

SIMRS Analysis using SUS and PIECES for User Satisfaction (Case Study: XYZ Hospital)

Nyoman Alvia Wirayani*, I Made Agus Dwi Suarjaya, Putu Wira Buana
Department Information Technology, Faculty of Engineering, Udayana University
Jl. Raya Kampus Unud, Jimbaran, Bali, INDONESIA
Email: alviawirayanii@gmail.com, agussuarjaya@it.unud.ac.id, wb@unud.ac.id

*Corresponding Author

Abstract Management Information System of a Hospital is an information technology system that manages the entire service process flow within the hospital environment to obtain accurate information. One way to optimize and improve the performance of the SIMRS is by assessing user satisfaction from the perspective of employees at XYZ Hospital, requiring an evaluation. The methods used in the satisfaction analysis testing are System Usability Scale (SUS) and PIECES. The purpose of this study is to determine the level of employee satisfaction and identify the service aspects in SIMRS that need to be improved and maintained, as well as the creation of a service chatbot for distributing user satisfaction questionnaires and assisting in providing solutions to employees to resolve frequently asked problems. The System Usability Scale method obtained a score of 57.15 in the Okay category and grade D, while the PIECES method received a rating of 3.57 in the Satisfied category and grade B.

Key words: SIMRS, System Usability Scale, PIECES, Chatbot.

I. INTRODUCTION

The development of information technology has impacted several aspects of life, including the healthcare industry. With the rapid advancement of technology, a system is needed to facilitate various tasks quickly and easily. XYZ Hospital has an information system used daily, namely SIMRS.

SIMRS is an information technology system that manages the entire service process in the hospital environment. So far, Hospital XYZ has not known the shortcomings of SIMRS. To optimize and improve the performance of SIMRS, it is necessary to evaluate the satisfaction of its users, namely the employees of Hospital XYZ. In testing user satisfaction, two methods with different indicators are used, namely the System Usability Scale (SUS) method and the PIECES method.

System Usability Scale is a method used to evaluate or assess applications by measuring their level of usability. The SUS method has 10 questions, with odd-numbered questions having positive statements, while even-numbered questions have negative statements. To give a score to the questionnaire, a predetermined Likert scale is used. Another method used in satisfaction analysis is

PIECES as a tool to analyze a system that will be tested thoroughly and in detail.

The research findings can be used as a recommendation for XYZ Hospital to improve the performance of SIMRS. In addition, a chatbot service was created through the Telegram application to distribute user satisfaction questionnaires and assist staff in resolving frequently asked problems. This service will be connected to one of the websites owned by XYZ Hospital.

II. LITERATURE REVIEW

The research entitled "Measuring User Satisfaction Level of Archival Application using System Usability Scale and PIECES Framework" discusses the archival application owned by HIMASI at the National University, which is used to manage important documents and data of the association's officers. The purpose of this study is to evaluate the comfort and satisfaction of users of the application with a total of 30 respondents using System Usability Scale and PIECES Framework [1].

The research titled "Comparison of PIECES and System Usability Scale Methods for Analyzing User Satisfaction in Android-based Car Rental System" discusses the search for a car and reservation that was initially done manually. Therefore, a comparison was made using the PIECES and SUS methods in analyzing user satisfaction in the android-based car rental system, which is expected to help the customer reservation process quickly [2].

The research entitled "Usability Evaluation of Simalu Application Using Usability Testing Method" discusses the Bali domestic application that focuses on environmental cleanliness. Simalu is a relatively new application that was released in early January 2018 and has not been evaluated before. The method used is usability testing with 10 respondents [3].

III. RESEARCH METHODOLOGY

The research was conducted through several stages. These stages are outlined below:

A. Research Plan

In the research planning stage, the research process of analyzing user satisfaction and designing a chatbot service for Hospital XYZ will be outlined.

A.1. Research Flow of User Satisfaction Analysis

Fig. 1 contains the steps that will be taken in the research, as follows

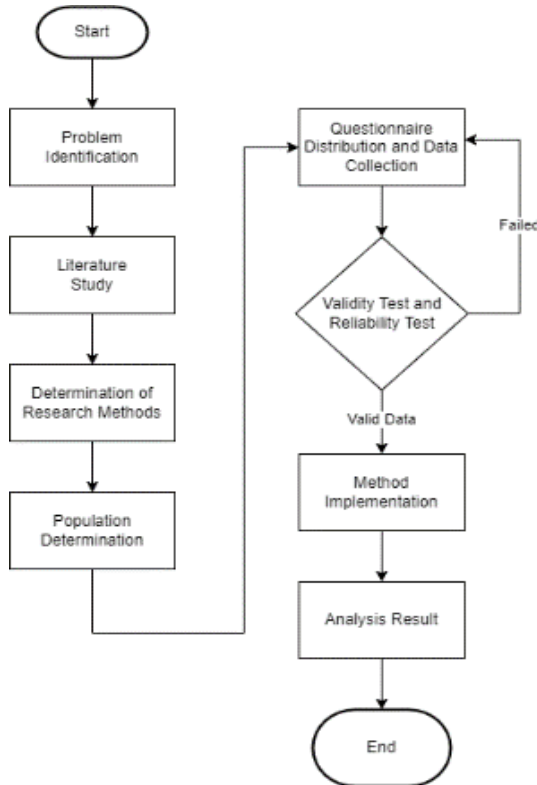


Fig.1. Research Flow of User Satisfaction

The explanation of the steps that will be taken to analyze user satisfaction are as follows:

1. In the problem identification stage, an overview of the problems related to the research is obtained.
2. Searching for various reference sources, including papers and books.
3. In the method selection phase, two methods will be used: System Usability Scale (SUS) and the PIECES method to measure user satisfaction with SIMRS.
4. In the population determination stage, the population is determined to determine the number of respondents to be used using the Slovin Formula.
5. The next step is distributing the questionnaire and collecting the questionnaire data. In this stage, data is obtained from the distribution of questionnaires according to the System Usability Scale (SUS) and PIECES method.
6. The next step is to conduct reliability and validity testing.
7. In the implementation stage, the measurement will be carried out according to the calculation of the System Usability Scale (SUS) and PIECES methods in

measuring the level of user satisfaction, and the calculation results from each method will be obtained.

8. The final step is the analysis of the results, which includes the overall findings of the study and recommendations for XYZ Hospital to improve the SIMRS.

B. Designing Questionnaire

The questions to be given are combined using two methods, namely the System Usability Scale (SUS) method and the PIECES method. The number of questions is 17 items and the questionnaire distribution uses the Indonesian language.

TABLE I. USER SATISFACTION ANALYSIS QUESTIONNAIRE

No	Question	Methods
1.	Can SIMRS speed up the entire service process at XYZ Hospital so that you think you will use this system again?	SUS and PIECES (Efficiency)
2.	Is SIMRS complicated to use and does it take a long time to get the information you need?	SUS and PIECES (Performance)
3.	Are all units connected to each other in SIMRS so that coordination is easy?	SUS and PIECES (Performance)
4.	After conducting training at least once, do you need help from others when using the system?	SUS and PIECES (Service)
5.	In operating the system on a daily basis, does SIMRS produce appropriate outputs with minimal inputs?	SUS and PIECES (Efficiency)
6.	Is there anything that is inconsistent in providing updated information? (For example: Patient Room Status, Room Available, etc.)	SUS and PIECES (Informations and Data)
7.	Is each employee given a user id and password in accordance with their access rights?	PIECES (Control and Security)
8.	Can the system store the same data (duplication of data) so that it can confuse employees?	SUS and PIECES (Information and Data)
9.	Is there no obstacle in processing data to produce information and has it been done quickly?	SUS and PIECES (Performance)
10.	Does the SIMRS system often experience interruptions (errors in accessing) so you need to get used to it before using it?	SUS and PIECES (Service)
11.	Has the data entered into the system been stored in one storage media?	PIECES (Informations and Data)
12.	Does the data stored match what is entered into the SIMRS system?	PIECES (Informations and Data)
13.	Is there a significant change in development with the SIMRS system?	PIECES (Economics)
14.	Are the operational costs incurred by the Hospital less with SIMRS compared to using conventional methods? (Example: use of paper for prescriptions, payment notes, etc.)	PIECES (Economics)
15.	Are the features contained in SIMRS in accordance with the needs of employees?	PIECES (Economics)

No	Question	Methods
16.	In your opinion, can changes in SIMRS only be made by the IT team? (For example: merge separate billing, reset password)	PIECES (Control and Security)
17	In your opinion, is the form of security contained in SIMRS able to protect data or information from various forms of fraud or crime?	PIECES (Control and Security)

IV. RESULT AND DISCUSSION

A. Result of System Usability Scale (SUS) Questionnaire

Eq. 1 is used for calculating the score of the System Usability Scale (SUS) method.

$$\text{Average Value: } \bar{x} = \frac{\sum x}{n} \tag{1}$$

Description:

\bar{x} = Average Score

$\sum x$ = Total SUS Score

n = Number of Respondents

The average responses from the users' satisfaction analysis of the Hospital Information System (SIMRS) at XYZ Hospital are shown in Table II.

Based on the Table II, the SUS score obtained is 57.15 with an Acceptability level categorized as Marginal and a Grade level of "D", and the Adjective Rating level is "Okay". The total number of respondents is 80 employees of XYZ Hospital in the Admission, Pharmacy, Emergency, and Cashier departments.

TABLE II. CALCULATION RESULT OF SUS METHOD

R	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Amount	Total (Amount * 2.5)
R1	3	3	3	1	3	1	3	1	2	1	21	52.5
R2	3	3	3	1	2	1	3	1	2	1	20	50
.
.
R80	2	2	2	2	2	2	3	2	2	2	21	52.5
Grand Total											4527.5	
Score											57.15	

B. The Results of The PIECES Questionnaire

Eq. 2 is used to determine the average value of user satisfaction level using the PIECES method is as follows.

$$RK = \frac{JSK}{JK} \tag{2}$$

Description:

RK = Average Satisfaction

JSK= Total Questionnaire Score

JK = Total Questionnaires

This method involves 6 variables, namely performance, information and data, economy, control and security, efficiency, and service. The responses from the respondents for each question are as follows:

B.1. Performance

$$RK = \frac{(5*17)+(4*101)+(3*73)+(2*48)+(1*1)}{240}$$

$$RK = \frac{85+404+219+96+1}{240}$$

$$RK = \frac{805}{240} = 3,35$$

The result obtained for the Performance variable is 3.35, which falls into the PUAS category.

B.2. Information and Data

$$RK = \frac{(5*17)+(4*171)+(3*68)+(2*61)+(1*3)}{320}$$

$$RK = \frac{85+684+204+122+3}{320}$$

$$RK = \frac{1098}{320} = 3,43$$

The result obtained for the Information and Data variable is 3.43, which falls into the PUAS category.

B.3. Economy

$$RK = \frac{(5*17)+(4*122)+(3*81)+(2*19)+(1*1)}{240}$$

$$RK = \frac{85+488+243+38+1}{240}$$

$$RK = \frac{855}{240} = 3,56$$

The result obtained for the Economy variable is 3.56, which falls into the PUAS category.

B.4. Control and Security

$$RK = \frac{(5*31)+(4*157)+(3*36)+(2*16)+(1*0)}{240}$$

$$RK = \frac{155+628+108+32+0}{240}$$

$$RK = \frac{923}{240} = 3,84$$

The result obtained for the Control and Security variable is 3.84, which falls into the PUAS category.

B.5. Efficiency

$$RK = \frac{(5*14)+(4*99)+(3*43)+(2*4)+(1*0)}{160}$$

$$RK = \frac{70+396+129+8+0}{160}$$

$$RK = \frac{603}{160} = 3,76$$

The result obtained for the Efficiency variable is 3.76, which falls into the PUAS category.

B.6. Service

$$RK = \frac{(5*22)+(4*67)+(3*39)+(2*32)+(1*0)}{160}$$

$$RK = \frac{110+268+117+64+0}{160}$$

$$RK = \frac{559}{160} = 3,49$$

The result obtained for the Service variable is 3.49, which falls into the **PUAS** category.

Based on the Table III, all of them fall into the **PUAS** category. It can be concluded that the SIMRS at XYZ Hospital using the PIECES method has played a good role in improving the quality of services, thereby providing satisfaction to hospital employees who use the SIMRS.

TABLE III. PIECES VARIABLES RECAPITULATION

Variabels	Average Value	Category
<i>Performance</i>	3,35	Puas
<i>Information and Data</i>	3,43	Puas
<i>Economics</i>	3,56	Puas
<i>Control and Security</i>	3,84	Puas
<i>Efficiency</i>	3,76	Puas
<i>Service</i>	3,49	Puas
Satisfaction Level with PIECES Method	3,57	PUAS

C. Comparison of SUS and PIECES Methods

A comparison to determine the quality of SIMRS at XYZ Hospital using the System Usability Scale (SUS) and PIECES methods is shown in Table IV.

TABEL IV. SUS AND PIECES RESULTS COMPARISON

	System Usability Scale (SUS)	PIECES
Score	57,15	3,57
Category	OKAY	PUAS
Grade	D	B

Based on the comparison of the two methods used, it is found that the SIMRS has different levels of satisfaction. The SUS method obtained a score of 57.15 in the "Okay" category and "D" grade, while the PIECES method obtained a score of 3.57 in the "Puas" category and "B" grade. It can be concluded that the PIECES method has a better value compared to the SUS method.

D. Issues with SIMRS

The problems commonly experienced by each department when using SIMRS were identified through interviews with 4 department representatives as respondents to analyze the employee satisfaction towards SIMRS as follows.

D.1. Admission Department

In the Admissions department, there are several issues that are often experienced by XYZ Hospital employees, as follows:

1. The SIMRS often experiences errors and loading issues, which hampers work productivity.
2. Sometimes when inputting new patient data and selecting save, it cannot be done and requires logging in again.
3. Often there are double registrations due to system errors, causing patient data to be duplicated and slowing down the service if there is a system error during registration.

4. The multiple access steps often make users forget.
5. In the "Rencana Tindakan" feature, there are often identity errors during the check of the Identity Number of the Patient because all Identity Numbers are the same. Therefore, when inputting data, the Medical Record Number must be entered first so that the correct identity appears. This can cause the creation of the wrong SEP because the identity is not correct due to the similarity of the Identity Numbers.

D.2. Pharmacy Department

In the Pharmacy department, there are several problems that employees of Hospital XYZ often experience, as follows:

1. Often experience errors during mutation in the Pharmacy department.
2. SIMRS often experiences errors or obstacles when retrieving data globally in the Pharmacy department.
3. SIMRS often experiences errors when saving data.
4. ESP, BPJS Therapy Protocol, and Lab Results should be combined into one to avoid the need for scanning to merge them, thus saving paper and speeding up work.
5. Since the implementation of E-Resep, the system has become slow when inputting data.

D.3. Cashier Department

In the Cashier department, there is an issue that is often experienced by employees of Hospital XYZ, namely sometimes the SIMRS login becomes slow and error-prone.

D.4. Emergency Department

In the UGD field, there are issues frequently encountered by the employees of Hospital XYZ, namely SIMRS errors when logging in or when many people are accessing the system, so the computer that is turned on 24 hours a day needs to be restarted first in the morning before logging in.

E. Impelementation of Chatbot

The Telegram chatbot service of XYZ Hospital can be accessed through the telegram application at https://t.me/rsbalimeddps_bot/ which consists of 3 main menus as follows.

E.1. SPO Staff Feature

The SPO Staff feature is used to assist staff in knowing the Standard Operating Procedures for each problem resolution. The display of the SPO Staff feature can be seen in Fig. 2 to 4.



Fig. 2. SPO Staff Display – System Problem Menu

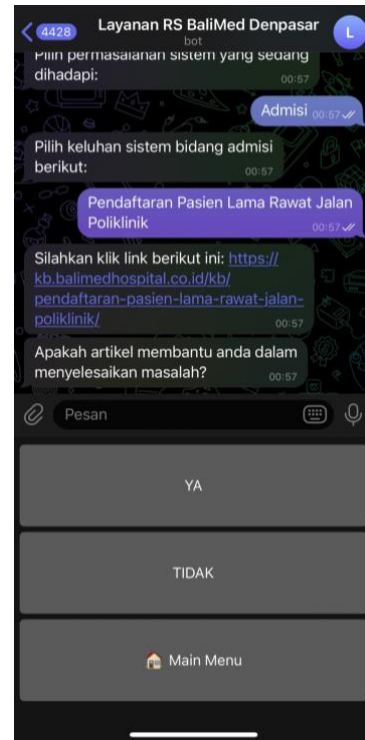


Fig. 4. SPO Staff Display – Feedback Menu

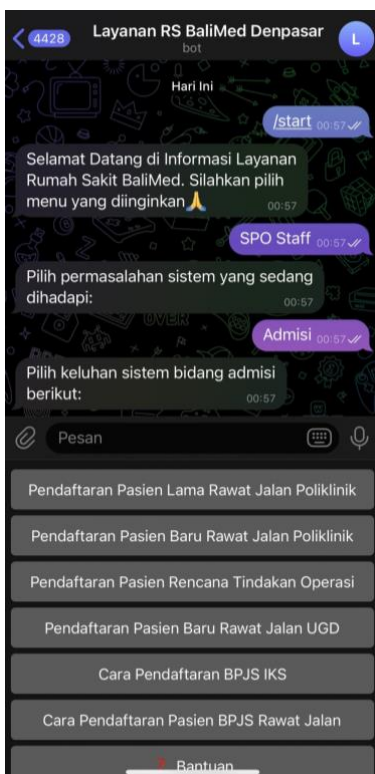


Fig. 3. SPO Staff Display – System Admissions Menu

E.2. Keluhan Teknis Feature

The problem that arises due to dissatisfaction with the technical aspects is expressed in the form of complaints. In this chatbot, it is intended for the complaint feature, the keluhan synonymous with complaint. The Keluhan Teknis feature is used to assist staff in resolving technical issues. The display of the Keluhan Teknis feature can be seen in Fig. 4 and Fig. 5.

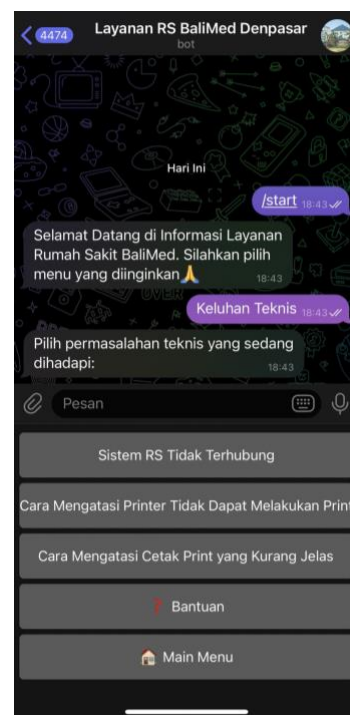


Fig. 4. "Keluhan Teknis" Feature Display – Technical Problem Menu

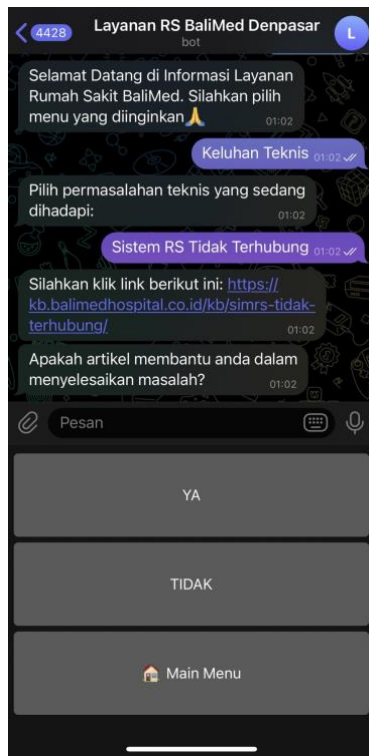


Fig. 5. “Keluhan Teknis” Feature Display – Feedback Menu

E.3. Analisis Kepuasan Pengguna SIMRS Feature

The Analisis Kepuasan Pengguna Feature of SIMRS is used to distribute user satisfaction questionnaires. The display of the SIMRS Analisis Kepuasan Pengguna feature can be seen in Fig. 6 to 8.

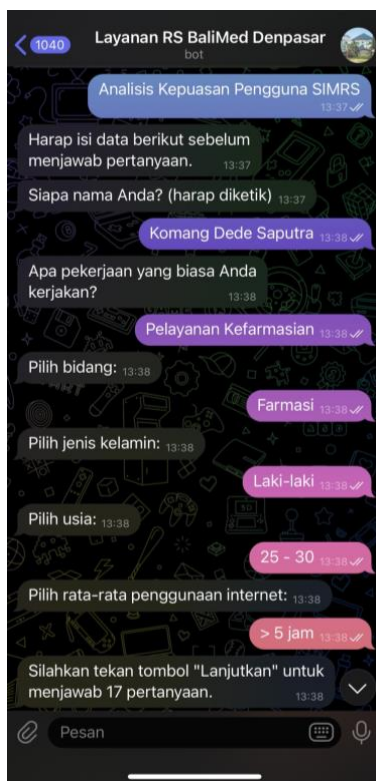


Fig. 6. “Analisis Kepuasan Pengguna SIMRS” Feature Display – Input Form

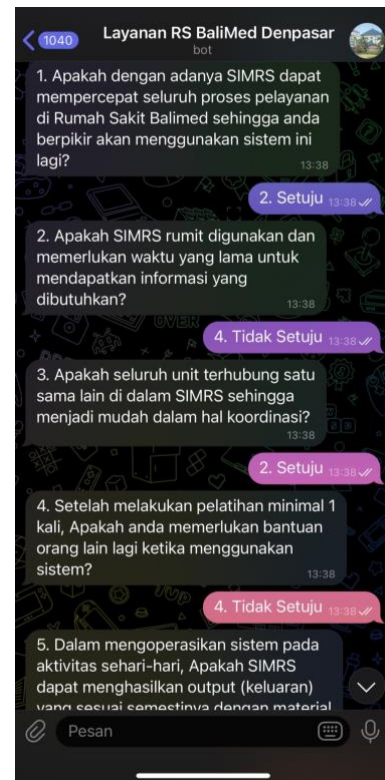


Fig. 7. “Analisis Kepuasan Pengguna SIMRS” Feature Display – Feedback Questions

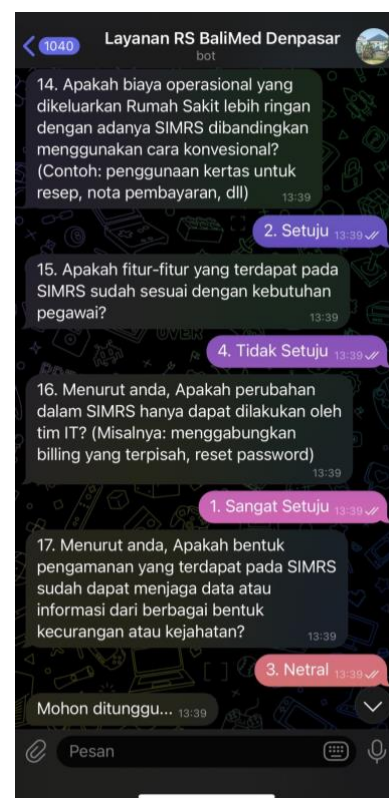


Fig. 8. “Analisis Kepuasan Pengguna SIMRS” Feature Display – Saving Feedback Questions

The data inputed by the user will be directly saved into Google Spread Sheet, which includes the user's personal data and their answers to each questionnaire question

V. CONCLUSION

Based on the research conducted, it can be concluded that:

1. The result of the user satisfaction analysis of SIMRS at Hospital XYZ, consisting of 80 respondents, based on the System Usability Scale (SUS) method obtained a score of 57.15 with the category "Okay" and grade "D", while on the PIECES method obtained a score of 3.57 with the category "Puas" and grade "B", thus the PIECES method has a better value than the SUS method.
2. The Chatbot Service of XYZ Hospital is implemented using the Telegram application with 3 main features: SPO Staff Feature is used to assist staff in knowing the Standard Operating Procedures (SPO) for each problem resolution, Technical Complaints Feature is used to assist staff in solving technical problems, and SIMRS User Satisfaction Analysis Feature is used to distribute user satisfaction questionnaires that are integrated with Google Spread Sheet.

REFERENCES

- [1] A. M. Nur Fauzi, A. Triayudi, and I. D. Sholihati, "Mengukur Tingkat Kepuasan Pengguna Aplikasi Kearsipan Menggunakan System Usability Scale Dan Pieces Framework," *JUPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform.*, vol. 7, no. 1, pp. 231–239, 2022, doi: 10.29100/jupi.v7i1.2452.
- [2] R. T. Aldisa, E. Samudra, and R. Sahara, "Perbandingan Metode Pieces Dan System Usability Scale Untuk Menganalisa Kepuasan Pengguna Pada Sistem Penyewaan Mobil Berbasis Android," vol. 9, no. 4, pp. 1094–1102, 2022, doi: 10.30865/jurikom.v9i4.4705.
- [3] N. Luh Putri Ari Wedayanti, N. Kadek Ayu Wirdiani, and I. Ketut Adi Purnawan, "Evaluasi Aspek Usability pada Aplikasi Simalu Menggunakan Metode Usability Testing," *J. Ilm. Merpati (Menara Penelit. Akad. Teknol. Informasi)*, vol. 7, no. 2, p. 113, 2019, doi: 10.24843/jim.2019.v07.i02.p03.
- [4] W. Anggraini, N. Nofriza, R. M. Candra, and W. U. Sari, "Analisis Pada Sistem Informasi Akademik Mahasiswa Menggunakan Metode System Usability Scale," *J. Penelit. Saintek*, vol. 25, no. 2, pp. 184–194, 2020.
- [5] P. L. Lokapitasari Belluano, I. Indrawati, H. Harlinda, F. A. . Tuasamu, and D. Lantara, "Analisis Tingkat Kepuasan Pengguna Sistem Informasi Perpustakaan Menggunakan Pieces Framework," *Ilk. J. Ilm.*, vol. 11, no. 2, pp. 118–128, 2019, doi: 10.33096/ilkom.v11i2.398.118-128.
- [6] I. G. A. A. Diah Indrayani, I. P. A. Bayupati, and I. M. S. Putra, "Analisis Usability Aplikasi iBadung Menggunakan Heuristic Evaluation Method," *J. Ilm. Merpati (Menara Penelit. Akad. Teknol. Informasi)*, vol. 8, no. 2, p. 89, 2020, doi: 10.24843/jim.2020.v08.i02.p03.
- [7] Y. Yusran, "Perancangan Sistem Informasi Administrasi Pembayaran SPP Siswa Berbasis Web," *Edik Inform.*, vol. 6, no. 2, pp. 7–14, 2020, doi: 10.22202/ei.2020.v6i2.3980.
- [8] A. F. Sallaby and I. Kanedi, "Perancangan Sistem Informasi Jadwal Dokter Menggunakan Framework Codeigniter," *J. Media Infotama*, vol. 16, no. 1, pp. 48–53, 2020, doi: 10.37676/jmi.v16i1.1121.
- [9] R. Narang, "Peraturan Kementerian Kesehatan Republik Indonesia," vol. 16, no. 22, pp. 119–128, 2013.
- [10] BaliMed, "BaliMed Denpasar." 2019, [Online]. Available: <https://balimedhospital.co.id/id/balimed-denpasar/>.
- [11] B. A. Made Ngakan and U. J. Joy Nashar, "Penerapan Metode PIECES Framework Pada Tingkat Kepuasan Sistem Informasi Layanan Aplikasi Myindihome," *J. Sist. Komput. dan Inform. Hal 325–*, vol. 332, no. 3, pp. 325–332, 2022, doi: 10.30865/json.v3i3.3964.
- [12] M. Kurosu, *Human Centered Design*. 2009.
- [13] Z. Miftah and I. P. Sari, "Analisis Sistem Pembelajaran Daring Menggunakan Metode Sus," *Res. Dev. J. Educ.*, vol. 1, no. 1, p. 40, 2020, doi: 10.30998/rdje.v1i1.7076.
- [14] D. Khuntari Manajemen Informasi dan Komunikasi and S. Yogyakarta, "Analisis Usability Google Workspace for Education di Universitas dengan System Usability Scale Usability Analysis of Google Workspace for Education in University using System Usability Scale," *Februari*, vol. 21, no. 1, pp. 76–88, 2022.
- [15] I. A. G. R. W. Astari and I. N. T. Putra, "Analisis Sistem Informasi Kemdikbud pada SD Negeri 2 Dawan Klod Dengan System Usability Scale," *JIKO (Jurnal Inform. dan Komputer)*, vol. 4, no. 1, pp. 23–30, 2021, doi: 10.33387/jiko.
- [16] R. N. Patton, *Analysis and Design Methods.*, vol. 18, no. 4. 1985.
- [17] R. Prayogi, K. Ramanda, C. Budihartanti, and A. Rusman, "Penerapan Metode PIECES Framework Dalam Analisis dan Evaluasi Aplikasi M-BCA," *J. Infortech*, vol. 3, no. 1, pp. 7–12, 2021, doi: 10.31294/infortech.v3i1.10122.
- [18] A. R. A. Nalendra *et al.*, *Statistika Seri Dasar dengan SPSS*. 2021.
- [19] R. A. Purnomo, *Analisis Statistik Ekonomi dan Bisnis Dengan SPSS*. 2016.
- [20] S. P. Hadi Ismanto, *Aplikasi SPSS Dan Eviews Dalam Analisis Data Penelitian*. 2021.

- [21] B. Darma, *Statistika Penelitian Menggunakan SPSS (Uji Validitas, Uji Reliabilitas, Regresi Linier Sederhana, Regresi Linier Berganda, Uji t, Uji F, R2)*. 2021.
- [22] E. Mursidah, L. Ambarwati, A. Karima, K. Kunci, : Chatbot, and M. Baru, "Implementasi Chatbot Layanan Informasi Pendaftaran Mahasiswa Baru Program Pascasarjana Departemen Teknik Informatika Its Implementation of Chatbot Information Services for New Student Registration Postgraduate Program Its Information Engineering Departmen," *J. Ilm. NERO*, vol. 7, no. 1, p. 2022, 2022.
- [23] H. D. Permana, A. A. Hapsari, D. Nugraha, and A. Jaenul, "Evaluasi Kinerja Sistem Aplikasi E-commerce Shopee menggunakan Metode PIECES Framework," *J. ICT Inf. Commun. Technol.*, vol. 20, no. 2, pp. 202–209, 2021, doi: 10.36054/jict-ikmi.v20i2.358.