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Usability Test for User Centered Design-Based Industrial Internship Management System

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ABSTRACT

Internship is one of the efforts to align the knowledge or competencies obtained during the lecture with the world of work directly. In this research will be built an industrial internship management system starting from industry submissions, internship guidance and assessment of industry seminars with User Centered Design. This UCD method focuses on designing user-oriented systems. The results of the study were conducted with a usability test with 20 items (items) and 19 respondents, it can be concluded that each component of usability gets a value of > 80% which means it has a very good predicate, while the overall usability test of 87.69% includes a very good predicate.

1. INTRODUCTION

Polytechnics organize applied education in certain fields of knowledge, by providing professional knowledge that emphasizes more practice, and the skills possessed will have a major effect on the world of work entered by students [1]. The implementation of vocational education as an effort to realize revitalization programs is more emphasized on improving the quality and competence of graduates in line with industry needs by facilitating students to learn as in the industry in internship programs [2]. The internship program aims to equip students through real experience jumping directly in the field and preparing professional graduates with acquired experience and expertise in accordance with the competencies that must be mastered. In addition, internship programs in an effort to bridge the gap between the theory obtained by students and the real profession [3]. Improving the quality of internship learning is also a way to shape student capacity especially in the competence of educational units outside of school [4]. Because in the internship itself will learn details about the ins and outs of work standards in the industrial world, gaining experience, skills and expertise in accordance with the competencies that must be mastered. This experience then becomes a provision in establishing a real career

path. In addition, student attitudes can be further honed through direct application to the industrial world in communicating or interacting professionally in the real world of work. So do not feel afraid or awkward again communicate professionally.

Before the internship, students must do the adjutant process first. The procedure in the submission is that students will submit a proposal and first register the industry and internship group. The student concerned must obtain internship approval to several stakeholders. Among them are approval by the coordinator, head of department, and deputy director III of student affairs. Once approved new students are allowed to apply for internships to the intended industry. But in its implementation, the adjutant process often experiences obstacles. One of the causes is the busyness of each different stakeholder so that the adjutant process can be completed in a long time. In addition, based on data, the number of students in the industry is often not updated. This is due to the lack of digitization of the system so that the department does not know the overall amount of adjutant data because it is not well documented. The track record of internship report guidance is also only through chat/email applications. After the completion of the internship will be conducted internship seminar, where the assessment is still in the form that must be filled out by the examiner. This makes it difficult for majors to assess the final results. By looking at the existing conditions, it is expected that a solution will be an internship management system that can present and process data & information related to internship activities conducted by students. The internship management information system is the utilization of technology that can facilitate institutions or universities in terms of the process of applying for industrial internships by students, internship guidance with guidance lecturers conducted while students are in the industry and assessment of internship seminars conducted at the end of the internship. The system was developed using the User Centered Design (UCD) method in user-oriented system design. The use of user-centered design methods is to overcome the problem of user inability to use the system in the hope that the user knows the function of the system only once [5][6].

UCD is the design of interfaces that engage and attract the attention of users with an interactive process by which design and evaluation steps are made at the beginning of the project up to the implementation stage [7]. Based on the background that has been described above, the researcher is interested in creating "User Centered Design Engineering in Industrial Internship Management System". Thus, it will provide benefits for work units or organizations including regularity in the internship application process so that it can be done more efficiently, optimal data management, and speed up the process of finding data and the history of internships in the industry.

Research on User Centered Design has been conducted by several researchers, including the User Centered Design approach conducted to design a prototype management information system. This system contains activities related to academics, especially those on the UMM Informatics Engineering website with user-oriented in order to produce mature concepts according to the user's wishes. The UCD concept here produces

maximum user interface and functionality and also tested with usability tests. As for interface testing applying the Heuristic Evaluation method by evaluating the design and assessing the system in order to find flaws early before system implementation [8]. In addition, rapid application development method based on User Centered Design is also developed in the creation of thesis information systems. The View Controller Model architecture is used to separate user interfaces, data and controls with UML analysis to model designed applications. In the research, user involvement in each stage of system development is very visible so that the system built can be used according to the needs of the user [9]. Another study on usability testing was conducted based on android on the work internship information system Amik Akmi Baturaja. The results obtained that the overall average assessment results above 4 so that the system made has a good aspect of usability [10]. Based on previous research, this research is focused on designing systems built using User Centered Design where in the testing stage using usability tests. The purpose of this research is to build internship management applications starting from the submission stage, the internship guidance process with the guidance lecturer and assessment during the internship seminar.

2. RESEARCH METHOD

System development in research using the User Centered Design (UCD) approach. The framework steps carried out in this study consist of several stages that can be summarized as below.

2. 1 Apprenticeship

According to Law No. 13 of 2003 on Employment, internships are part of an integrated job training system between job training in training institutions by working directly under the guidance and supervision of instructors or workers or workers or workers who are more experienced, in the process of producing goods and / or services in the company, in order to master certain skills or skills [11]. Internship is a learning activity in the field that aims to introduce and grow the ability of students in the real world of work [12].

2. 2 User Centered Design

User Centered Design is a new paradigm in the web system development design process that focuses on user needs where the approach is optimized for end-users [13]. Users here are intensively involved in all aspects, including how the implementation of the new system will affect their work [5]. In User Centered Design there are several principles that need to be considered including:

1. Focus on the user;
2. Integrated design;
3. User testing and

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4. Interactive design

2. 3 Usability

Usability is a qualitative analysis used to determine the satisfaction of the wearer [11]. Usability or "usability" is the level of quality of the system that is easy to learn, easy to use and encourages users to be able to access the functionality of the system effectively, efficiently and use the system as a task-solving tool [14]. There are 5 components of usability that are used to achieve the ideal level, namely [15]:

1. Learnability, how easily the application can be used and learned
2. Memorability, related to the ease of the user in remembering after a certain period of time directed through a relatively fixed interface design layout
3. Efficiency, relating to the level of efficiency in the work of tasks or applications
4. Errors, related to the prevention of errors made by users during interaction with the application.
5. Satisfaction, user satisfaction after using the application that can also be measured from the benefits obtained by the user after using the application

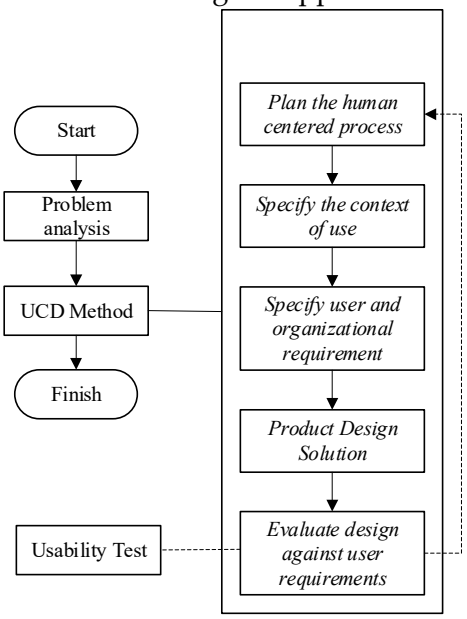

Figure 1 Research Framework

In the initial stages of problem analysis by identifying the root of the problem first. Furthermore, the stage of literature studies on books, journals and research related to research. Then it is done by observation and interview by observing the submission procedure, guidance process and internship assessment. The interview (Q&A) is directly conducted with the internship coordinator and other stakeholders related to the system to be built and then formulate the problems obtained from the interview results. Then the User Centered Desin stage is carried out where all data and information obtained at the

interview stage will be analyzed and identified to adjust the user's needs to the application to make it easier in the next stage. The issues discussed in this study are described in Figure 2. In system design, use case diagrams, class diagrams and activity diagrams to help realize solutions and decrypt interactions between one or more designed actors. After that the implementation of the system is carried out in accordance with the design that has been made. In the testing stage, the activity is to make some questions to conduct a usability test to find out the level of ease of application users to achieve their goals in the management of internships.

3. RESULTS AND DISCUSSION

From this stage obtained the root of the problem by using fishbone diagrams as seen in Figure 2. Fishbone diagram or fishbone diagram is one of the methods / tools in improving quality.

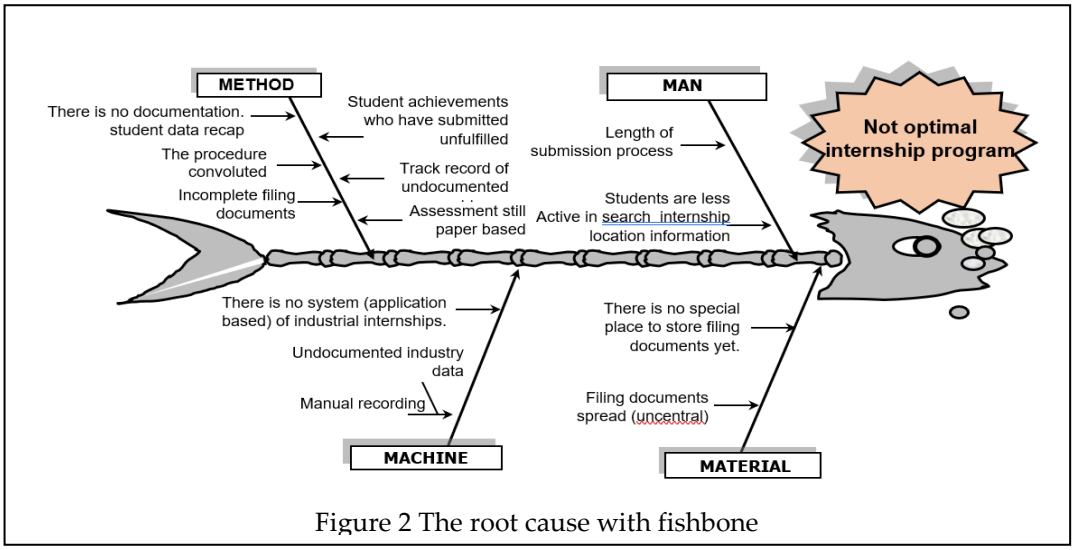

Figure 2 The root cause with fishbone

This diagram will show an impact or consequence of a problem with various causes. Effects or consequences are written as the muzzle of the head. While the bones of fish are filled by causes in accordance with the approach of the problem [16].

3.1. Plan the human centered process

At this stage is the first stage in the UCD method, namely the study of literature conducted by studying, researching, and studying various literatures from books, texts, scientific journals, websites on the internet and readings related to research topics.

3.2. Specify the context of use

From this stage will be identified who the user will use the product. There are 8 users who will use the internship management system. Then observation and interview activities

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are conducted between researchers as system developers and stakeholders related to the system to be built and implemented later so as to get an initial picture of the application that suits the needs of the user.

3.3. Specify user and organizational requirement

Activities at this stage are the excavation of information or data to collect the need for needed facilities and what activities are carried out by the system in general. After the information / data is collected, then the arrangement of information from the needs of the user, so that the software development process can be fulfilled. In the system there are 8 actors as users as described in Table 2 list of system needs:

Table 2 Analysis of System Needs

No.	User / Actor	System Needs
1	Admin	Manage user data
2	Koordinator	Enter internship approval Enter industry values Manage guidance data Managing industry data Receive an internship report
3	Mahasiswa	Enter student data Enter guidance data Enter parental license data Enter an internship proposal Receive internship adjutant results
4	Dosen Pembimbing	Enter seminar values Manage guidance data Enter the guidance lecturer data
5	Kepala Jurusan	Enter internship approval Receive an internship report
6	Wadir 1	Enter internship approval
7	BAAK	Manage submission letters
8	BAUP	Enter an internship letter number

3.4. Product design solution

At this stage, a system design solution is made using UML (Unified Modelling Language) in accordance with the needs of users.

3.4.1 Use case Diagram

The design of industrial internship activities is illustrated with a usecase diagram on the figure 3 so that it can be clearly shown the functions that can be used and the form of the system to be developed. Users who will be connected to the system are, admin, coordinator, head of department, guidance lecturer, student, BAAK, BAUP and WD I.

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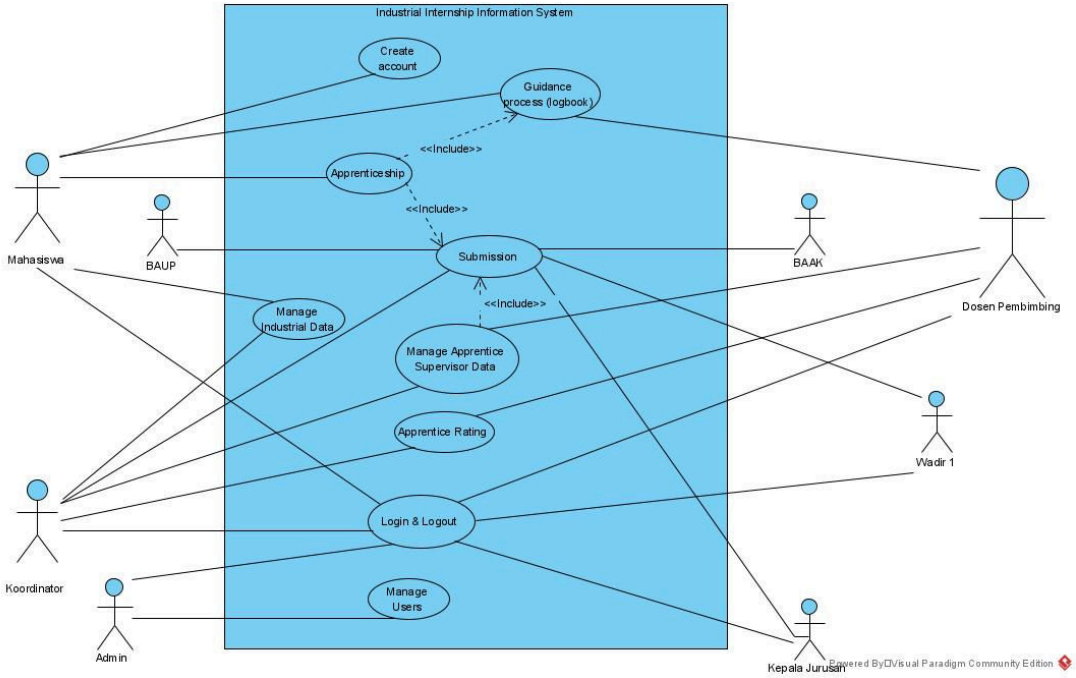

Figure 3 Use case Apprentice System Diagram

Figure 3 the use case design above explained that in the process of applying for internships, admins first synchronize student data and lecturer data through the system. In addition, students are required to get the approval of the coordinator and head of the department first. Then the approval of the letter by BAUP and BAAK. Once all is approved, the final approval is on the Deputy Director. When the adjutant process has been completed, the coordinator will enter student data with their respective guidance lecturers to be able to carry out the guidance process. And the final stage is, after the completion of the implementation of the industry internship the student concerned brings an assessment form from the industry that will be put into the system by the coordinator. In addition, the guidance lecturer also includes value during the internship seminar that will be processed with industry values that produce student internship value.

3.4.2 Class Diagram

Class Diagrams on industrial internship management systems can be seen in the figure 4 which is a depiction of the structure of the system as well as the definition of the class being constructed by the system

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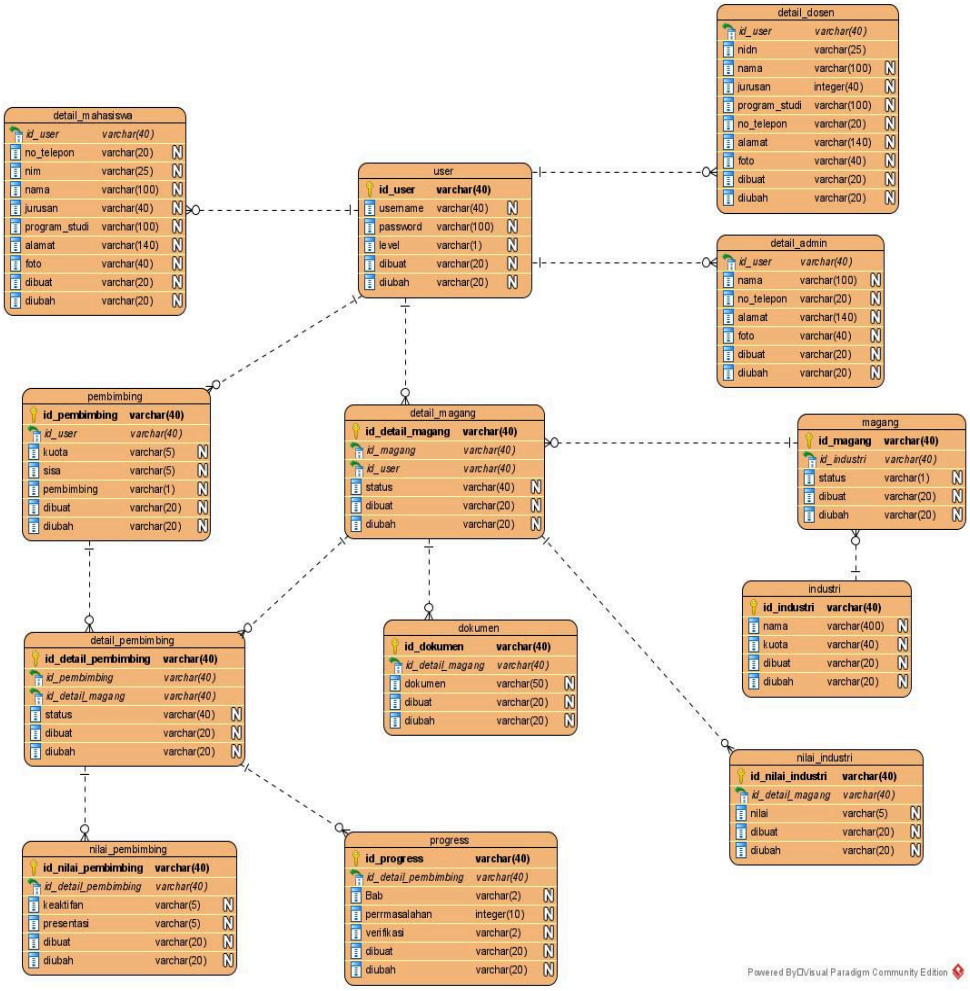

Figure 4 Class Diagram of Internship Management System

3.5. Evaluate design againt user requirement

In this stage, the evaluation of the system uses usability testing against the design tailored to the needs of the user to see the extent to which the application objectives have been achieved. The usability test is used to determine a measure of the quality of the user experience when interacting with a product or system. The usability test in this study was conducted based on the results of filling instruments by respondents. The instrument is divided into 20 items(items), of which 20 items are grouped into five (5) variables: learnability, efficiency, memorability, errors and statisfaction.

Table 3 Instruments in usability test

No	Variable	Question
1	Learnability	Easy-to-understand system interface
2	Learnability	Menu display on the system can make it easier to find information
3	Learnability	You as a system user can understand navigational flow easily
4	Learnability	Form stuffing based on menus on the system is easy to use

5	Learnability	Icons, buttons, labels and links on the system are easy to understand
6	Efficiency	When typed keywords in a search/search city, information can be displayed quickly and precisely.
7	Efficiency	Existing form, can help you to manage data quickly and precisely
8	Memorability	You as a system user can easily remember how to access the system after some time of not using it.
9	Memorability	You as a system user can easily recall the menus and page views that are in the system.
10	Memorability	You as a system user can easily remember every navigation flow you want.
11	Memorability	You as a system user can easily remember how to display the desired information quickly.
12	Memorability	You as a system user can easily remember how to manage certain information quickly and precisely.
13	Errors	Error messages always appear when you make an error when managing data
14	Errors	Error message that appears when there is a link / menu / page that errors in accordance with the content
15	Errors	You as a system user can fix errors when managing data quickly and easily
16	Satisfaction	Text information you can read easily
17	Satisfaction	The language used in the system is easy to understand.
18	Satisfaction	The color design and layout of the system is comfortable to look at
19	Satisfaction	Information displayed in accordance with your needs and expectations
20	Satisfaction	In the future, you prefer to use this system to do your tasks related to the management of internships, rather than doing it manually.

3.6. System Implementation

The results of the User Centered Design design that has been done in the development of the internship management system can be spelled out that the system made consists of 3 main processes, namely the submission process, internship guidance and internship seminar assessment.

3.6.1 View of student internship submission page

This stage is the initial process where students are asked first to complete adjutant data in the form of proposals, parental licenses and submit industry submissions before the implementation of internships.

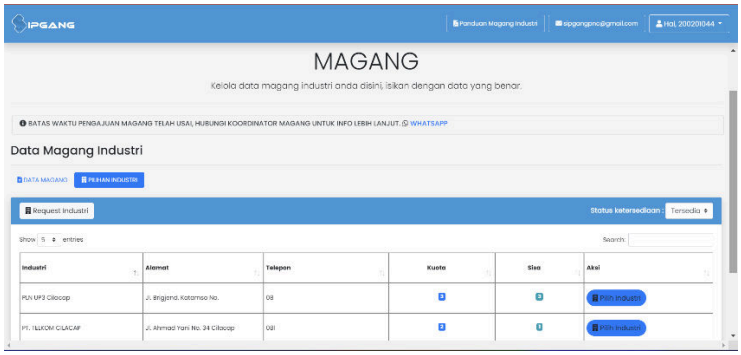

Figure 5 Pages of internship submissions

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3.6.2 Page view of the guidance process

This stage is an internship guidance process conducted by students with institutional guidance lecturers.

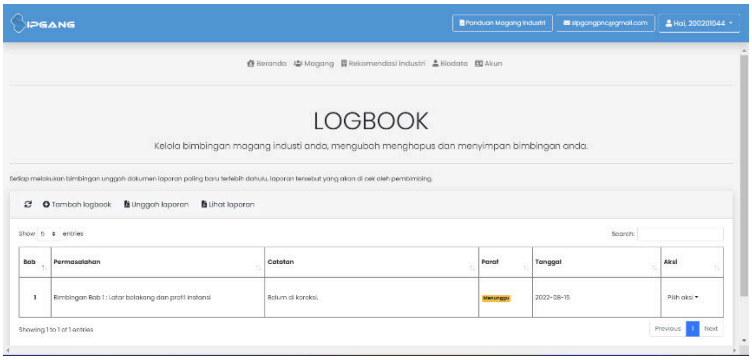

Figure 6 Screenshoot application sipgang process guidance

3.6.3 Internship assessment page view

Once all the internship and guidance process has been completed, get an assessment. The final assessment given comes from the percentage of industry assessments and presentation assessments during internship seminars.

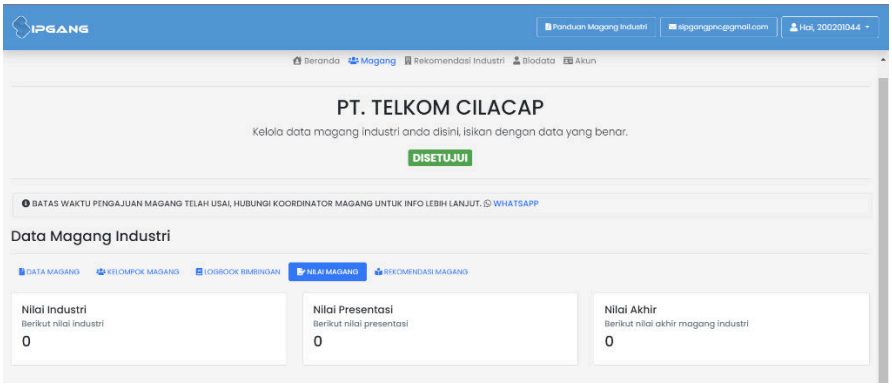

Figure 7 Screenshoot application sipgang assessment process

3.7. System Testing

System testing uses usability tests with 20 items and 4 answer intervals using the likert scale (1-4). The Likert scale is used to measure the attitudes, opinions, and perceptions of a person or group of people about social phenomena. With the Likert scale, the variables to be measured, can be spelled out as below.

1: Strongly Disagree
2: Disagree
3: Agree

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4: Strongly Agree

The results of the Industrial Apprentice Information System questionnaire analysis showed the functionality of the system that had been built had been rated quite well. The results of the instrument filling carried out by 19 respondents are displayed in the table below

Table 4 Instrument Filling Results by Respondents

No	Question	Score	Max
LEARNABILITY			
1	Question Items/Items 1	68	76
2	Question Items/Items 2	67	76
3	Question Items/Items 3	65	76
4	Question Items/Items 4	71	76
5	Question Items/Items 5	69	76
TOTAL		340	380
EFFICIENCY			
6	Question Items/Items 6	67	76
7	Question Items/Items 7	68	76
TOTAL		135	152
MEMORABILITY			
8	Question Items/Items 8	64	76
9	Question Items/Items 9	65	76
10	Question Items/Items 10	65	76
11	Question Items/Items 11	69	76
12	Question Items/Items 12	65	76
TOTAL		328	380
ERRORS			
13	Question Items/Items 13	64	76
14	Question Items/Items 14	64	76
15	Question Items/Items 15	65	76
TOTAL		193	228
SATISFACTION			
16	Question Items/Items 16	69	76
17	Question Items/Items 17	69	76
18	Question Items/Items 18	63	76
19	Question Items/Items 19	68	76
20	Question Items/Items 20	68	76
TOTAL		337	380
TOTAL KESELURUHAN		1333	1520

Based on Table 2 above, it can be calculated the Usability test value of each component. The usability test value of each component is as follows:

Usability learnability = 340 / 380 * 100% = 89.47%
Usability efficiency = 135 / 152 * 100% = 88.82 %
Usability memorability = 328/380*100% = 86.32 %
Usability errors = 193 / 228 * 100% = 84.65 %
Usability satisfaction = 337 / 380 * 100% = 88.68 %

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While the value of the overall usability test is as follows:
Overall usability = 1333 / 1520 * 100% = 87.69 %

Based on the calculation process that has been done and obtained the results of values from the usability test, then the values can be grouped into intervals and percent interpretations in order to know the assessment of each component as attached to the following table.

Tabel 1 Interpretation of System Predicates

Percentage of Predicate	Test Results
81 % - 100 %	Excellent
61 % - 80 %	Good
41 % - 60 %	Pretty Good
21 % - 40 %	Less Good
0 % - 20 %	Bad

By looking at the predicate of the system in the Table above as a whole, it can be concluded that each component of usability gets a value of more than 80% which means it has a very good predicate. As for the overall usability test score of 87.69%, so it is also included in the predicate "Very Good"

4. CONCLUSION

Based on the analysis of the results of research and discussions that have been described above, it can be concluded that the design using the User Centered Design method can be applied, this is obtained from a questionnaire test that states that the system is declared very good by the results of assessments conducted by some respondents. This analysis is obtained from the design of needs analysis, use case, and class diagram

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