DEVELOPMENT OF WEB-BASED SERVICEAPP APPLICATIONS AND USABILITY TESTING USING THE USABILITY SCALE SYSTEM (SUS) CASE STUDY: PT TELEMEDIA MITRA ERAJAYA

Axcel Lukito[1], Jansen Wiratama[2], Hari Santoso[3]

[1,2] Information Systems, Faculty of Engineering and Informatics, Universitas Multimedia Nusantara, Jl. Boulevard, Gading Serpong, Kabupaten Tangerang, 15810, Indonesia.
[3] Information Systems, STMIK Dharma Putra, Jl. Otto Iskandar Dinata, No.80, Kota Tangerang,
E-mail: [1]axcel.lukito@student.umn.ac.id, [2] jansen.wiratama@umn.ac.id, [3]hari.santoso8687@gmail.com

Abstrak

Dewasa ini banyak perusahaan yang sudah memanfaatkan penggunaan teknologi untuk membantu proses bisnisnya. Salah satu perusahaan di Indonesia yang bergerak pada bidang Test and Measurement, Network Monitoring dan Telecom Professional Services adalah PT Telemedia Mitra Erajaya yang menggunakan aplikasi untuk membantu proses bisnisnya terutama dalam inventory. Penelitian ini bertujuan untuk mengevaluasi dan menghasilkan rancangan aplikasi yang direkomendasikan berdasarkan hasil evaluasi menggunakan metode System Usability Scale (SUS) untuk mengukur usability aplikasi. Dalam pengujian usability, ada lima komponen, yaitu: Learnability, Efficiency, Memorability, Errors, dan Satisfaction. Setelah evaluasi Usability selesai, hasilnya akan digunakan sebagai rekomendasi untuk perancangan aplikasi Serviceapp. Hasil pengujian usability pada aplikasi perusahaan yang sudah ada mendapatkan hasil sebesar 54,75 poin. Framework yang digunakan untuk menrancang aplikasi Serviceapp adalah Laravel dengan template adminLTE. Hasil dari penelitian ini adalah sebuah aplikasi Serviceapp Inventory berbasis website yang dapat membantu perusahaan dalam menginput data dan mudah di akses. Hasil usability testing yang didapatkan adalah sebesar 74,75 poin. Dengan desain aplikasi aplikasi Layanan yang baru, hasil pengujian meningkat sebesar 20 poin.

Kata kunci—*AdminLTE, Laravel, System Usability Scale (SUS), Usability Testing, Website.*

Abstract

Nowadays, many companies have taken advantage of the use of technology to help their business processes. One of Indonesia's companies engaged in Test and Measurement, Network Monitoring, and Telecom Professional Services is PT Telemedia Mitra Erajaya which uses applications to help its business processes, especially inventory. This study aims to evaluate and produce a recommended application design based on the evaluation results using the System Usability Scale (SUS) method to measure application usability. In usability testing, there are five components: Learnability, Efficiency, Memorability, Errors, and Satisfaction. After the Usability evaluation is complete, the results will be used as recommendations for the design of the Service app application. The results of usability testing on existing enterprise applications get the results of 54.75 points. The framework for designing the Service app application is Laravel with the adminLTE template. This research results from a website-based Service App Inventory application that can help companies enter data and are easy to access. The usability testing results obtained are 74.75 points. With the new application, test results increased by 20 points.

Keywords— *AdminLTE, Laravel, System Usability Scale (SUS), Usability Testing, Website*

1. **INTRODUCTION**

Human life today has been heavily influenced by the existence of information technology. In the past, it required a long time to send a letter from one location to another to reach its destination. However, by utilizing information technology, letters can be delivered in minutes or even seconds. Reading the letter is enough to use a device from information technology [1]. The system is called Enterprise Resource Planning (ERP). Many companies use ERP systems to help their business processes monitor activities within the company. ERP systems automate all company processes and show accurate, current positions that help knowledge workers within a company to achieve targets that have been planned by the company [2]. In 2022 PT Telemedia Mitra Erajaya needs an application that can help their business processes to be even better than before. This study aims to design a service app application and evaluate its usability of a service app application using the System Usability Scale (SUS) method.

After the application has been designed, the company will use the application, and the service app application users will assist this research in evaluating the usability of the application. Usability has five components: Learnability, Efficiency, Memorability Errors, and Satisfaction [3]. This research was conducted because the service app application was newly designed, and the usability scale of the application had never been tested. This research uses the SUS testing method because SUS method has been used and tested for more than 30 years and still proves to be a reliable method for evaluating the usability of a system based on computer standards [4].

This study has several supporting theories from previous studies that other researchers carried out and are still related to this research.

1) **Information and Communication Technology**
   Information technology is a combination of technology and communication in the form of software and hardware that can be used for processing, processing, compiling, storing, and manipulating data in various ways to obtain accurate information, namely relevant, excellent and timely information. , which can be used by companies or organizations for personal, business, and government purposes to produce strategic information for decision-making [5].
2) **Enterprise Resource System (ERP)**
   ERP is an information system model that enables organizations to automate and integrate their crucial business processes. In today's era, implementing an ERP system for companies can be a massive effort that can take years. ERP implementation aims to increase the company's competitiveness [2].
3) **Website**
   The website is an application system that must be accessed using the internet. A website is an information page provided through the internet so that it can be accessed worldwide as long as it is connected to the internet network. Websites are divided into two types which have different purposes. Types of websites based on their nature, namely dynamic and static websites. Dynamic websites are constantly changing with the aim of varying content, for example, news media in the form of websites. In comparison, a static website has a fixed nature or does not frequently change in scope, for example, a company profile website.
4) **Laravel**
   Laravel is a PHP framework released under the MIT license, built on the MVC (model view controller) concept [6]. Laravel helps us to maximize the use of the PHP programming language in the website design process. PHP is a very dynamic programming language, but since Laravel, it has become more powerful, fast, secure, and

efficient. With every release of the latest version, Laravel always brings out new
technologies among other PHP frameworks.

5) Usability Testing

Usability is one of the essential aspects of information technology. Availability is used to
measure the level of availability of a system or device [7]. Usability testing is a technique
used to evaluate products by testing them directly on users. Usability testing is an attribute
to assess how easy the website interface is to use. Usability testing has five components,
namely [3]: (1) Learnability; (2) Efficiency; (3) Memorability; (4) Error; (5) Satisfaction.

6) System Usability Scale (SUS)

System Usability Scale (SUS) is a method to perform usability testing in evaluating the
usability of an application. This SUS is a questionnaire used to receive evaluation results
from users (user experience). SUS was developed by John Brooke in 1986 and had several
advantages in this method, namely:

a. System Usability Scale (SUS) can be used easily because the result is a score of 0–
100.

b. The system Usability Scale (SUS) is effortless and does not require complicated
calculations.

c. The system Usability Scale (SUS) is free of charge and does not require additional
costs.

d. The System Usability Scale (SUS) is proven valid and reliable, even with small
sample sizes.

e. The SUS method is a questionnaire consisting of 10 questions. This questionnaire
also uses a 5-point Likert scale. Respondents will be given the choice of "Strongly
disagree," "Disagree," "Neutral," "Agree," or "Strongly agree" to answer ten
questions from the System Usability Scale (SUS) method.

The following are ten questions from the System Usability Scale (SUS) method in table 2.1
below:

Table 1.1. SUS Question

No	Question
1	I will use/visit this site often
2	I find this site too complex (contains a lot of unnecessary stuff)
3	I find this site easy to browse
4	I need technical assistance to use/browse this site
5	I think the functions/features provided on this site are well designed and prepared
6	I rate too many inconsistencies on this site
7	I feel most people will find it easy to use/browse this site quickly
8	I find this site very complicated to navigate
9	I feel very confident browsing this site
10	I need to learn a lot of things before I can explore this site properly

In addition, this research also uses several previous research results that are related and
relevant to this research, namely:

1) Usability Test

a) The research, "Usability Measurement of Mobile Applications with System
Usability Scale (SUS)", determines the usability score of the four most widely used
mobile applications, Facebook, WhatsApp, YouTube, and Mail, using SUS adjusted
to the adjective rating scale [8].

b) In the research "Usability Evaluation Website library.umn.ac.id Multimedia Nusantara University" determines the usability value of library.umn.ac.id. This research produces recommendations for the library.umn.ac.id application [9].

2) System Usability Scale

a) In the research "Usability Application on PENTAS Application Using System Usability Scale (SUS) Method", the study results can be concluded that the application is still in the poor category to use and must make improvements if the PENTAS application still wants to be used [10].

b) In the research "Implementation of Usability Testing Methods with Usability Scale System in Evaluation of Websites for Subtitle Service Providers", the level of ease of users in completing tasks when using the website is 82.7%, and this shows that the learnability aspect of the subscene.com website can be said to be exemplary [11].

3) Web-Based Design

In the research "Analysis and Design of a Web-Based Congregation Information System Case Study: BNKP Pewarta Church", the information system website design at the BNKP Pewarta Church for congregational data collection has been successfully distributed using the WDLC method. The website can be accessed at localhost [12].
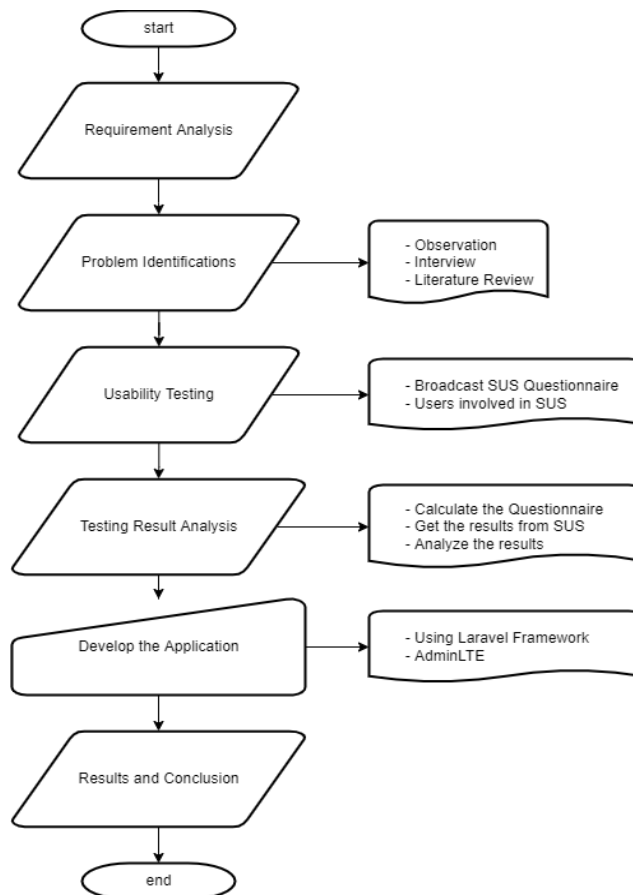
2. RESEARCH METHOD

A. Research Flow

Figure 2.1 Research Flow

B. Research Method
1) Data Collection Technique
   The data collection techniques used by the author in this study were in several ways, namely through library research and questionnaires. A literature study is conducted to collect information that can help researchers find solutions to solve existing problems. At the same time, this questionnaire was conducted to obtain quantitative information.
2) Data Analysis Technique
   This data analysis technique was selected based on the research objective, namely evaluating the usability of the service app application. The reason the author chooses the descriptive technique is that this descriptive technique is effortless to use in processing quantitative data and can systematically describe the variables obtained after taking data through questionnaires so that they get quantitative data.
3) Usability Testing Analysis with SUS Method
   After analyzing the test, the last thing is to draw the results and conclusions from the research. In this phase, the test results will be made with the measurement components of the Nielsen Model: learnability, memorability, efficiency, error, and satisfaction. In addition, this research also produces a recommendation design for the service app application.

Table 2.1 SUS Analysis – Old Application

I find this system complicated to use	4	5	4	4	4	4	4
I find this system easy to use	2	1	4	2	2	2	2
I need help from someone else or a technician in using this system	4	5	4	4	4	5	4
I feel the features of this system are working properly	2	1	4	2	2	2	2
I find this system confusing	4	5	4	4	4	3	4

Table 2.2 SUS Calculations Results – Old Application

No	Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	Score (Total x 2.5)
1	Abdul Mukti	3	2	2	2	3	2	2	2	3	3	24	60
2	Febriyanto	2	2	2	2	3	2	2	2	2	3	22	55
3	Prasetya	3	2	2	2	3	2	2	3	2	2	23	57,5
4	Faudrial	2	2	3	3	2	2	2	3	2	2	23	57,5
5	Mahendra	2	2	2	3	2	2	2	2	2	2	21	52,5
6	Naufal	2	2	2	3	2	2	2	2	2	2	21	52,5
7	Andi	3	2	2	2	2	2	2	2	3	3	23	57,5
8	Jordan	2	3	3	2	3	3	2	2	2	2	24	60
9	Ivan	2	2	2	3	2	2	2	2	2	3	22	55
10	Samuel	2	1	2	1	2	2	1	2	1	2	16	40
Average													54,75

C. Research Variable
In this research there are two variables, namely the independent variable and the dependent variable:

1) Independent Variables
The independent variable (X) in this study is a questionnaire from the System Usability Scale in the form of 10 questions. The study will be rated on a five-point scale, with one being the lowest and five being the highest. The study will receive an average score on the SUS questionnaire.

2) Dependent Variables
This study's dependent variable (Y) represents the five components of usability testing: learnability, performance, memorability, error, and satisfaction.

3. RESULTS AND DISCUSSION

Object System analysis is done first to see the system requirements. System requirements analysis is carried out to identify the requirements needed in building application programs. In this research, an analysis of input requirements, process requirements, and output requirements was carried out. Further explanation of the three needs analysis is as follows:

1.   Input Requirements

Table 3.1 Input Requirements

Software	Hardware
Phpmyadmin	
MySQL – DBMS	
XAMPP	Notebook ASUS: Model VivoBook X415UA
Text Editor – VS Code	
Browser – Google Chrome	

2.   Process Requirements
Process requirements analysis in this research is in the form of data modeling. This analysis is intended to describe the processes contained in the application program through modeling. The modeling used by the author is a structured approach using Data Flow Diagrams (DFD) and flowcharts.
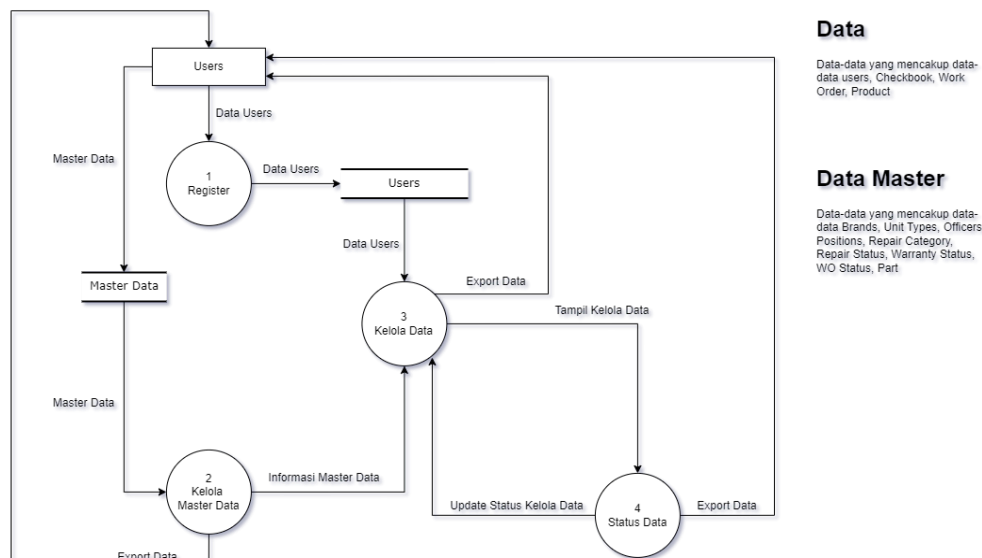

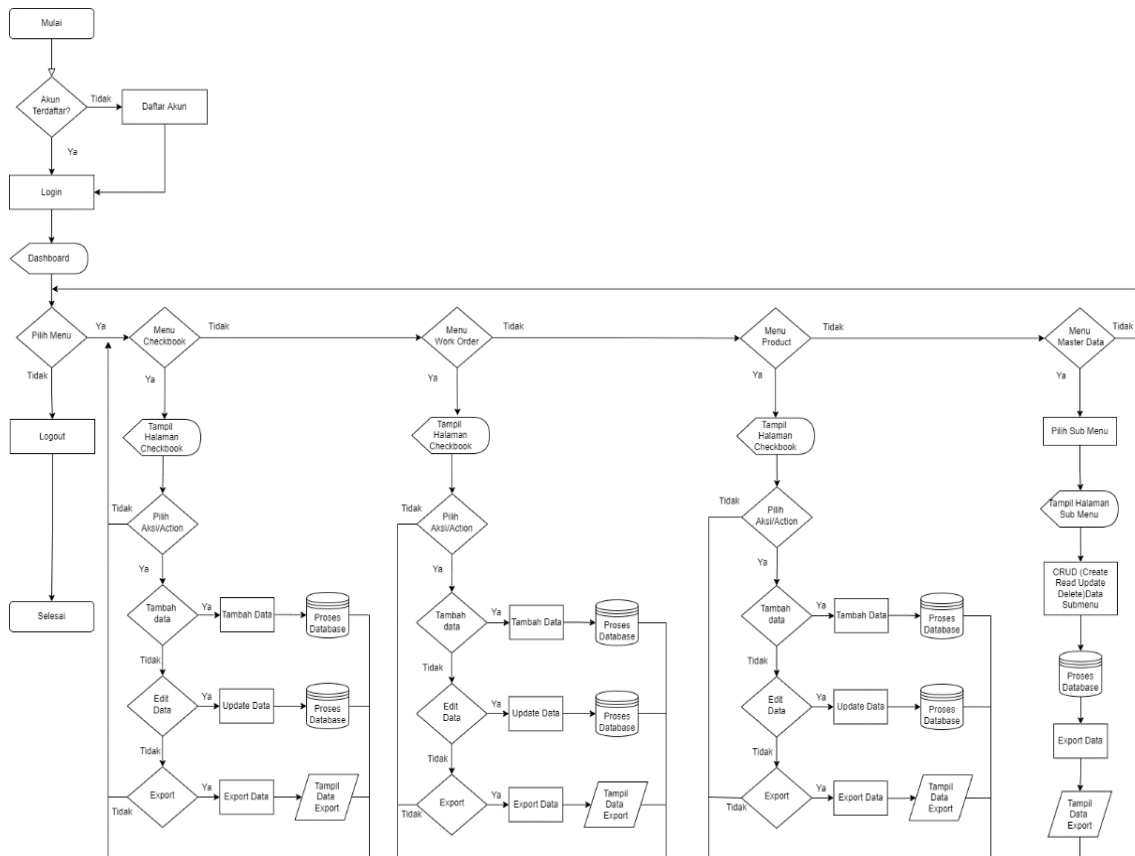**Figure 3.1** Data Flow Diagram

Figure 3.2 Flowchart

3. Output Analysis

Analysis of output requirements in this study is in the form of an application display designed in interface design. The web-based application uses XAMPP as a web server and MySQL as a DBMS. This application can be accessed using smartphones, tablets, and laptops through browsers such as Google Chrome, Mozilla Firefox, Microsoft Edge, and others.

4. User Interface

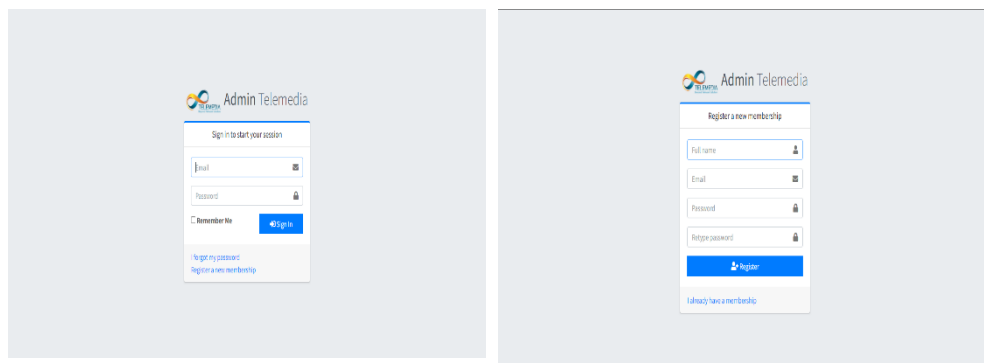4.1 Application User Interfaces

a) Login and Register page

Figure 3.3 Login and register page

b) Dashboard and Checkbook page
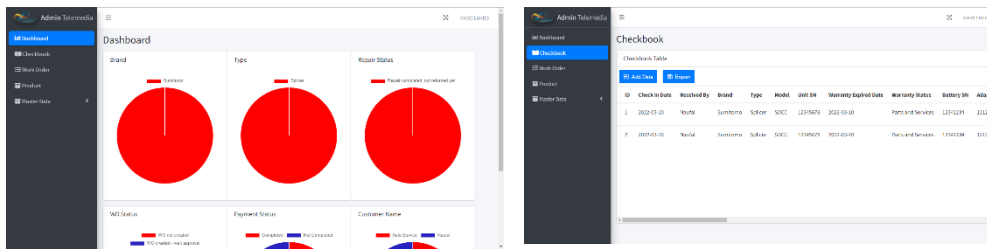
Figure 3.4 Dashboard and chekbook page
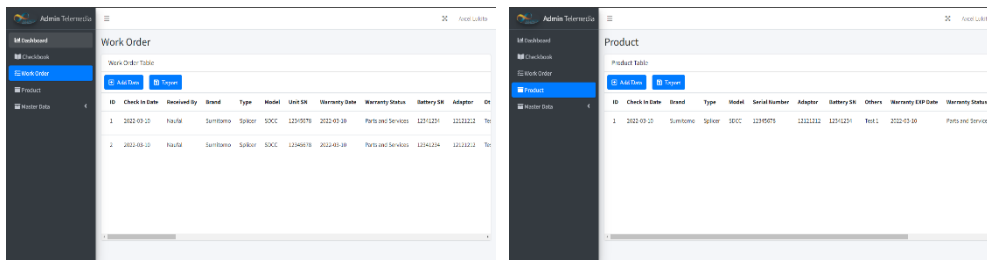
c) Work order and Product page

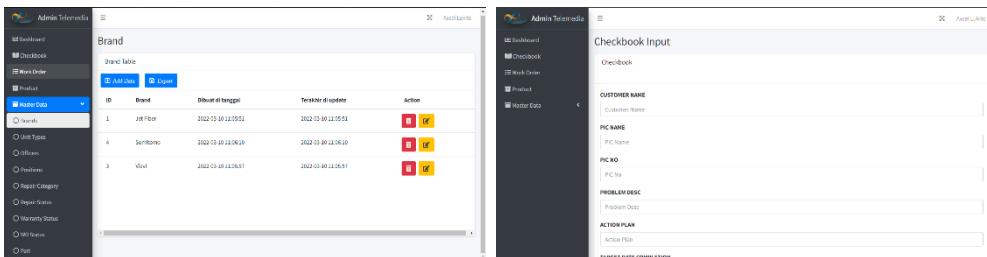**Figure 3.5** Work order and Product page

d) Master Data and Add data page

Figure 3.6 Master Data and Add data page
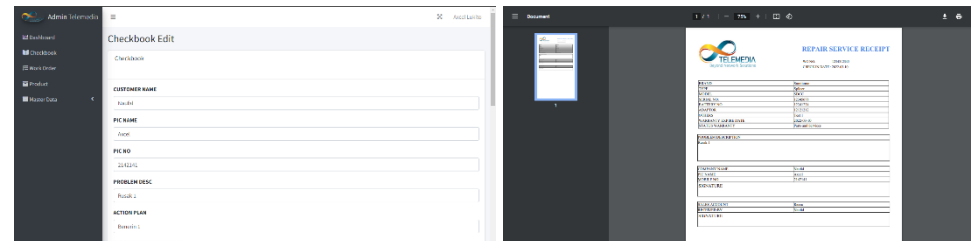
e) Edit Data and reporting page

Figure 3.7 Edit Data and reporting page

4.2 SUS Results

Table 3.2 SUS Analysis – New Application

I find this system complicated to use	2	2	2	3	2	3	3
I find this system easy to use	5	5	5	4	4	4	5
I need help from someone else or a technician in using this system	3	2	2	2	3	2	2
I feel the features of this system are working properly	4	3	4	4	3	3	3
I find this system confusing	1	2	1	2	1	2	2

Table 3.3 SUS Calculations Results – New Application

No	Respondent	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	Score (Total x 2.5)
1	Abdul Mukti	4	2	5	1	5	1	4	1	4	1	28	70
2	Febriyanto	5	1	4	2	5	1	5	1	5	1	30	75
3	Prasetya	4	1	4	1	5	1	5	1	5	1	28	70
4	Faudrial	5	2	5	2	5	1	5	1	5	1	32	80
5	Mahendra	4	2	4	2	5	1	4	1	5	1	29	72,5
6	Naufal	5	1	5	1	5	1	5	2	5	1	31	77,5
7	Andi	5	1	4	1	5	1	4	2	5	1	29	72,5
8	Jordan	5	1	5	1	5	1	4	2	4	2	30	75
9	Ivan	5	1	5	1	5	2	5	1	5	1	31	77,5
10	Samuel	5	2	5	1	5	1	5	1	5	1	31	77,5
Average													74,75

The conclusions from table 2.2, which is the result of the calculation of the old application, and 3.3, which is the result of the analysis of the new application, are The average system usability scale score obtained from all respondents. The score is then adjusted to the system usability scale assessment. The average score of the system usability scale is 68, so if the system usability scale value is above 68, it will be considered above the average, and weight below 68 will be below the average. In Figure 3.3, there is a range of scores for the results of the usability scale system.
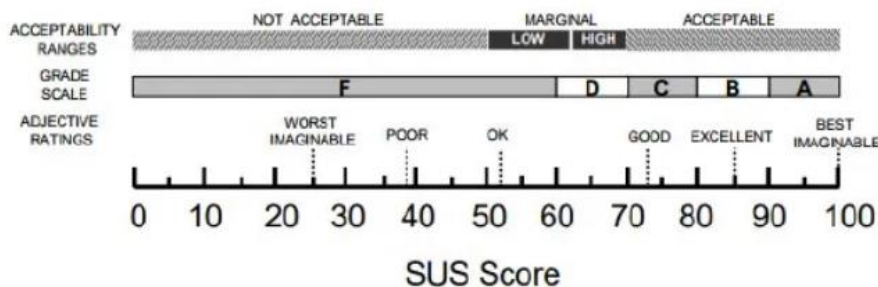

Figure 3.8 System Usability Scale Result Range

In this research, the average system usability scale score for the old application was 54.75 points, and for the new application was 74.75 points. It can be concluded that the Service app application that was tested using the system usability scale method got an increase of 20 points and good results when viewed from the picture of the range of the usability scale system results above.

4. CONCLUSION

Based on the results of application design and testing using the System Usability Scale (SUS) method, it can be concluded that this research produces:
1) Generate application service applications with the laravel framework;
2) Increase the usability testing score based on five components by 20 points from the previous 54.75 points to 74.75 points.

REFERENCE

[1] R. Purba, Aplikasi Teknologi Informasi: Teori dan Implementasi - Google Books, vol. 2, no. 1. 2020.

[2] M. Ikhsan, R. S. Anggraeni, D. A. Rarasati, A. N. Rahman, A. P. Widodo, and E. Sediyono, "Advantages of Enterprise Management System by Combining ERP (Enterprise Resource Planning)," LENSA: Jurnal Kependidikan Fisika. vol. 9, no. 1, pp. 73–85, 2021.

[3] U. B. Darma, "Evaluasi Usability Website Menggunakan," pp. 588–595.

[4] D. W. Ramadhan, "Pengujian Usability Website Time Excelindo Menggunakan System Usability Scale (Sus) (Studi Kasus: Website Time Excelindo)," JIPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform., vol. 4, no. 2, p. 139, 2019, doi: 10.29100/jipi. v4i2.977.

[5] BPS, "Information and Communication Technology Development Index (IP-ICT) 2020 (Indeks Pembangunan Teknologi Informasi dan Komunikasi (IP-TIK) 2020)," vol. 12, no. 95, pp. 1–8, 2020, [Online]. Available: https://www.bps.go.id/pressrelease/2020/12/15/1750/indeks-pembangunan-teknologi-informasi-dan-komunikasi--ip-tik--indonesia-tahun-2019-sebesar-5-32-pada-skala-0---10.html#:~:text=Indeks Pembangunan Teknologi Informasi dan Komunikasi (IP-TIK) merupakan, dig.

[6] M. Lesnanda, Y. Aryo, and B. Raharjo, "Perancangan Website Penjualan Pada Online Shop Luxmoire Dengan Framework Laravel Dan Bootstrap," vol. 2, pp. 209–221, 1978.

[7] A. W. Soejono, A. Setyanto, A. F. Sofyan, and W. Anova, "Evaluasi Usability Website UNRIYO Menggunakan S ystem Usability Scale (Studi Kasus: Website UNRIYO)," vol. XIII, pp. 29–37, 2018.

[8] A. Kaya, R. Ozturk, and C. A. Gumussoy. "Usability Measurement of Mobile Applications with System Usability Scale (SUS)". Global Joint Conference on Industrial Engineering and Its Application Areas, GJCIE 2018, June 21–22, Nevsehir, Turkey, 2018.

[9] M. Rumbiak and J. Setiawan, "Evaluasi Usability Website library.umn.ac.id Universitas Multimedia Nusantara", Ultima InfoSys: Jurnal Ilmu Sistem Informasi, vol. 8, no. 2, pp. 87-94, Dec. 2017.

[10] A. Saputra, "Penerapan Usability pada Aplikasi PENTAS Dengan Menggunakan Metode System Usability Scale (SUS)", JTIM, vol. 1, no. 3, pp. 206-212, Nov. 2019.

[11] Z. Elma. "Implementation of Usability Testing Methods with Usability Scale System in Evaluation of Websites for Subtitle Service Providers", Ultima InfoSys: Jurnal Ilmu Sistem Informasi, Vol. 10, no. 2, pp. 104-110, Jan. 2020.

[12] J. Wiratama and R. Desanti, "Analysis and Design of Web-Based Information System for Church Congregations Case Study: Church BNKP Pewarta", Ultima InfoSys : Jurnal Ilmu Sistem Informasi, vol. 12, no. 2, pp. 115-120, Apr. 2022.