SYNTIA – Systems and Technologies in Artificial Intelligence Applications.
E-ISSN: XXXX-XXXX. Volume 1 Issue 1 (December 2025). Page: 1-10.
DOI: 10.1234/syntia.v1i1.2025.xxx.

Decision Support System for Patient Satisfaction with Healthcare Services Using the Preference Selection Index (PSI)

Fein Dwi Muhammad[1*], Rahma Laila[2], Prakasit Poonwong[3]

[1*]*Information Technology Department, Engineering Faculty, Universitas Tadulako, Indonesia. E-mail: feininformatika17@gmail.com*
[2] *Information Technology Department, Engineering Faculty, Universitas Tadulako, Indonesia. E-mail: rahmah.laila91@gmail.com*
[3] *Boromarajonani College of Nursing, Chainat, Nursing Faculty, Praboromrajchanok Institute, Thailand. E-mail: prakasit@bcnchainat.ac.th*

Abstract: The range of patient satisfaction and healthcare services generally provided by community health centers (Puskesmas) includes curative services (treatment), preventive services (disease prevention), promotive services (health promotion), and rehabilitative services. The existence of Puskesmas helps address the community's need for accessible and adequate healthcare services. The objective of this research is to implement the Preference Selection Index (PSI) method within a system designed to assess patient satisfaction and facilitate data processing at the Tawaeli Community Health Center. This system is intended to support and simplify the work of Puskesmas staff. The Preference Selection Index (PSI) method is a multi-criteria decision-making (MCDM) approach. In this method, it is not necessary to define the relative importance among attributes, nor is it required to compute attribute weights during the decision-making process. In meeting patient satisfaction with service at the Tawaeli Community Health Center, several challenges have been identified, including patient complaints about service quality, such as the lack of suggestion boxes and the limited availability of specialist doctors. Therefore, a decision support system will be developed using the PSI method to improve and evaluate patient satisfaction with services at the Tawaeli Community Health Center.

Keywords : Satisfaction; Community Health Center; Patients; Healthcare Services; Preference Selection Index.

Received: November 01, 2025 | Revised: November 28, 2025 | Accepted: December 15, 2025 | Published: December 31, 2025

1. Introduction

Service quality is the level of service related to the fulfillment of consumer expectations and needs. In other words, a service can be considered high quality if it meets most consumer expectations. Patient satisfaction and healthcare services commonly provided by community health centers (Puskesmas) include curative services (treatment), preventive services (preventive efforts), promotive services (health promotion), and rehabilitative services [1]. Service quality is a form of consumer evaluation of the services received and the level of service expected [2]. Service can be defined as actions carried out to assist, prepare, and manage goods or services from one party to another [3]. Service quality can be determined by comparing consumer perceptions of the services provided, based on service characteristics, with the services they actually expect [4].

The types of basic services included in the Minimum Service Standards (SPM) for public health at the district/city level consist of healthcare services for pregnant women, newborns, infants, elementary school students, individuals of reproductive age, and the elderly. In addition, healthcare services have been developed for patients with hypertension, diabetes mellitus, severe mental disorders, suspected tuberculosis, and communities at risk of infection by viruses that weaken the immune system [5]. A Decision Support System (DSS), also known as a Decision Support System (DSS), is a system that provides problem-solving capabilities and can communicate in both structured and unstructured ways to address specific problems. DSS is designed to be user-friendly and easy to operate, even for individuals with only basic computer skills [6]. A decision support system is a computer-based decision-making process that assists decision-makers in solving various unstructured problems using specific data and models [7].

Similar research was conducted by Ben et al. in 2023 entitled Introducing a Decision Support System Using the Preference Selection Index (PSI) Method in the Recruitment of Graphic Design Teachers. Graphic design teachers are highly needed in various schools because graphic design plays an important role in knowledge dissemination and in helping individuals find jobs that match their skills [8]. Similar research was also conducted by Laia et al. in 2022 entitled Feasibility of COVID-19 Patient Data Scanner Results Using the Preference Selection Index (PSI) Method. This method is useful when conflicts arise in determining the relative importance among attributes. In the PSI index calculation stage, criterion weights are determined based on the information contained in the decision matrix [9]. Further related research was conducted by Panggabean and Hasibuan in 2020 entitled Application of the Preference Selection Index (PSI) in a Decision Support System for the Appointment of Housekeeping Supervisors. The Preference Selection Index (PSI) method was developed by Maniya and Bhatt (2010) to solve multi-criteria decision-making (MCDM) problems. In the proposed method, it is not necessary to define the relative importance of attributes [10].

Similar studies were also carried out by Fauziyah et al. in 2022 entitled Decision Support System for Selecting Tutoring Instructors Using the Preference Selection Index (PSI) Method. This research focuses on learning management activities conducted by management teams in collaboration with various institutions, such as the Ministry of Education, job placement agencies, and industries in the Majalaya region [11]. Another related study was conducted by Siregar and Mesran in 2020 entitled Decision Support System for Evaluating the Best Students in Junior High Schools Using the Preference Selection Index (PSI) Method. Identifying outstanding students requires a lengthy process because each student has different abilities. This selection process may be subjective and may not always be appropriate for determining the best students [12]. Therefore, it is necessary to develop a decision support system that supports and facilitates staff and personnel in the field of patient services. The objective of this research is to determine patient satisfaction at the Tawaeli Community Health Center, identify the optimal level of patient satisfaction, and facilitate decision-making by using the PSI method through the development of a decision support system. This system is expected to simplify data processing and make the operations of the community health center more efficient.

2. Method

2.1. Research Location

The location determined for this research is Tawaeli Community Health Center (Puskesmas Tawaeli), located at Bulangisi Street, Tawaeli District, Palu City, Central Sulawesi, postal code 94352.

2.2. Research Tools

The hardware used in this study includes an Acer Aspire E-5473 Series laptop with an Intel® Core i5 CPU and 4 GB DDR3 RAM. The software used consists of Sublime Text, web browser, XAMPP, Microsoft Word 2010, and Microsoft Excel 2010.

2.3. Research Materials

The materials required for this research include data from the research location, patient visit data, and questionnaire result data.

2.4 Development Method

The software development in this research uses the Waterfall model. The Waterfall development method consists of several sequential stages, namely: Requirements analysis, System design, Coding and testing, Program implementation, and Maintenance [13].

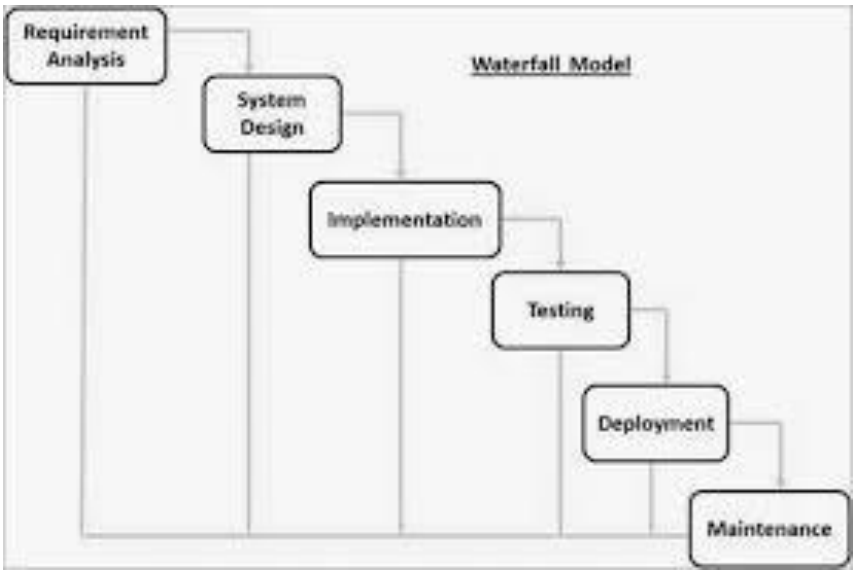

Figure 1. Waterfall Model

The explanation of the Waterfall model shown in Figure 1 is as follows:

a. Requirements Analysis
At this stage, the system developer engages in communication to understand user expectations regarding the software as well as the software's limitations. This information is typically obtained through interviews, discussions, or direct questioning. The collected information is then analyzed to determine the necessary data.

b. System Design
In this phase, the requirements identified in the previous stage are reviewed, and the system design is created. System design helps determine hardware and system requirements and also assists in defining the overall system architecture.

c. Implementation
During this phase, the system is initially developed in small programs called units, which are integrated in later stages. Each unit is developed and functionally tested, a process known as unit testing.

d. Testing
All units developed during the implementation phase are integrated into a complete system after individual unit testing. After integration, the entire system is checked for errors or defects.

e. Deployment and Maintenance
This phase is usually (but not always) the longest. The system is fully installed and operational. This final stage of the Waterfall model ensures the software is running and maintained. Maintenance includes correcting any errors that were not detected in previous steps.

2.5. Data Collection Techniques

The data collection techniques used in this research are as follows:

a. Interviews
Interviews are a technique for collecting data directly, conducted by the researcher to obtain the required information. In this study, the researcher conducted surveys with community members who received treatment and used the services of Tawaeli Community Health Center (Puskesmas Tawaeli) to obtain data used as the primary research data.

b. Literature Study
A literature study involves collecting written sources such as books, articles, journals, documents, and other references by reading, analyzing, and recording important information related to the research.

c. Observation

Observation is a common activity conducted in many fields. In research, observation is an essential activity that must be carried out by every researcher. Observation is conducted to obtain data or insights relevant to the study.

2.6. Preference Selection Index (PSI) Method

The Preference Selection Index (PSI) method is a technique for solving multi-criteria decision-making (MCDM) problems. In this proposed method, it is not necessary to determine the relative importance of attributes. In fact, the method does not require the calculation of attribute weights for decision-making [14].The procedural steps of the PSI method are as follows:

1. Normalize the decision matrix.
2. Normalize the decision matrix (repetition in original text likely emphasizes thorough normalization).
3. Calculate the mean value of the normalized data.
4. Calculate the preference variation value.
5. Determine deviations in preference values.
6. Determine the weights of the criteria.
7. Calculate the PSI values.

The final PSI result indicates that the best alternative is the one with the highest PSI value after completing the series of steps in this method.

3. Results and Discussion

3.1. System Implementation

This implementation stage describes the application of the Decision Support System for Patient Satisfaction with Healthcare Services Using the Preference Selection Index (PSI) Method: A Case Study at Tawaeli Community Health Center (Puskesmas Tawaeli).

a. Respondent Data Input

Figure 2 shows the respondent data input page. On this page, information such as the patient's name, age, gender, and address is entered to populate the patient's biodata into the system application.

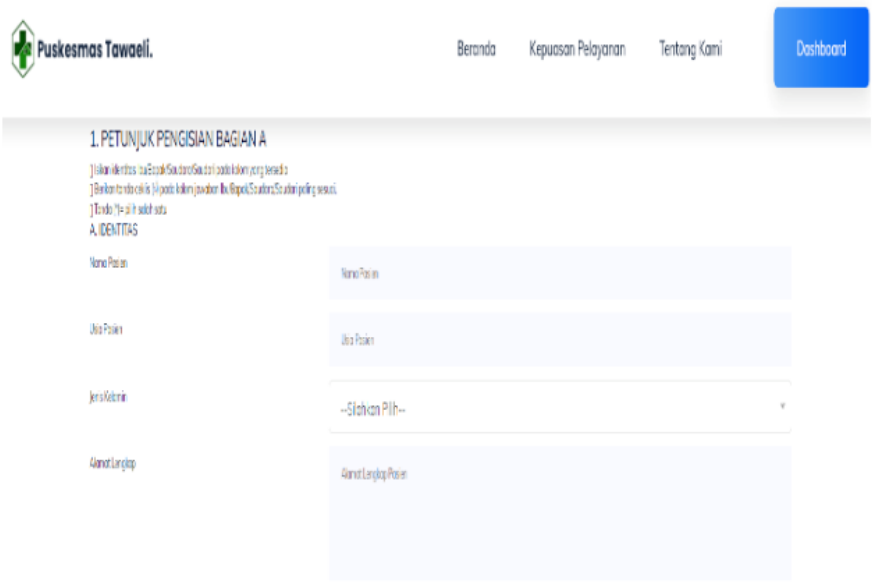

Figure 2. Respondent Data Input Page

b. Criteria Data Input Page

Figure 3 shows the page for entering criteria data for the respondents.

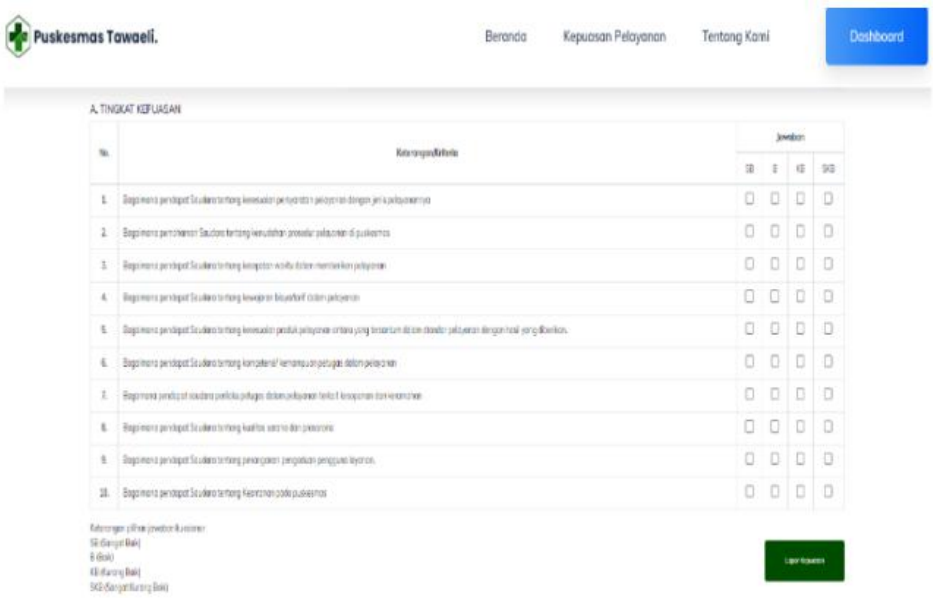

Figure 3. Criteria Data Input Page

c. Criteria Value Data Input Page

Figure 4 shows the criteria and their corresponding values. This page is accessible only by the administrator.

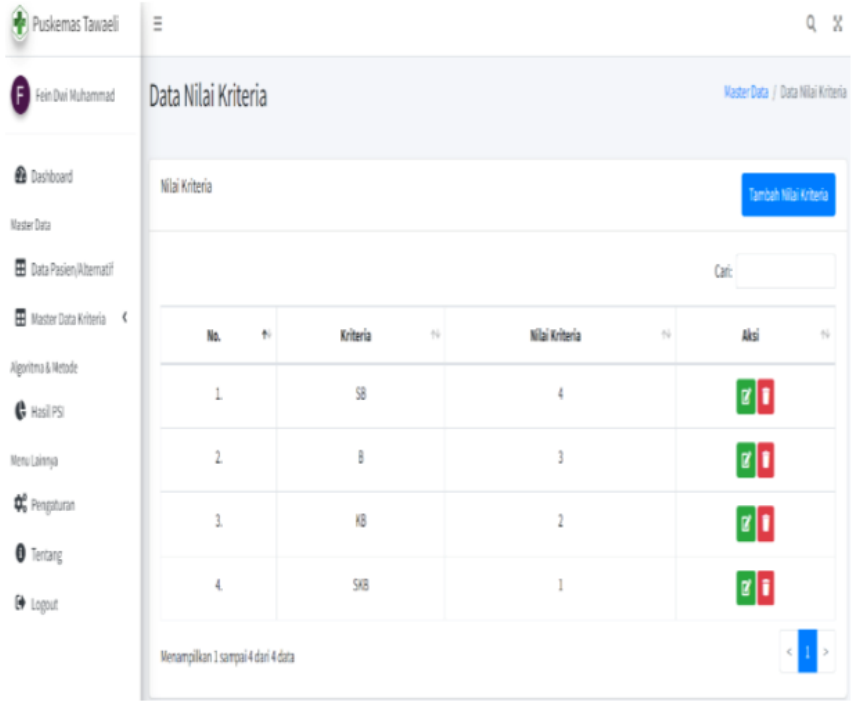

Figure 4. Alternative Data Page

d. Patient Data Form

Figure 5 shows the patient data page, where respondents fill in their personal information. This page is accessible only by the administrator.

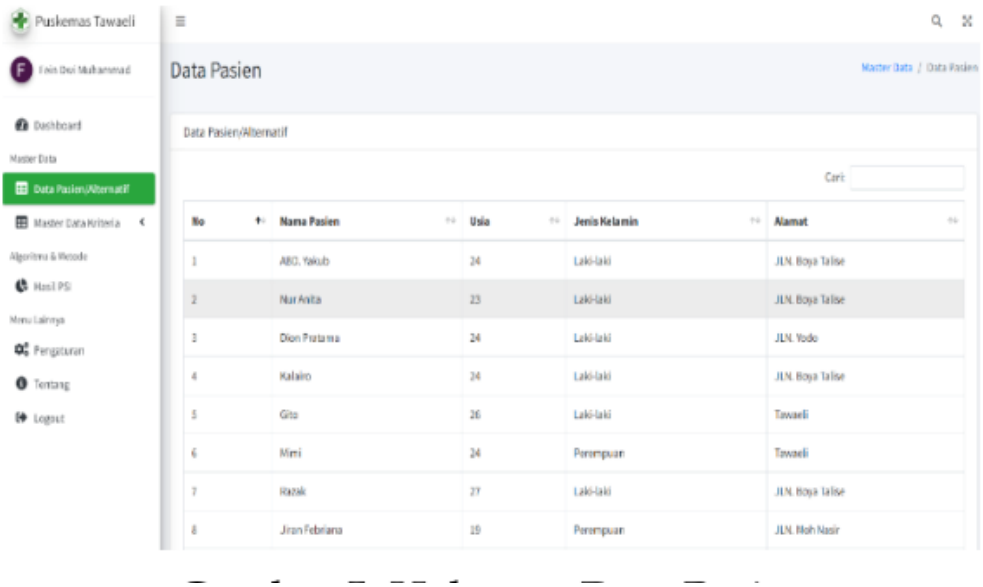

Figure 5. Patient Data Page

e. Matrix Creation Process Form

Figure 6 shows the page displaying respondent values. This page is used to view the values entered by the respondents and is accessible only by the administrator.

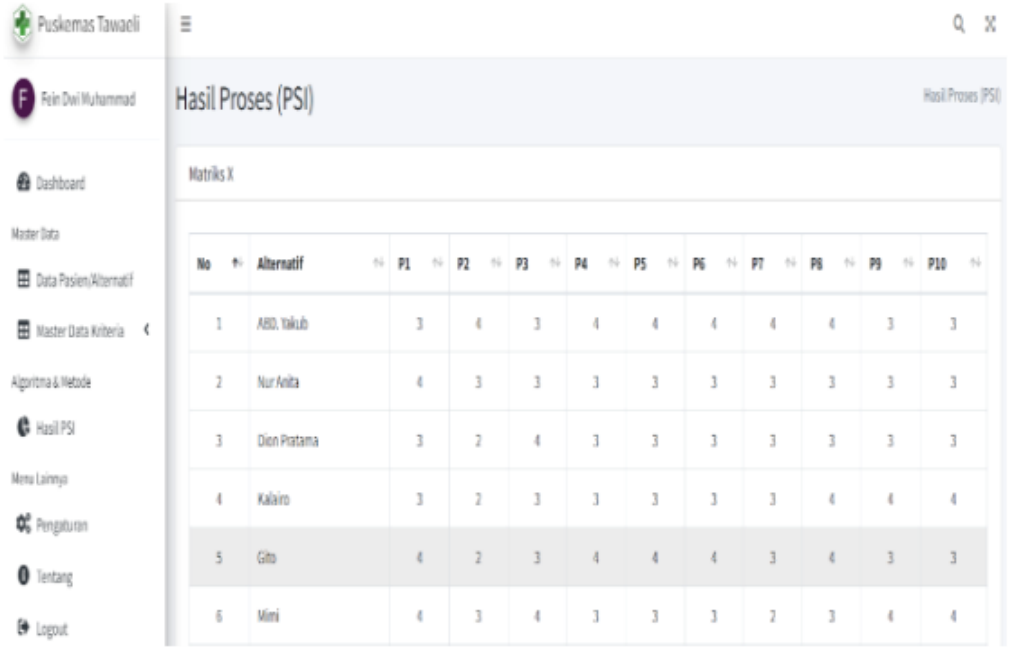

Figure 6. Matrix X Processing Results Page

f. Normalized Matrix Page

Figure 7 shows the page displaying the results of the normalized matrix. This page is accessible only by the administrator.

Figure 7. Add Criteria Page

g. Determining the Average Value

Figure 8 shows the page for calculating the average value from the normalized matrix. This page is accessible only by the administrator.

Figure 8. Evaluation Page

h. Determination of Preference Variation Values

Figure 9 shows the page for determining the results of preference variation values. This page is accessible only by the administrator.

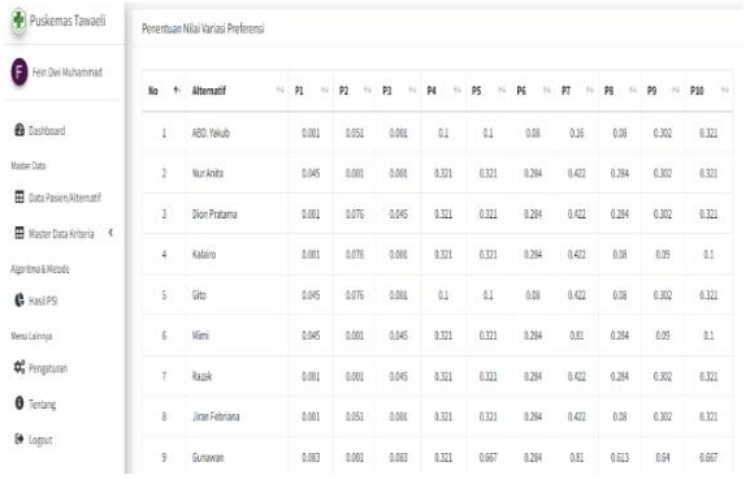

Figure 9. Penentuan nilai variasi prefensi

i. PSI Calculation Results Form

The patient rankings are displayed in this section, as shown in Figure 10.

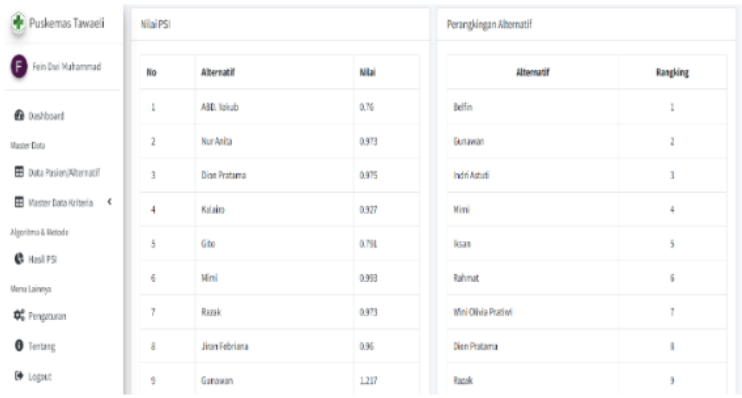

Figure 13. Ranking Results

3.2. Application of the Preference Selection Index (PSI) Method

To address the problem above, the PSI method is applied following the steps outlined in the methodology section. Manual testing in this study produced the final values, which are presented in Table 1.

Table 1. PSI Ranking Results

No	Name	Value	Rank
1	Belfin	0,8297	1
2	Gunawan	0,8289	2
3	Indri astuti	0,8152	3
4	Mimi	0,8052	4
5	Iksan	0,8032	5
6	Rahmat	0,8013	6
7	Wini olivia	0,7964	7
8	Rajat	0,7884	8
9	Dion pratama	0,7874	9
10	Rajat	0,7837	10

Based on the ranking results in Table 1, Jiran Febriana obtained the highest score and ranking, with a value of 0.8297, placing her at rank 1.

3.3. Black Box Testing

Black box testing is a software testing method that focuses on evaluating the functionality of a system without considering its internal structure. This type of testing is used to ensure system security and optimal performance without requiring in-depth technical knowledge of the system's internal implementation. In this study, black box testing was conducted to assess the system's functionality before deployment [15].

3.4. User Satisfaction Testing

The user satisfaction testing for this system involves administrators directly using the developed system, completing a satisfaction questionnaire, and inputting data into the system. Questionnaire testing is conducted objectively by distributing surveys to local community members, particularly those who have previously visited Tawaeli Community Health Center (Puskesmas Tawaeli). A sample of 20 respondents was taken. The system calculates results based on the questionnaire responses to determine conclusions regarding the highest scoring rankings. The questionnaire consists of 10 questions, with answers categorized into four levels: very good, good, fair, and poor.

4. Conclusion

The conclusion of this study is that the Decision Support System for patient satisfaction with healthcare services using the Preference Selection Index (PSI) method can provide an overview or perception of the community regarding the services available at the community health center. The PSI approach allows the system to generate rankings and more accurate values, enabling decisions to be made based on the highest value, which receives a rank 1 designation. This means a service is considered high quality if it meets most consumer expectations. Based on the steps outlined in the Waterfall development method, the process consists of requirements analysis, system design, coding, program testing, and operation and maintenance. This system is designed to assess patient satisfaction with services because the PSI method can determine rankings based on satisfaction values. The main objective is to ensure patient satisfaction at the health center by supporting decision-making through the PSI method and building a decision support system that facilitates the operational processes of the community health center.

Author Contributions Statement

Fein Dwi Muhammad: Conceptualization, Methodology, Software, Data Curation, Formal Analysis, Visualization, Writing – Original Draft.
Rahma Laila: Data Curation, Investigation, Validation, Software, Writing – Review & Editing.
Prakasit Poonwong: Supervision, Methodology, Resources, Writing – Review & Editing.

References

[1] F. Ramadhan, D. Muhafidin, dan D. Miradhia, "Kualitas Pelayanan Kesehatan Puskesmas Ibun Kabupaten Bandung," JANE - J. Adm. Negara, vol. 12, no. 2, p. 58, 2021, doi: 10.24198/jane.v12i2.28684.

[2] M. I. H. Ahmad Zikri, "Analisis Kualitas Pelayanan Pengiriman Barang terhadap Kepuasan Konsumen pada PT Pos Indonesia Regional I Sumatera," J. Ilmu Komputer, Ekon. dan Manaj., vol. 1, no. 1, pp. 129–138, 2022.

[3] S. Suandi, "Analisis Kepuasan Masyarakat terhadap Pelayanan Publik Berdasarkan Indeks Kepuasan Masyarakat di Kantor Kecamatan Belitang Kabupaten OKU Timur," J. PPS UNISTI, vol. 1, no. 2, pp. 13–22, 2019, doi: 10.48093/jiask.v1i2.8.

[4] M. Andayani, "Pengaruh Kualitas Pelayanan dan Disiplin Kerja Terhadap Kepuasan Pasien Rawat Inap Pada Rumah Sakit Umum Daerah Kabupaten Lahat," Motiv., vol. 6, no. 1, pp. 2716–4039, 2021. [Online]. Available: http://jurnal.um-palembang.ac.id/motivasi

[5] M. Zudi, A. Suryoputro, dan S. P. Arso, "Analisis Implementasi Standar Pelayanan Minimal Bidang Kesehatan di Puskesmas Guntur I Kabupaten Demak," JKM (Jurnal Kesehat. Masyarakat) Cendekia Utama, vol. 8, no. 2, p. 165, 2021, doi: 10.31596/jkm.v8i2.681.

[6] I. Zulkarnain, A. Calam, S. N. Arif, B. Anwar, dan P. Insani, "Sistem Pendukung Keputusan Dalam Menentukan Ketua Kelompok Kerja Madrasah Menggunakan Metode MOORA," J-SISKO TECH (Jurnal Teknol. Sist. Inf. dan Sist. Komput. TGD), vol. 6, no. 2, p. 472, 2023, doi: 10.53513/jsk.v6i2.7989.

[7] M. Y. Simargolang, Y. Imanita, dan M. Thasandra, "Rekomendasi Pemasangan Wifi.id di Lokasi Strategis Menggunakan Metode COPRAS," Sist. Pendukung Keputusan dengan Apl., vol. 2, no. 1, 2023, doi: 10.55537/spk.v2i1.612.

[8] B. Rahman, I. Hasian, N. Y. Arifin, J. Hutahaean, dan R. A. Atmoko, "Penerapan Sistem Pendukung Keputusan dalam Penerimaan Pengajar Desain Grafis Menerapkan Metode Preference Selection

Index (PSI)," J. Media Inform. Budidarma, vol. 7, no. 2, pp. 891–897, 2023, doi: 10.30865/mib.v7i2.6099.

[9] S. Laia, F. Sonata, dan S. Yakub, "Kelayakan Hasil Scanner Data Pasien Covid-19 Menggunakan Metode PSI (Preference Selection Index)," J. Sist. Inf. Triguna Dharma (JURSI TGD), vol. 1, no. 3, p. 182, 2022, doi: 10.53513/jursi.v1i3.5217.

[10] R. Panggabean dan N. A. Hasibuan, "Penerapan Preference Selection Index (PSI) Dalam Sistem Pendukung Keputusan Pengangkatan Supervisor Housekeeping," Resolusi Rekayasa Tek. Inform. dan Inf., vol. 1, no. 2, pp. 85–93, 2020, doi: 10.30865/resolusi.v1i2.70.

[11] F. Fauziyah, F. Nugroho, dan E. Buulolo, "Sistem Pendukung Keputusan Pemilihan Instruktur Bimbingan Belajar Menggunakan Metode PSI (Preference Selection Index)," Build. Informatics, Technol. Sci., vol. 4, no. 3, pp. 1447–1455, 2022, doi: 10.47065/bits.v4i3.2695.

[12] U. R. Siregar dan Mesran, "Sistem Pendukung Keputusan Penilaian Siswa Terbaik Pada Sekolah Menengah Pertama Menggunakan Metode Preferences Selection Index (PSI)," Semin. Nas. Teknol. Komput. Sains, pp. 459–466, 2020.

[13] A. Abdul Wahid, "Analisis Metode Waterfall Untuk Pengembangan Sistem Informasi," J. Ilmu-ilmu Inform. dan Manaj. STMIK, no. November, pp. 1–5, 2020.

[14] D. Science, W. I. Safitri, P. T. Informatika, dan U. B. Darma, "Penerapan Metode Preference Selection Index (PSI) Dalam Penerimaan Staff IT," vol. 1, no. 1, pp. 1–5, 2022.

[15] R. R. N. Fikri, Indera, A. Rahardi, dan I. Agus, "Pengujian Blackbox pada Sistem Informasi Komunitas Pecinta Kucing di Bandar Lampung," Teknika, vol. 18, no. x, pp. 25–34, 2024.