ineffective and inefficient use of time and result in a high workload and a large risk of errors in the accreditation process at SMK. A computer assisted vocational school (SMK) accreditation assessment model is needed in the accreditation assessment system.
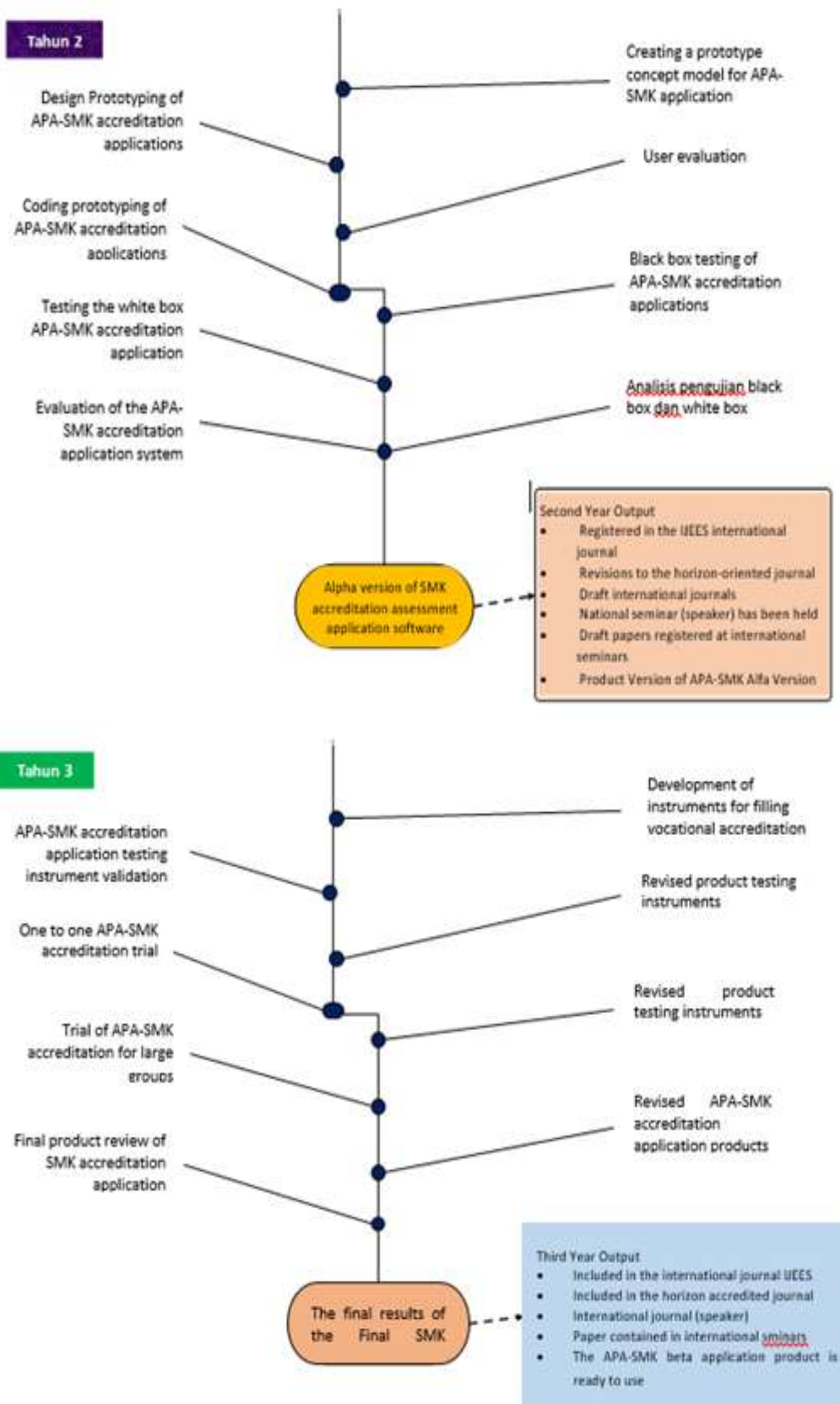
Figure 1: Research Road Map from year 1, year 2 and year 3

II. RESEARCH METHODS

Software development in the form of an APA-SMK accreditation assessment application is carried out with an engineering approach where the stages are: Requirement analysis, application development which includes: analysis, design, implementation, and evaluation, then after an accreditation assessment application model is produced, the research continues by testing a product developed to the NAB S/ M assessors through the PAB in the city of Makassar. In general the research road map is described as follows:
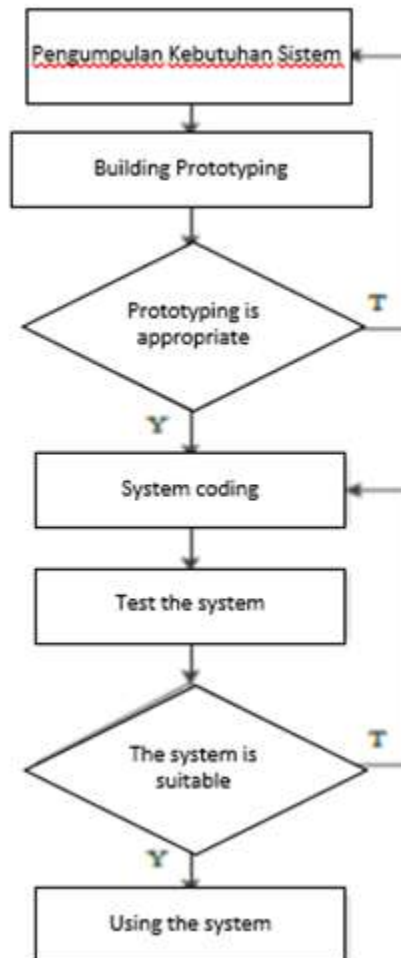
Figure 2: APA Vocational Application Development Model

Planned research is research and application development. This study aims to produce a product in the form of vocational accreditation assessment applications. The following application development used in this study is as stated by Howard (2004: 76). In the development of an application, an approach and system development are needed that will determine the process of completion of software engineering, while the system approach used is to use the prototype method.

The initial phase of the trial application for the SMK accreditation assessment (APA-SMK) that will be developed is to validate the application produced to senior assessors, visual communication design experts, and programming experts and educational evaluation experts. Then the product trial is conducted on an individual assessment assessor, then to a small number of the assessor group and finally a trial is carried out on a larger number of the assessor group.
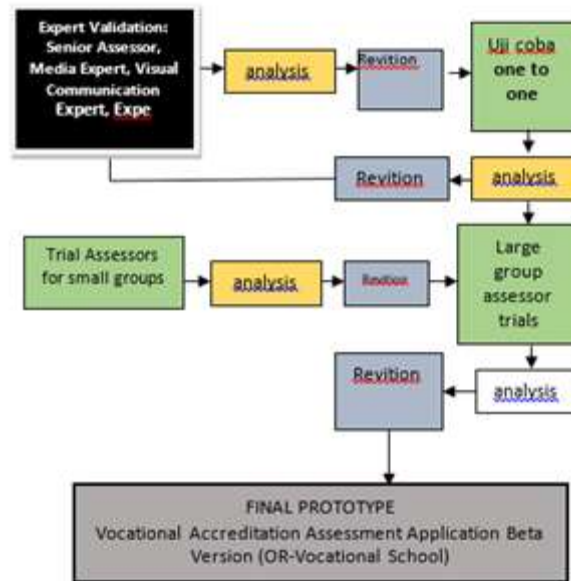
Figure 3: Testing Procedure for SMK accreditation assessment product application

III. RESULTS AND DISCUSSIONS

3.1 Research Results

Development of Computer Assisted Vocational High School Accreditation Assessment Model through three stages where the first stage achieved is the result of developing a valid and reliable model for the evaluation of computer-assisted SMK accreditation, the second stage obtained is an effective computer-assisted Vocational School SMK accreditation evaluation model in the high school accreditation system vocational, and the third stage obtained by practical computer in a vocational high school accreditation system then the results of this system will be tested using the ISO 9126 standard, which is finally validated by the validator and tested on the object of the researcher. The results of the analysis of system requirements can be seen in the appendix. the assisted vocational accreditation assessment model

3.1.1 Testing functionality

The system testing was carried out by involving seven experienced experts in the field of web programming. Experts test the system directly by trying all the functions in it, then fill in the test results in the checklist questionnaire table and provide input on the system being tested. Test results from the seven experts are listed in the Table

Table I.Data on system functionality testing results

The Answer	Score by Validator						
	Val. 1	Val. 2	Val. 3	Val. 4	Val. 5	Val. 6	Val. 7
Yes	58	58	58	58	58	58	58
No	-	-	-	-	-	-	-

Calculation of functionality testing
(Total score / question items) x 100%
= (58/58) x 100%
 = 100%

The results obtained have a percentage> 50% of testing functionality. The value is then converted to qualitative data and based on the rating scale, from the percentage score obtained, the quality of the software in terms of functionality can be accepted and is in accordance with aspects of functionality

3.1.2 Reliability Testing

One of the reliability testing of information systems is the stress testing method. Stress testing can be tested using a web testing tool called the Web Server Stress Tool which consists of three types of tests, namely click test, time test and ramp test.

Table II.Click Test

User No.	Clicks	Hits	Errors	Avg. Click Time [ms]	Bytes	kbit/s	Cookies
1	5	5	0	1.389	34.650	39,91	
2	5	5	0	806	34.650	68,77	
3	5	5	0	786	34.650	70,56	
4	5	5	0	2.325	34.650	23,85	
5	5	5	0	1.134	34.650	48,88	

Logfiles	Results per User (Complete Test)		Results per URL (Complete Test)		
URL No.	Name	Clicks	Errors	Errors [%]	Time Spent [ms]	Avg. Click Time [ms]
1		23	0	0,00	23.207	1.009

The results obtained in the Click Test per URL test showed the number of clicks given 5 times with the number of hits 5 with an error that occurred as much as 0, for an average click time of 1,134 ms, the speed of bytes reached 34,650 and for access speeds reached 70.56 kbit / s.

Table III.Time Test

Logfiles	Results per User (Complete Test)				Results per URL (Complete Test)		
User No.	Clicks	Hits	Errors	Avg. Click Time [ms]	Bytes	kbit/s	Cookies
1	16	15	0	517	103.950	107,30	
2	14	13	0	407	90.090	136,12	
3	11	10	0	523	69.300	105,98	
4	9	8	0	236	55.440	234,85	

Logfiles	Results per User (Complete Test)		Results per URL (Complete Test)		
URL No.	Name	Clicks	Errors	Errors [%]	Time Spent [ms]	Avg. Click Time [ms]
1		49	0	0,00	19.469	397

The results obtained in testing Time Test per URL with a constant amount of load at a predetermined time. Time-test testing is done with a total of 60 minutes, with 5 virtual users and 20 seconds delay time with 16 and 15 clicks with 15 hits with 0 errors, for an average click time of 319 ms, speed bytes reached 103,950 and access speeds reached 173.61 kbit / s

Table IV.Ramp Test

User No.	Clicks	Hits	Errors	Avg. Click Time [ms]	Bytes	kbit/s	Cookies
1	5	5	0	1.389	34.650	39,91	
2	5	5	0	806	34.650	68,77	
3	5	5	0	786	34.650	70,56	
4	5	5	0	2.325	34.650	23,85	
5	5	5	0	1.134	34.650	48,88	

Logfiles	Results per User (Complete Test)		Results per URL (Complete Test)		
URL No.	Name	Clicks	Errors	Errors [%]	Time Spent [ms]	Avg. Click Time [ms]
1		23	0	0,00	23.207	1.009

Run Test with the amount of load that increases in a predetermined time. Ramp Test is carried out at 60 minutes with 5 virtual users and 7 seconds delay time with 16 clicks with 15 Hits with 0 errors, for an average click of 523 ms, bytes reach 103,950 and for access speed reached 234.85 kbit / s. Errors that occur are usually caused by a down network, but this error will end when the network has improved.

Table V.Record of Reliability testing

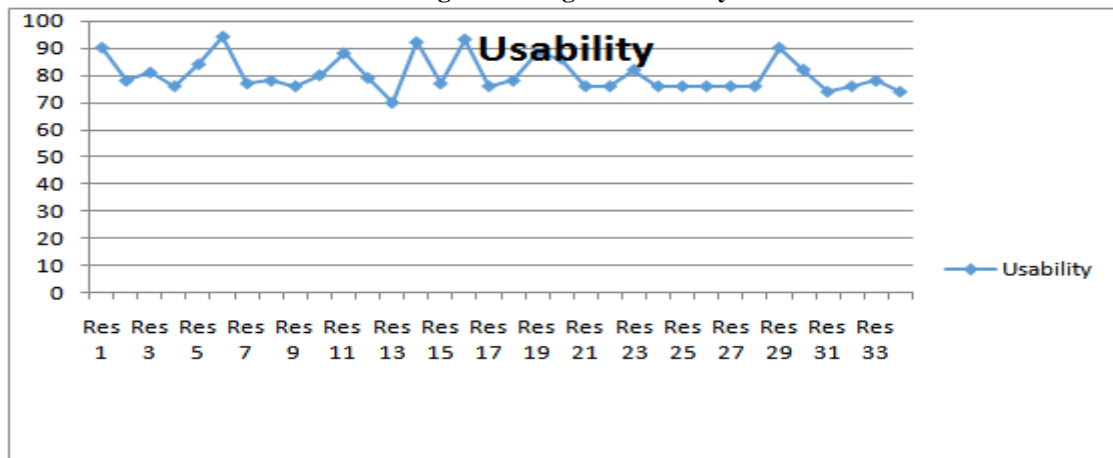| Score Percentage	information
0% - 20%	Very bad
20% - 40%	Note Beak
40% - 60%	Nuetral
60% - 80%	Good
80% - 100%	Very good

3.1.3   Usability Testing

The usability aspect testing has been carried out by using The Standardized Universal Percentile Rank Questionner (SUPR-Q) filled by prospective users and respondents who work as ICT Teachers and Vocational High School Operators as many as 30 people. From the data usability testing aspects can be calculated as in table VI.

Type of Test	Percentage of Error per URL	Percentage of Success per URL
Click Test	0%	100%
Time Test	0%	100%
Ramp Test	0%	100%
Average		**100%**

Table VI.Analysis of Usability Testing Data
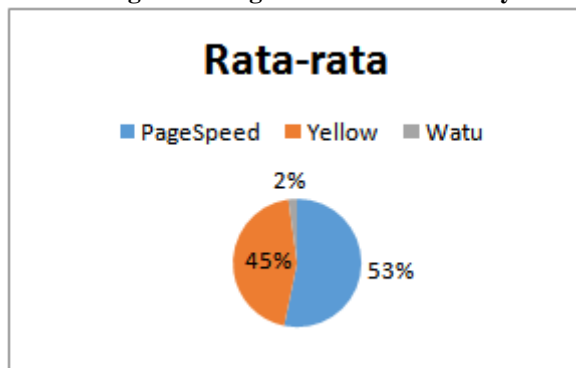
Diagram I.Diagram Usability

3.1.4 Efficiency Testing

The testing of APA VOCATIONAL SCHOOL application on the efficiency aspect is carried out to see the level of performance efficiency of the developed application. The testing process is carried out with the help of several tools. Tools used in testing are YSlow and PageSpeed Insight. Testing is done online with the link: https://gtmatrix.com.

Table VII.Analysis of Usability Testing Data

NO	Page	Test result		
		PageSpeed	Yslow	Time
ADMIN				
1	Login	96	81	2.6
2	Dashboard	86	72	3.6
3	PAB Master Data	86	72	3.7
4	School Data Master	86	72	3.9
5	Utilitas	78	72	4.2
6	Guide	86	72	3.8
ASSESSOR				
7	Login	96	81	2.6
8	Dashboard	86	72	3.9
9	Penilaian	86	72	3.9
10	Data Assessor	86	72	3.8
11	School dtaa	86	72	3.8
12	Guide	86	72	3.6
SCHOOL				
13	Login	96	81	2.6
14	Dashboard	88	72	3.6
15	Assessment	88	72	3.9
16	School Instruments	88	70	3.6
17	Rating Result	88	72	3.6
18	Guide	88	70	3.4
Average		**87.8**	**73.3**	**3.6**

Diagram II.Digram Round Efficiency

Obtained an average for page speed of 87.8%, Yslow of 73.3%, and load time of 3.6 seconds. The web is said to be good if the load time is at least less than 10 seconds (Nielsen, 2010). So it can be concluded that the information system has fulfilled the characteristics of performance efficiency.

3.1.5   Maintainability Testing

Testing on this aspect uses measures that are tested by researchers directly in the field operationally (Land, 2002). In accordance with Land maintainability testing instruments, this test covers 3 aspects, namely instrumentation, consistency, and simplicity.

Table VIII.Maintainability Test Results

Aspect	Assessment	Hasil
Instrumentation	There is a warning from the system if an error occurs and the identification of errors	When there is an error made by the user, the system issues a warning to identify the error. For example, when a user enters new data in many fields and there are still empty fields, a warning will appear to complete the data.
Consistency	The use of one design model in the entire system design	The system design model has one form in common. This can be seen in the system implementation part, that is, the appearance of web pages from one page to another has similarities, similar forms, and consistent.
Simplicity	Ease of managing, improving and developing the system	The test results show that the system is easy to repair and develop, because it is made using a PHP framework based on ModelView-Controller (MVC). If you want to add functionality, developers only need to create a new controller without changing other system components. When an error is found in the system function, the error can be traced only to the problematic component / controller component. For example if the data storage function cannot function properly, the developer only needs to look for errors on the components of the data storage module.

From the operational test results of maintainability aspects as in Table VIII above, the test results of maintainability aspects are said to meet maintainability standards.

3.1.6   Portability Test Results

Testing aspects of Portability is done by trying to run a school accreditation assessment application at the Vocational High School level through a desktop-based browser. Trials in desktop-based environments include using various browsers. This test is done directly and also using a web simulation. Data from the Portability aspects of the test results are listed in table IX below.

3.2   Discussion

The school accreditation assessment application at the Vocational High School level in this study is in the form of a system designed to provide convenience to the PAB, Processors and Schools. The school accreditation assessment system is designed by utilizing computer technology and also optimizes the management of assessor assessment data. This system was designed using a prototyping design model.

Table IX.Results of Testing Aspects of Portability

NO	Tested aspects	Test result
Desktop		
1	Chrome Dev	Result
2	Explorer	Result
3	Chrome	Result
4	Firefox	Result
5	Microsoft Edge	Result
Mobile		
1	Android	Result
2	Iphone	Result

The design stages are system requirements analysis, system design, revision, system coding, system testing, system implementation will then be tested with ISO 9126. The design process begins with analyzing needs by conducting interviews directly with teachers, assessors about what systems are running now and share needs analysis instruments, how the system should be, and what functions will be used in information systems.

Then the stages of designing the system by making Use Cases, Context Diagrams, Flowcharts and ERD that describe how the program works, then display the information system in accordance with the system workflow.

The testing of the Vocational High School accreditation assessment application is carried out through several stages, namely testing using expert validation, and user user responses. Based on the two stages of testing, the results obtained that this system is feasible to be implemented. This can be seen from the results of tests that have been carried out where all the criteria for evaluation of successful test results. Therefore, this Vocational High School accreditation assessment application is said to be able to run well in accordance with the previous design criteria. Expert validation is to ask for responses and suggestions in this test carried out by system / application experts, and content experts, hereinafter referred to as validators whose task is to provide an assessment of the Vocational High School accreditation assessment application that has been made and shows good results and is feasible to be implemented. Some respondents or users provide responses to the system that has been created and shows good results and deserves to be implemented. Testing in terms of ease of detecting errors in typing and filling incomplete data, the results of the maintainability test are stated to meet the maintainability standard.

Tests carried out using the ISO 9126 standard as a test reference. There are several tests conducted, namely, testing functionality, reliability, usability, efficiency, maintainability and portability. Software quality test results in terms of functionality as shown in table 4.1 and it can be concluded that the application of SMK accreditation assessment can be accepted in terms of its function. Run the system using several desktop and mobile browsers. Portability test results show excellent results marked by a successful system and can run in all tested web browsers

Ability related to the use of software, ease in using the functions provided and ease of learning the system. Testing for aspects of usability is done by using a questionnaire on user responses. Based on the calculation of the results of the questionnaire obtained an average score of 84.49% as shown in table 4.10. The average score of 84.49% obtained is included in the very good category seen from table 4.11 of the Likert scale score range and its interpretation, this shows that applications made can be accepted by end users well in terms of usability aspects.

Reliability testing on APA Vocational School applications is one of them using stress testing method. Stress testing is a method of software testing that determines the resilience of a software by testing it outside the normal use limits. Stress testing can be tested using a web testing tool called the Web Server Stress Tool, which has a 100% success ratio in the Vocational High School Accreditation Assessment Application.

Testing the efficiency of the APA Vocational Application is done online with the link: https://gtmatrix.com. This test is intended to see the level of efficiency of the application being tested, the tools used for this test are YSlow and Pagespeed Insight which contains tools whose function is to analyze web pages and investigate things that cause page loads to slow based on yahoo rules to improve performance the website. The results of this test were 87.8% pagespeed, 73.3% YSlow and 3.6 seconds load time. This test can be concluded successful because the load time is at least less than 10 seconds.

Maintainability testing on the APA Vocational Application is tested directly, if there are input errors made by the user, the system will automatically give an error warning message. The test results show that the system is easy to repair and develop, because it is made using a PHP framework based on ModelView-Controller (MVC). If you want to add functionality, developers only need to create a new controller without changing other system components. When errors are found in the system function, errors can be traced only to problem component / controller component parts. For example if the data storage function cannot function properly, the developer only needs to look for errors on the components of the data storage module.

Portability testing on APA Vocational Applications is done by running the system on several versions of Windows and OS. The results of this direct test, which were carried out in several versions, showed success in each test, in terms of portability this system can be used in different versions of the web and OS.

Based on the results of this research application for vocational high school accreditation assessment after validation and testing using the ISO 9126 standard in terms of functionality, reliability, usability, efficiency, maintainability and portability, it can be concluded that the vocational high school accreditation assessment application can be used by users end.

IV.   CONCLUSIONS AND SUGGESTIONS
4.1 Conclusion
The results show that the SMK accreditation assessment application has been successfully developed using an engineering approach where the stages are: Requirement analysis, application development which includes: analysis, design, implementation, and evaluation, then after an accreditation assessment application model is produced, the research is continued with a trial run on products developed to NAB S/ M assessors through PAB in Makassar with aspects of assessment based on ISO 9126 standards, the results of application quality analysis using the ISO 9126 standard are as follows: (1) functionality aspects obtained 100% or very good value; (2) the

aspect of reliability obtained 100% value is very good; (3) the usability aspect is 84.49% or very good; (4) the aspect of efficiency obtained values 87.8% pagespeed, 73.3% YSlow and load time of 3.6 seconds; (5) aspects of maintainability, conclusions are easily corrected if there are errors; and (6) aspects of portability obtained results without errors

4.2 Suggestion

Vocational high school accreditation assessment application will be very useful in assessing and developing a Vocational accreditation assessment application in accordance with ISO 9126 standards. Therefore researchers have some suggestions for developing an accreditation assessment application, the following suggestions:

1- Maximizing the use of vocational accreditation assessment applications that are owned so that these applications are made that can be evaluated and developed more broadly and specifically;

2- There is a need for coordination between and PAB in terms of utilizing APA VOC technology so that assessments can be implemented online and minimize the scattering of files.

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