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Implementation of a Decision Support System for Selecting the Best Supplier Using the SAW Method

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Abstract

This study aims to design and implement a Decision Support System (DSS) based on the Simple Additive Weighting (SAW) method in the process of selecting the best supplier within the Micro, Small, and Medium Enterprises (MSMEs) environment, with a case study on Thaiyo Thaitea. In the face of increasingly competitive business environments, choosing the right supplier is a crucial factor in maintaining operational efficiency and service quality. However, the supplier selection process is often subjective and unstructured. Therefore, the SAW method is implemented to provide an objective and systematic approach to evaluating multiple supplier alternatives based on various criteria. This study uses five main criteria in supplier evaluation: price, product quality, completeness, delivery timeliness, and service. The SAW method allows for weighting and normalizing these criteria, resulting in a quantitative ranking of suppliers. The research findings indicate that supplier H. Slamet (A1) achieved the highest score (12.01), making it the best choice for Thaiyo Thaitea. System validation was conducted using the Black Box method to test the application's reliability and functionality. The test results demonstrate that all core features, including criteria data management, assessment processes, and user authentication, function as expected. This study provides practical contributions to improving efficiency and objectivity in the decision-making process for MSMEs. The study's implications indicate that the implementation of the SAW method in DSS can produce more transparent, accurate, and structured decisions. This research opens opportunities for further development through real-time data integration or comparisons with other Multi-Criteria Decision Making (MCDM) methods to enhance decision-making flexibility and accuracy in the future.

I. INTRODUCTION

In the era of globalization and increasingly intense business competition, Micro, Small, and Medium Enterprises (MSMEs) play an important role in a country's economy. One crucial aspect of MSME operations is selecting the right supplier to ensure smooth production and product quality. Suppliers are essential business partners who play a significant role in ensuring the availability of the supplies needed by the company [1]. A reliable supplier ensures the availability of quality raw materials, which in turn enhances business competitiveness and reputation. Supplier selection is not a simple task; it requires evaluation based on various criteria such as product quality, price, delivery timeliness, and after-sales service. Random decisions made without a clear method can lead to uncertainty in business relationships and negatively impact company performance. Therefore, a systematic and data-driven approach is essential to evaluate and select the supplier that best meets the company's needs.

Decision Support Systems (DSS) provide an effective solution to assist in complex and multi-criteria decision-making [2]. DSS utilizes information technology to collect, process, and analyze data, providing accurate

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information to support decision-making [3], [4]. In the context of supplier selection, DSS enables companies to evaluate and compare various alternatives based on predetermined criteria, reducing uncertainty and increasing consistency in decision-making.

One of the most commonly used methods in Decision Support Systems (DSS) is Simple Additive Weighting (SAW), which falls under the category of Multi-Criteria Decision Making (MCDM). The SAW method has advantages in ease of implementation and its ability to provide transparent and consistent results by assigning weights to each predetermined criterion and summing the performance values of each alternative across all criteria. In the context of supplier selection, the SAW method can accommodate various evaluation factors such as price, product quality, delivery timeliness, order flexibility, and supply stability, which often have different levels of importance for each company.

Previous research has shown that the application of the SAW method in DSS can improve objectivity and accuracy in supplier selection. For example, a case study in the manufacturing industry demonstrated that the SAW method is effective in evaluating supplier performance based on relevant criteria, helping companies determine the best supplier choice [5]. Another study also shows that the SAW method can be used to rank existing alternatives based on predetermined criteria, thus aiding in more objective decision-making [6].

By integrating the SAW method into a Decision Support System (DSS), the decision-making process becomes more structured, objective, and quantitative. This is particularly relevant for Micro, Small, and Medium Enterprises (MSMEs), which often face resource limitations in conducting complex manual analyses. Through a SAW-based DSS, MSMEs can efficiently identify the best supplier, thereby improving operational efficiency and enhancing competitiveness in a dynamic market. Therefore, this study aims to design and implement a Decision Support System based on the SAW method to assist MSMEs in selecting the best supplier optimally and measurably. This research is expected to provide practical contributions to supply chain management and enrich the literature on the application of Multi-Criteria Decision Making (MCDM) in the small and medium enterprise sector.

II. LITERATURE REVIEW

Research implementing the SAW method in Decision Support Systems (DSS) has been conducted in various fields. For example, a study applied the SAW method in decision-making for employee bonus allocation, aiming to simplify the evaluation process and improve employee motivation and job satisfaction [7]. The SAW method is used to determine recipients of Direct Cash Assistance (BLT), aiming to ensure that the aid is accurately targeted to eligible beneficiaries [8]. In the context of education, the SAW method is applied for student ranking, assisting in the assessment process and decision-making related to academic performance [9]. Overall, the application of the SAW method in Decision Support Systems (DSS) has proven to assist decision-makers in various contexts. The strength of this method lies in its ability to perform accurate assessments by considering multiple criteria, resulting in more objective and precise decisions [10], [11].

A. UMKM

MSMEs are businesses that play an important role in Indonesia's economy, both in terms of job creation and the number of enterprises [12]. Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in Indonesia's economy. They not only contribute significantly to the Gross Domestic Product (GDP) but also serve as a primary source of job creation, helping to reduce unemployment and poverty levels [13]. Research shows that MSMEs are capable of surviving and adapting to various economic conditions, including during crises, making them the backbone of the national economy. Regarding Micro, Small, and Medium Enterprises (MSMEs), they are defined based on asset and turnover criteria as follows [14]:

a. Micro Business: Have a maximum net asset of IDR 50 million, excluding land and buildings where the business is located, and annual sales of a maximum of IDR 300 million.
b. Small Business: Have net assets of more than IDR 50 million to IDR 500 million, with annual sales revenue of more than IDR 300 million to IDR 2.5 billion.
c. Medium Enterprise: Has net assets of more than IDR 500 million to IDR 10 billion, with annual sales revenue of more than IDR 2.5 billion to IDR 50 billion.

B. Decision Support System (DSS)

Decision Support System (DSS) is a part of computer-based information systems, including knowledge-based systems, designed to support decision-making in an organization or company. DSS is intended to assist managers or decision-makers in solving structured and semi-structured problems by providing relevant information, models, or analytical tools [15]. Thus, DSS can improve the quality of decisions made by managers or other decision-makers.

Decision-making is a process carried out by an individual based on the knowledge and information they possess. Decision Support Systems (DSS) are designed with the following objectives [16]:

1. Assist in decision-making on structured problems.

2. Provide assistance as needed by managers without replacing their roles or functions.
3. Improving the effectiveness of decisions made is more than just improving its efficiency.
4. Leveraging computing speed to enable decision-makers to perform calculations quickly and cost-effectively.

The following is a paraphrase of the stages in the decision-making process:
1. Intelligence: This stage involves the process of identifying and understanding the problem at hand by tracing and detecting various aspects within the scope of the problem.
2. Data Collection: Data is collected, processed, and analyzed to identify the core of the problem in more depth.
3. Design: At this stage, exploration, development, and analysis of various possible alternative solutions are carried out. The goal is to understand the problem thoroughly, come up with potential solutions, and evaluate the feasibility of those solutions.
4. Choice: This stage focuses on selecting the best alternative solution among several available options. The selected alternatives are then implemented in the decision-making process.
5. Implementation *Phase*: This is the stage of implementing a system that has been designed and the implementation of alternative actions that have been chosen to solve the problem.

C. Metode *Simple Additive Weighting* (SAW)

The *Simple Additive Weighting* (SAW) method is known as the weighted addition method. The basic concept of the SAW method is to find the weighted sum of the performance rating of each alternative on all attributes. The SAW method requires the process of normalizing the decision matrix (X) to a scale that can be compared to all ratings [17]. The steps to complete using it are [18]:
1. Determining Alternatives (Ai).
2. Determining Criteria (Cj).
3. Determining the Match Rating Value.
4. Determining Preferred Weights (W).
   W = [W1, W2, W3,...WJ]
5. Create a Match Rating Table.
6. Forming a Result Matrix (X) like an equation (1).
7.

$$X = \begin{bmatrix} x11\ x12 & \cdots & x1j \\ \vdots & & \vdots \\ xi1\ xi2 & \cdots & xij \end{bmatrix} \quad (1)$$

8. Normalization of Decision Matrices, such as equations (2).

$$rij = \begin{cases} \dfrac{Xij}{Max\ Xij} \\ \dfrac{Min\ Xij}{Xij} \end{cases} \quad (\mathbf{2})$$

9. Forming a Normalized Matrix (R).
10. Calculating Preference Values (Vi), such as equations (3).

$$V1 = \sum_{j=1}^{n} Wj\ Rij \quad (3)$$

III. RESULT

In this study, a selection of the best suppliers was carried out using the *Simple Additive Weighting* (SAW) Method. This method requires several criteria and weights to perform the calculation so that it will produce the best alternative. The following in Table 1 are the criteria used to determine the best supplier.

TABLE 1
DESCRIPTION OF THE CRITERIA USED

No	Criteria	Information
1	C1	Price
2	C2	Quality
3	C3	Completeness
4	C4	Delivery
5	C5	Service

Implementation of manual calculations and application program implementation of Decision Support System to Choose the Best Supplier at Thaiyo Thaitea Based on Website Using the *Simple Additive Weighting* (SAW) Method that has been made. The following table 2 presents the evaluation of five suppliers to determine the best supplier in Thaiyo Thaitea.

TABLE 2
CRITERIA VALUES

Alternative	Criteria				
	C1	C2	C3	C4	C5
H.Slamet (A1)	3	3	2	3	1
Aradhana (A2)	2	2	2	2	1
Maulana (A3)	2	1	3	2	2
Adaby (A4)	1	3	1	2	2
Tiara (A5)	1	2	2	1	1
Bobot	**0.45**	**0.25**	**0.15**	**0.1**	**0.05**

Based on Table 2 above, it is the value of the criteria obtained from the previous respondents. Furthermore, the alternative table can be formed into a matrix of X decision as follows:

$$X = \begin{matrix} 3 & 3 & 2 & 3 & 1 \\ 2 & 2 & 2 & 2 & 1 \\ 2 & 1 & 3 & 2 & 2 \\ 1 & 3 & 1 & 2 & 2 \\ 1 & 2 & 2 & 1 & 1 \end{matrix}$$

The next stage is to normalize the X matrix into the R matrix, as follows:

1. Price Criteria (C1)

$$R1.1 = \frac{3}{Max3,2,2,1,1} = \frac{3}{3} = 1$$

$$R2.1 = \frac{2}{Max3,2,2,1,1} = \frac{2}{3} = 0,67$$

$$R3.1 = \frac{2}{Max3,2,2,1,1} = \frac{2}{3} = 0,67$$

$$R4.1 = \frac{1}{Max3,2,2,1,1} = \frac{1}{3} = 0,33$$

$$R5.1 = \frac{1}{Max3,2,2,1,1} = \frac{1}{3} = 0,33$$

2. Quality Criteria (C2)

$$R1.2 = \frac{3}{Max3,2,1,3,2} = \frac{3}{3} = 1$$

$$R2.2 = \frac{2}{Max3,2,1,3,2} = \frac{2}{3} = 0,67$$

$$\mathrm{R3.2} = \frac{1}{\mathrm{Max3,2,1,3,2}} = \frac{1}{3} = 0,33$$

$$R4.2 = \frac{3}{Max3,2,1,3,2} = \frac{3}{3} = 1$$

$$R5.2 = \frac{2}{Max3,2,1,3,2} = \frac{2}{3} = 0,67$$

3. Completeness Criteria (C3)

$$R1.3 = \frac{2}{Max2,2,3,1,2} = \frac{2}{3} = 0,67$$

$$R2.3 = \frac{2}{Max2,2,3,1,2} = \frac{2}{3} = 0,67$$

$$\mathrm{R3.3} = \frac{3}{\mathrm{Max2,2,3,1,2}} = \frac{3}{3} = 1$$

$$R4.3 = \frac{1}{Max2,2,3,1,2} = \frac{1}{3} = 0,33$$

$$R5.3 = \frac{2}{Max2,2,3,1,2} = \frac{2}{3} = 0,67$$

4. Submission Criteria (C4)

$$R1.4 = \frac{3}{Max3,2,2,2,1} = \frac{3}{3} = 1$$

$$R2.4 = \frac{2}{Max3,2,2,2,1} = \frac{2}{3} = 0,67$$

$$\mathrm{R3.4} = \frac{2}{\mathrm{Max3,2,2,2,1}} = \frac{2}{3} = 0,67$$

$$R4.4 = \frac{2}{Max3,2,2,2,1} = \frac{2}{3} = 0,67$$

$$R5.4 = \frac{1}{Max3,2,2,2,1} = \frac{1}{3} = 0,33$$

5. Service Criteria (C5)

$$R1.5 = \frac{1}{Max1,1,2,2,1} = \frac{1}{2} = 0,5$$

$$R2.5 = \frac{1}{Max1,1,2,2,1} = \frac{1}{2} = 0,5$$

$$\mathrm{R3.5} = \frac{2}{\mathrm{Max1,1,2,2,1}} = \frac{2}{2} = 1$$

$$R4.5 = \frac{2}{Max1,1,2,2,1} = \frac{2}{2} = 1$$

$$R5.5 = \frac{1}{Max1,1,2,2,1} = \frac{1}{2} = 0,5$$

From the normalization equation of matrix X, the matrix R is obtained as follows:

$$R = \begin{matrix} 1 & 1 & 0,67 & 1 & 0,5 \\ 0,67 & 0,67 & 0,67 & 0,67 & 0,5 \\ 0,67 & 0,33 & 1 & 0,67 & 1 \\ 0,33 & 1 & 0,33 & 0,67 & 1 \\ 0,33 & 0,67 & 0,67 & 0,33 & 0,5 \end{matrix}$$

Next, a ranking is carried out based on the R matrix obtained, using the Weight of W = [3,3,3,3,2]:

V1 = (3)(1) + (3)(1) + (3)(0,67) + (3)(1) + (2)(0,5)
= 3 + 3 + 2,01 + 3 + 1
= 12,01
V2 = (3)(0,67) + (3)(0,67) + (3)(0,67) + (3)(0,67) + (2)(0,5)
= 2,01 + 2,01 + 2,01 + 2,01 + 1
= 9,04
V3 = (3)(0,67) + (3)(0,33) + (3)(1) + (3)(0,67) + (2)(1)
= 2,01 + 0,99 + 3 + 2,01 + 2
= 10,01
V4 = (3)(0,33) + (3)(1) + (3)(0,33) + (3)(0,67) + (2)(1)
= 0,99 + 3 + 0,99 + 2,01 + 2
= 8,99
V5 = (3)(0,33) + (3)(0,67) + (3)(0,67) + (3)(0,33) + (2)(0,5)
= 0,99 + 2,01 + 2,01 + 0,99 + 1
= 7

From the final score calculation process, an alternative ranking score was obtained in Table 3.

TABLE 3
DESCRIPTION OF THE CRITERIA USED

No	Alternative	Value
1	H.Slamet (A1)	12,01
2	Aradhana (A2)	9,04
3	Maulana (A3)	10,01
4	Adaby (A4)	8,99
5	Tiara (A5)	7

So based on the ranking results from Table 3 above, which has the highest score, namely H.Slamet (A1) with a value of 12.01, can be used as a consideration data to be selected as the best supplier for Thaiyo Thaitea.

The next process is system testing using the Black Box method. This system testing is beneficial for verifying the performance between system components that have been implemented. The main objective of this testing is to ensure that all system elements and components function as expected. Black-box testing is a behavior-based testing method that focuses on evaluating software functions according to specified requirements, without requiring knowledge of the internal processes or how the system works within the application [19], [20]. At this stage, the application system that has been created will be tested to ensure whether the system can run according to the needs that have been set, as well as to detect errors in data management or other errors. The login menu test can be seen in Table 4.

TABLE 4
TESTING THE LOGIN MENU

Testing	Expected Results	Test Results	Conclusion
Opening the system by typing *the url* on the *browser page*	Can display *website pages* in the form of *login forms*	Display *the website page* in the form of *a login form*	Succeed
Enter *ussername* and *password* at *the admin* level (owner)	Can *log* in to the system with *the admin level*	Display *admin page*	Succeed
Enter *username* and *password* with user level	Can *log* in to the system with the *user level*	Display *user pages*	Succeed
Enter *the username* and *password* with the wrong data	Unable to *log* in to *the system* and provide information that *username* and *password* are incorrect	*Admins*/*users* cannot access the main page and the system provides information that *the username* and *password* are incorrect	Succeed

Testing of the criteria data page can be seen in Table 5.

TABLE 5
TESTING CRITERIA DATA PAGES

Testing	Expected Results	Test Results	Conclusion
Click the data menu criteria to enter data on the *website* user *form* after filling in all and then click save data	Successfully added data and returned to the Data Criteria page with a data notification successfully added	Successfully add data to *the database*	Succeed
Click the criteria data menu and then select *the edit icon* after editing the data then click save data	Hasik changes the data and returns to the criteria data page with a notification of the edited data	Successfully change data and save data to *a database*	Succeed
Click the criteria data menu and then select *the delete* the product you want to delete icon	Successfully deleted data and returned to the criteria data page with a notification that the data was successfully deleted	Successfully delete data from *the database*	Succeed

The test of the assessment data page can be seen in Table 6.

TABLE 6
TESTING ASSESSMENT DATA PAGES

Testing	Expected Results	Test Results	Conclusion
Click the assessment menu and then enter the data on the *add* assessment data form after filling in save data	Successfully added data and displayed a notification of successfully added data	Successfully add data to *the database*	Succeed
Click the assessment data menu and then select *edit* after changing the data save data	Successfully change data with notification of successful editing data	Successfully change data	Succeed
Click the assessment menu and then select *the* delete icon on the assessment data	Successfully delete data with a data deleted notification	Successfully delete data from *the database*	Succeed

IV. DISCUSSION

This study demonstrates that the Simple Additive Weighting (SAW) method in the Decision Support System (DSS) can effectively support the selection process for the best supplier in an objective and measurable manner. By considering five main criteria—price, quality, completeness, delivery, and service—this method provides a clear quantitative assessment through normalization and weighting processes. Based on the research conducted at Thaiyo Thaitea, supplier H. Slamet (A1) achieved the highest score (12.01), making it the most suitable choice. The SAW approach allows companies to evaluate suppliers transparently and systematically, thereby reducing subjectivity in decision-making.

Additionally, the SAW method offers advantages in ease of implementation and clarity in the calculation process. Each criterion used in this study is weighted according to its importance for the company's operational efficiency. This approach makes the supplier selection process more structured and accurate, reducing the risk of errors that may occur if decisions are made manually or based solely on intuition.

System validation through Black Box testing shows that the DSS application functions as expected. Testing on key features, such as login, criteria data management, and the evaluation process, ran smoothly and produced accurate results. This testing proves that the system is not only reliable in supporting decision-making but also capable of providing a seamless and efficient user experience.

The successful implementation of the SAW method in this study opens opportunities for further development. One potential future enhancement is the integration of real-time data, allowing supplier evaluations to be conducted dynamically and responsively to changing market conditions. Additionally, comparing the SAW method with other Multi-Criteria Decision Making (MCDM) approaches, such as the Analytic Hierarchy Process (AHP) or the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), can provide additional insights into the accuracy and flexibility of each method in various decision-making contexts.

V. CONCLUSION

This study concludes that the Simple Additive Weighting (SAW) method is effective in the Decision Support System (DSS) for selecting the best supplier at Thaiyo Thaitea. This method provides objective and systematic results by considering various criteria through the normalization and weighting process. Supplier H. Slamet (A1) was selected as the best alternative with the highest score (12.01). Validation results using the Black Box method indicate that the system functions as expected and is reliable in supporting decision-making within the MSME environment.

For decision-makers in MSMEs, this study recommends implementing a SAW-based Decision Support System (DSS) to enhance objectivity and efficiency in supplier selection. This system enables transparent multi-criteria evaluation, minimizes subjective bias, and provides more accurate results. Additionally, decision-makers are advised to periodically update the criteria weights according to evolving business priorities to maintain the relevance of the evaluation results.

However, this study has several limitations, including the lack of real-time data integration, which could dynamically update evaluation results. Future research can expand the system by integrating real-time data and comparing the SAW method with other MCDM approaches, such as AHP or TOPSIS. This would make decision outcomes more adaptive to changing market conditions and diverse business needs.

REFERENCE

[1] T. Mesra, P. I. Sari, and M. Melliana, "Penerapan Metode Analytical Network Pocess dalam Pemilihan Supplier di UMKM Kerupuk Kulit Sapi," *J. Unitek*, vol. 15, no. 1, pp. 93–104, 2022, doi: 10.52072/unitek.v15i1.330.

[2] Liga Mayola, M. Afdhal, and Rita, "Analytical Hierarchy Process (AHP) dalam Seleksi Penerimaan Mahasiswa Baru," *J. KomtekInfo*, vol. 10, no. 2, pp. 81–86, 2023, doi: 10.35134/komtekinfo.v10i2.371.

[3] G. Onwujekwe and H. R. Weistroffer, "Intelligent Decision Support Systems: An Analysis of the Literature and a Framework for Development," *Inf Syst Front*, 2025, doi: https://doi.org/10.1007/s10796-024-10571-1.

[4] A. Podvesovskii, A. Zakharova, D. Korostelyov, and A. Kuzin, "DecisionMaster: A multi-criteria decision support system with ability to combine different decision rules," *SoftwareX*, vol. 16, p. 100814, 2021, doi: 10.1016/j.softx.2021.100814.

[5] Z. Muttaqin, D. Handayani, and G. Triyono, "Penerapan Metode Simple Additive Weighting (SAW) Dalam Pemilihan Supplier Terbaik Pada Industri Manufaktur Application of the Simple Additive Weighting (SAW) Method in Selecting the Best Supplier at Manucafturing Industry," vol. 13, no. November, pp. 418–427, 2024, doi: 10.34148/teknika.v13i3.1024.

[6] Yulaikha Mar'atullatifah and Nimas Ratna Sari, "Review: Sistem Pendukung Keputusan Dengan Metode Saw (Simple Additive Weighting) Untuk Seleksi Supplier Pada Rumah Makan," *J. Cakrawala Ilm.*, vol. 2, no. 8, pp. 3289–3296, 2023, doi: 10.53625/jcijurnalcakrawalailmiah.v2i8.5522.

[7] H. S. Lucia, "Optimization of Employee Bonus Decision Support System with Simple Additive Weighting Method," vol. 7, no. 2, 2024, doi: 10.32877/bt.v7i2.1726.

[8] P. P. Putra *et al.*, "Sistem Pendukung Keputusan Penentuan Penerima BLT Menggunakan Metode SAW," *J. Teknol. Dan Sist. Inf. Bisnis*, vol. 4, no. 2, pp. 285–293, 2022, doi: 10.47233/jteksis.v4i1.457.

[9] L. Nurlaela, Suprapto, and Usanto, "Sistem Pendukung Keputusan Pemeringkatan Siswa Menggunakan Metode SAW(Simple Additive Weigthing)," vol. 01, pp. 19–25, 2021.

[10] L. P. Sari and A. T. Oktaga, "Penerapan Metode SAW Untuk Sistem Pendukung Keputusan Pemilihan DosenTerbaik Program Studi S1 Sistem Dan Teknologi Informasi Institut TeknologiDan Bisnis (ITB) Semarang," *J. Cakrawala Inf.*, vol. 2, no. 1, pp. 59–68, 2024.

[11] J. M. F. Sihombing, R. P. Sadewo, F. D. Ramadhani, I. F. Achmad, and A. H. Anshor, "Penggunaan Metode SAW dalam Pemilihan Pegawai Terbaik Berdasarkan Kriteria Kinerja," *J. Ilm. Sinus*, no. 1, pp. 95–104, 2025.

[12] L. Hanim, *Karakteristik Usaha Mikro, Kecil, dan Menengah (UMKM)*. Jakarta: XYZ, 2018.

[13] L. H. Piliang, "Public Administration Journal Vol. 8 No. 1 (2024) UMKM PENGGERAK RODA PEREKONOMIAN NASIONAL," vol. 8, no. 1, pp. 1–8, 2024.

[14] A. Fidela, A. Pratama, and T. Nursyamsiah, "Pengembangan Usaha Mikro Kecil dan Menengah (UMKM) dengan Program Pemasaran Desa Jambu Raya di Desa Jambu , Kabupaten Sumedang," *J. Pus. Inov. Masy.*, vol. 2, no. 3, pp. 493–498, 2020.

[15] D. Jung, V. T. Tuan, D. Q. Tran, M. Park, and S. Park, "Conceptual framework of an intelligent decision support system for smart city disaster management," *Appl. Sci.*, vol. 10, no. 2, 2020, doi: 10.3390/app10020666.

[16] D. Nofriansyah, *Konsep Data Mining Vs Sistem Pendukung Keputusan*. Yogyakarta: Deepublish, 2018.

[17] F. I. Saputra and M. R. Maulani, "Perancangan Aplikasi Sistem Pendukung Keputusan Penerimaan Beasiswa Mengunakan Metode SAW," *J. Tek. Inform.*, vol. 15, no. 3, pp. 133–138, 2023, [Online]. Available: https://ejurnal.ulbi.ac.id/index.php/informatika/article/view/3102

[18] L. M. Sukaryati and A. Voutama, "Penerapan Metode Fuzzy Simple Additive Weighting Pada Sistem Pendukung Keputusan Karyawan Terbaik," *J. Manaj. Teknol. Dan Sist. Inf.*, vol. 4, no. 1, pp. 260–267, 2024, doi: 10.33998/jms.2024.4.1.1621.

[19] A. Ijudin and A. Saifudin, "Pengujian Black Box pada Aplikasi Berita Online dengan Menggunakan Metode Boundary Value Analysis," *J. Inform. Univ. Pamulang*, vol. 5, no. 1, p. 8, 2020, doi: 10.32493/informatika.v5i1.3717.

[20] M. T. Abdillah, I. Kurniastuti, F. A. Susanto, and F. Yudianto, "Implementasi Black Box Testing dan Usability Testing pada Website Sekolah MI Miftahul Ulum Warugunung Surabaya," *J. Comput. Sci. Vis. Commun. Des.*, vol. 8, no. 1, pp. 234–242, 2023, doi: 10.55732/jikdiskomvis.v8i1.897.