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DECISION SUPPORT SYSTEM FOR SELECTING DELIVERY SERVICES AT DEDY SEGAR USING FUZZY SAW

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Abstract

Expedition service companies play a crucial role in ensuring the smooth distribution of goods, especially for businesses involved in selling fresh products, such as Dedy Segar. However, the current delivery service selection process at Dedy Segar is still manual and lacking a structured system to evaluate, making it difficult to compare multiple important criteria such as estimated delivery time, cost, and service quality. This manual approach consumes time and effort, increases the risk of inconsistent and suboptimal decisions, and struggles to handle uncertainty in qualitative assessments. This issue poses a risk to operational efficiency and customer satisfaction, highlighting the need for a more systematic and reliable decision-making tool.. To address this problem, this study proposes a solution through the implementation of the Fuzzy Simple Additive Weighting (FSAW) method in a web-based decision support system. The FSAW method combines the advantages of fuzzy logic in handling uncertainty and the SAW method's simplicity in weighting criteria, making it suitable for evaluating subjective and imprecise data in delivery service selection. The objective of this research is to optimize the selection process of delivery services by enhancing efficiency, accuracy, and objectivity, as well as to handle uncertainty in criteria assessment. The results show that the system successfully provides recommendations based on preference values, with the highest ranking achieved by GoSend (91.00), followed by SiCepat Ekspres (87.00), Lalamove (83.50), JNE and GrabExpress (77.75), J&T Express (71.50), and TIKI and Wahana at the lowest positions. Thus, the system has proven to be effective in supporting optimal decision-making for selecting delivery services for Dedy Segar.

Keywords: *Decision Support System, Delivery Service Selection, Dedy Segar, Fuzzy Simple Additive Weighting*

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1. INTRODUCTION

Expedition companies are entities that provide goods delivery services via land, sea, or air routes [1]. In the business world, the presence of expedition companies is crucial to ensure the smooth distribution of goods between regions [2]. Amid the rapid growth of digital marketing today, delivery services have become essential to support product shipments within a company [3]. The role of delivery services serves as a mainstay in ensuring that goods are delivered accurately and promptly to their intended destinations [4-5]. In addition, selecting the right delivery service is a key factor in ensuring smooth shipping and customer satisfaction, as well as impacting the overall performance of the business [6].

The same applies to Dedy Segar, a business focused on selling fresh fruits and vegetables, which requires delivery services to distribute its products to customers both within and outside the city. Choosing the right delivery service is crucial for Dedy Segar, considering that the products being sold are perishable and require special handling during the shipping process. However, the selection process for delivery services at Dedy Segar is currently relies on a manual, without the use of a structured system. This condition reflects a broader issue often encountered in small to medium enterprises (SMEs): the absence of intelligent, adaptive decision-making tools to systematically evaluate and compare logistics alternatives based on multiple conflicting criteria. The lack of such systems not only leads to inefficiencies in time and effort, but also increases the risk of inconsistent and suboptimal choices, especially when handling uncertainty in qualitative or

linguistic evaluations such as service responsiveness or reputation.

To address the issue of selecting delivery services, various studies have applied the Multi-Criteria Decision Making (MCDM) approach, which supports decision-making involving multiple competing criteria. Previous research has shown that the Fuzzy Simple Additive Weighting (FSAW) method is capable of handling uncertainty effectively, producing high success rates in recommending appropriate delivery services [3]. Other studies utilizing the Simple Additive Weighting (SAW) method have demonstrated its ability to generate objective, quantitative results, with certain delivery providers achieving the highest ranking based on predefined criteria [7-8]. However, the SAW method is generally less effective in handling data uncertainty, which is common in real-world scenarios.

The difference in this study lies in the addition of criteria for selecting delivery services and the combination of the Simple Additive Weighting (SAW) method with the Fuzzy concept, resulting in the Fuzzy Simple Additive Weighting (FSAW) method. The FSAW method offers advantages over the SAW or AHP methods used in previous studies [9-10], particularly in addressing subjectivity during criteria assessment through a fuzzy approach that effectively handles uncertain or vague data—especially when differences in perception arise during evaluation [11-13].

Unlike other fuzzy methods such as Fuzzy Tsukamoto or Fuzzy Sugeno, which are typically rule-based and more suitable for systems with precise output modeling FSAW is easier to implement in decision support systems that involve ranking and scoring alternatives based on multiple weighted criteria. This simplicity and suitability for additive evaluation make FSAW more appropriate for the problem of delivery service selection, where decision alternatives need to be ranked objectively based on linguistic assessments converted into fuzzy numbers. Thus, the contribution of this research lies in its practical implementation of FSAW in a business-oriented decision-making context that demands ease of use, clarity, and computational efficiency [13].

In this study, the FSAW method is implemented in a decision support system designed to assist Dedy Segar in selecting the most suitable delivery service, thereby improving operational efficiency and enhancing customer satisfaction [14]. Most previous research, however, focuses on a single decision-making technique applied to specific case studies, without addressing adaptability or integration with dynamic business needs. Furthermore, existing systems often assume ideal, complete data, limiting their applicability in uncertain or rapidly changing environments. This research is important because many businesses still rely on manual methods to select delivery services—an approach that is time-consuming, subjective, and inconsistent highlighting the need for a more adaptive and intelligent decision support system that can accommodate uncertainty while aligning with evolving user preferences and operational constraints.

2. RESEARCH METHOD

2.1 Type of Research

This type of research is applied research aimed at solving practical problems faced by Dedy Segar in selecting a delivery service using the Fuzzy SAW method, which is implemented into a decision support system. This study uses a quantitative approach as it involves numerical calculations with the Fuzzy Simple Additive Weighting (FSAW) method to produce optimal decisions based on specific criteria [15][16].

2.2 Research Stages

In this study, the workflow procedure follows the Waterfall Model methodology in developing the decision support system [17][18].

2.2.1 Analysis

At this analysis stage, the system requirements and the method to be used in developing the decision support system for selecting delivery services are identified. The system requirements analysis is modeled with the method analysis using the Fuzzy SAW method, as shown in the following flowchart in Figure 1 [19].

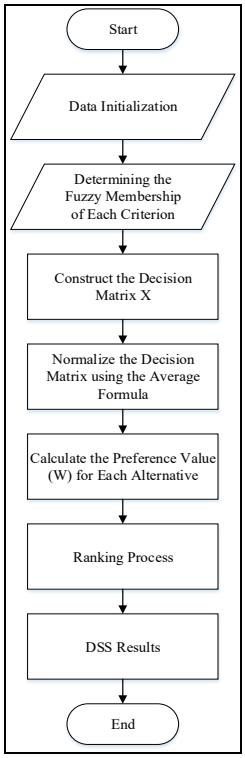

Figure 1. Flowchart of the Fuzzy SAW Method

Based on Figure 1, the stages that must be carried out in the implementation of the Fuzzy

Simple Additive Weighting (FSAW) method are described in detail. The steps are as follows [19][20]:

1. Data Initialization.
   Determine the criteria used: C1, C2, C3, C4, C5, C6, C7 and assign weights for each criterion: W (weight).
2. Determining the Fuzzy membership of each criterion.
   Using Fuzzy membership functions to transform criterion values into Fuzzy form.
3. Construct the decision matrix X.

$$X = \begin{bmatrix} x_{11}x_{12} \dots x_{1n} \\ x_{21}x_{22} \dots x_{2n} \\ . \quad . \quad . \quad . \\ . \quad . \quad . \quad . \\ x_{m1}x_{m2} \dots x_{mn} \end{bmatrix}$$ SAW method decision (1)

   matrix.
   Where:
   x_{ij} is is the value of the-i th alternative on the j-th criterion.
4. Normalize the decision matrix using the average formula.
   Perform the normalization of the decision matrix by calculating the normalized performance rating (r_{ij}) of alternative A_i on criterion Cj.

$$r_{ij} = \begin{cases} \frac{x_{ij}}{Max_i x_{ij}}, & (Benefit) \\ \frac{Min_i x_{ij}}{x_{ij}}, & (Cost) \end{cases},$$ Normalize the matrix using the SAW method (2)

   Information:

a. Benefit criteria are when the value provides an advantage to the decision-maker, conversely, cost criteria are when they incur a cost for the decision-maker.
b. If it is a benefit criterion, then the value is divided by the maximum value of each column, while for a cost criterion, the minimum value of each column is divided by the value.

5. Calculate the preference value (W) for each alternative.
   The final value is calculated by summing the results of multiplying the weights by the normalized values:

$$W = (w_1 * C_1) + (w_2 * C_2) + (w_3 * C_3) + (w_4 * C_4) + (w_5 * C_5) + (w_6 * C_6) + (w_7 * C_7)$$ (3)

   Where:
   w_j is the weight of criterion j.
   C_j is the normalized value of criterion j.
6. Ranking process.

The alternative with the highest W value is the best.

7. DSS Results.
   The system provides a recommendation for the best expedition service based on the calculation results.

2.2.2 Design

During this design phase, a detailed system design is carried out, which includes user interface design and database design. This phase aims to prepare the system blueprint (design) before moving on to the implementation phase.

1. User interface design uses UI/UX design software, namely Balsamiq Mockup 3.
2. Database design uses a database modeling tool, namely the Entity Relationship Diagram (ERD) using the website erdplus.com.

2.2.3 Programming Code Development

In this phase, the designed system will be implemented using the determined programming languages and technologies, namely the backend using the PHP programming language, the frontend using HTML, CSS, JavaScript, and the database using MySQL.

2.2.4 Testing

The testing phase is carried out to ensure the system runs according to the defined needs and specifications. The types of testing are divided into 2, namely Black-box Testing to test system functionalities such as data input, calculation processes, and output results, and White-box Testing to test the calculation logic of the Fuzzy SAW method [21][22].

2.2.5 Maintenance

In this phase, the built decision support system is given a testing period of 1 month to Dedy Segar, during which any bugs found will be directly maintained by the researcher.

3. RESULTS AND DISCUSSION

3. 1 Analysis Results

The results of this analysis are in the form of an explanation regarding the decision-making method used. The method analysis used in this research is FuzzySAW, by presenting a simple case example of this method in determining the appropriate expedition service for product delivery. Based on the flowchart in Figure 1, the workings of the Fuzzy SAW method are described as follows:

1. Data initialization.
   Determine the criteria used and determine the weight of each criterion: W (weight) based on the conclusion of the sales transaction dataset at Dedy Segar. The following Table 1 shows the results of data initialization.

Tabel 1. Data Initialization Results

No	Criteria	Characteristic	Weight (W)	Criteria Items
1.	Estimated Delivery Time (C1)	Benefits	20	Very Fast (More Than 1 Hour), Fast (1-3 Hours), Medium (3-6 Hours), Long (6-12 Hours), Very Long (Less Than 12 Hours)
2.	Damaged Goods Claims Handling Speed (C2)	Benefits	25	Very Fast (Under 1 hour), Fast (1–3 hours), Medium (3–6 hours), Long (6–12 hours), Very Long (Over 12 Hours)
3.	Company Experience (C3)	Benefits	10	Very Experienced (Above 10 years), Experienced (6–10 years), Fairly Experienced (3–5 years), Less Experienced (1–2 years), Newly Established (Under 1 Year)
4.	Order Tracking Service Speed (C4)	Benefits	10	Very Fast (Real-time, Under 1 minute), Fast (1–5 minutes), Medium (5–15 minutes), Slow (15–30 minutes), Very Slow (Above 30 minutes)
5.	Shipping Cost (C5)	Cost	25	Very Expensive (Above Rp 50,000), Expensive (Rp 35,001 – Rp 50,000), Moderate (Rp 25,001 – Rp 35,000), Cheap (Rp 15,000 – Rp 25,000), Very Cheap (Below Rp 15,000)
6.	Company Response (C6)	Benefits	5	Very Fast (Above 5 minutes), Fast (5–15 minutes), Medium (15–30 minutes), Slow (30–60 minutes), Very Slow (Above 1 hour)
7	Area Coverage (C7)	Benefits	5	National (All of Indonesia), Regional (Province or Island), Local (Big City), Limited (Limited Subdistrict or Area), Very Limited (Only Several Locations)

2. Determine the Fuzzy membership of each criterion.
   Fuzzy membership functions to convert the criteria values into Fuzzy form as shown in Table 2.

3. Construct the decision matrix X.
   A decision matrix (X) is prepared as shown in Table 3.

Table 1. Results of Determining Fuzzy Membership of Each Criteria

No	Criteria	Criteria Items	Criteria Item Weight
1.	Estimated Delivery Time (C1)	Very Fast (More Than 1 Hour)	5
		Fast (1-3 Hours)	4
		Medium (3-6 Hours)	3
		Long (6-12 Hours)	2
		Very Long (Less Than 12 Hours)	1
2.	Damaged Goods Claims Handling Speed (C2)	Very Fast (Under 1 hour)	5
		Fast (1–3 hours)	4
		Medium (3–6 hours)	3
		Long (6–12 hours)	2
		Very Long (Above 12 Hours)	1
3.	Company Experience (C3)	Very Experienced (Above 10 years)	5
		Experienced (6–10 years)	4
		Fairly Experienced (3–5 years)	3
		Less Experienced (1–2 years)	2
		Newly Established (Under 1 Year)	1
4.	Order Tracking Service Speed (C4)	Very Fast (Real-time, Under 1 minute)	5
		Fast (1–5 minutes)	4
		Medium (5–15 minutes)	3
		Slow (15–30 minutes)	2
		Very Slow (Above 30 minutes)	1
5.	Shipping Cost (C5)	Very Expensive (Above Rp. 50,000)	5
		Expensive (Rp 35,001 – Rp 50,000)	4
		Medium (Rp 25,001 – Rp 35,000)	3
		Cheap (Rp. 15,000 – Rp. 25,000)	2
		Very Cheap (Under Rp. 15,000)	1
6.	Company Response (C6)	Very Fast (Above 5 minutes)	5
		Fast (5–15 minutes)	4
		Medium (15–30 minutes)	3
		Slow (30–60 minutes)	2
		Very Slow (Above 1 hour)	1
7	Area Coverage (C7)	National (All Indonesia)	5
		Regional (Province or Island)	4
		Local (Big City)	3
		Limited (Restricted District or Area)	2
		Very Limited (Only a Few Locations)	1

Table 3. Results of Compiling the Decision Matrix X

No	Alternative Shipping Services	Criteria						
		1	2	3	4	5	6	7
1	JNE	4.00	4.00	4.00	4.00	3.00	4.00	5.00
2	TIKI	3.00	3.00	3.00	3.00	4.00	2.00	4.00
3	SiCepat Ekspres	4.00	4.00	3.00	5.00	2.00	5.00	5.00
4	GoSend	4.00	5.00	5.00	4.00	2.00	4.00	3.00
5	GrabExpress	4.00	4.00	5.00	4.00	3.00	4.00	3.00
6	J&T Express	4.00	4.00	3.00	4.00	4.00	4.00	5.00
7	LalaMove	5.00	5.00	4.00	5.00	4.00	5.00	3.00
8	Wahana Prestasi Logistik	2.00	2.00	5.00	3.00	5.00	3.00	5.00

4. Normalize the decision matrix using the average formula.

$$r_{JNE,estimated\_shipping\_time} = \frac{4.00}{5.00}$$

Table 2. Search Results Minimum/Maximum Values for Each Criteria

No	Criteria	Characteristic	Min/Max Value
1	Estimated_Shipping_Time	Benefits	5.00 - Maximum
2	Damaged Goods Claims Handling Speed	Benefits	5.00 - Maximum
3	Company_Experience	Benefits	5.00 - Maximum
4	Order_Tracking_Service_Speed	Benefits	5.00 - Maximum
5	Shipping costs	Cost	2.00 - Minimum
6	Company_Response	Benefits	5.00 - Maximum
7	Area_Coverage	Benefits	5.00 - Maximum

Perform decision matrix normalization by calculating the normalized performance rating value (r_{ij}) of alternative $_i$ on criterion Cj . The initial stage is to first look for the minimum value and the maximum of each criterion used in decision making. This value is needed to determine the normalization scale. The results of searching for the minimum and maximum values for each criterion are presented in Table 4 below.

Next, after getting the minimum/maximum value of each criterion, the next step is to normalize the alternatives for each criterion. Assume the JNE alternative for the estimated delivery time criteria is calculated:

$$r_{JNE,estimated\_shipping\_time} = 0.8$$

Then the normalization result of JNE alternative on criterion 1 (estimated delivery time) is 0.8. Continued to other alternatives and criteria to produce normalization results as in Table 5.

Table 4. Decision Matrix Normalization Results

No	Alternative Shipping Services	Criteria						
		1	2	3	4	5	6	7
1	JNE	0.80	0.80	0.80	0.80	0.67	0.80	1.00
2	TIKI	0.60	0.60	0.60	0.60	0.50	0.40	0.80
3	SiCepat Ekspres	0.80	0.80	0.60	1.00	1.00	1.00	1.00
4	GoSend	0.80	1.00	1.00	0.80	1.00	0.80	0.60
5	GrabExpress	0.80	0.80	1.00	0.80	0.67	0.80	0.60
6	J&T Express	0.80	0.80	0.60	0.80	0.50	0.80	1.00
7	Lalamove	1.00	1.00	0.80	1.00	0.50	1.00	0.60
8	Wahana Prestasi Logistik	0.40	0.40	1.00	0.60	0.40	0.60	1.00

5. Calculate the preference value (W) for each alternative.

The final value is calculated by adding the results of multiplying the weights by the normalization value. Assume the JNE alternative preference value is calculated.

$$W_{JNE} = (20 * 0.8) + (25 * 0.8) + (10 * 0.8) + (10 * 0.8) + (25 * 0.67) + (5 * 0.8) + (5 * 1)$$

Table 5. Preference Value Results (W) For Each Alternative

No	Expedition Services	Criteria						
		1	2	3	4	5	6	7
1	JNE	16.00	20.00	8.00	8.00	16.75	4.00	5.00
2	TIKI	12.00	15.00	6.00	6.00	12.50	2.00	4.00
3	SiCepat Ekspres	16.00	20.00	6.00	10.00	25.00	5.00	5.00
4	GoSend	16.00	25.00	10.00	8.00	25.00	4.00	3.00
5	GrabExpress	16.00	20.00	10.00	8.00	16.75	4.00	3.00
6	J&T Express	16.00	20.00	6.00	8.00	12.50	4.00	5.00
7	Lalamove	20.00	25.00	8.00	10.00	12.50	5.00	3.00
8	Wahana Prestasi Logistik	8.00	10.00	10.00	6.00	10.00	3.00	5.00

$$r_{JNE,estimated\_shipping\_time} = \frac{X_{JNE,estimated\_shipping\_time}}{max_{X_{JNE,estimated\_shipping\_time}}}$$

$$W_{JNE} = 16 + 20 + 8 + 8 + 16.75 + 4 + 5 = 77.75$$

This calculation is continued for other alternatives to produce a preference value for each alternative as in Table 6.

6. Ranking Process.

The alternative with the highest W value is the best. Then the results of the matrix multiplication are sorted to get a ranking order. Based on the calculation results, it can be seen that GoSend has the highest total value of 91.00, thus occupying the first rank as the best expedition service. Followed by SiCepat Express with a total value of 87.00 in the second rank, and Lalamove with a total value of 83.50 in the third rank. The other expedition services in descending order are JNE (77.75), GrabExpress (77.75), J&T Express (71.50), TIKI (57.50), and Logistics Achievement Vehicle (52.00). Thus, the alternative with the highest W value is the best, and the results of the matrix multiplication are sorted to obtain the ranking order of the expedition services.

7. Decision support system (DSS) results.

The system provides recommendations for the best expedition services based on the calculation results. From the calculation results carried out using the Fuzzy SAW method, the expedition service that is suitable and in accordance with the needs is Gosend with a value of 91.00.

3. 2 Design Results

The design results of the SPK draft for selecting expedition services for product delivery at Dedy Segar are illustrated with Balsamiq Mockup 3 and the database design with the Entity Relationship Diagram (ERD) tool.

3. 3 Programing Code Development Results

The following shows the results of the program creation display in the form of an SPK website for selecting expedition services for product delivery. View the ranking results page contains contains the results of generating decision support using the Fuzzy SAW method. The display of ranking results can be seen in Figure 2.

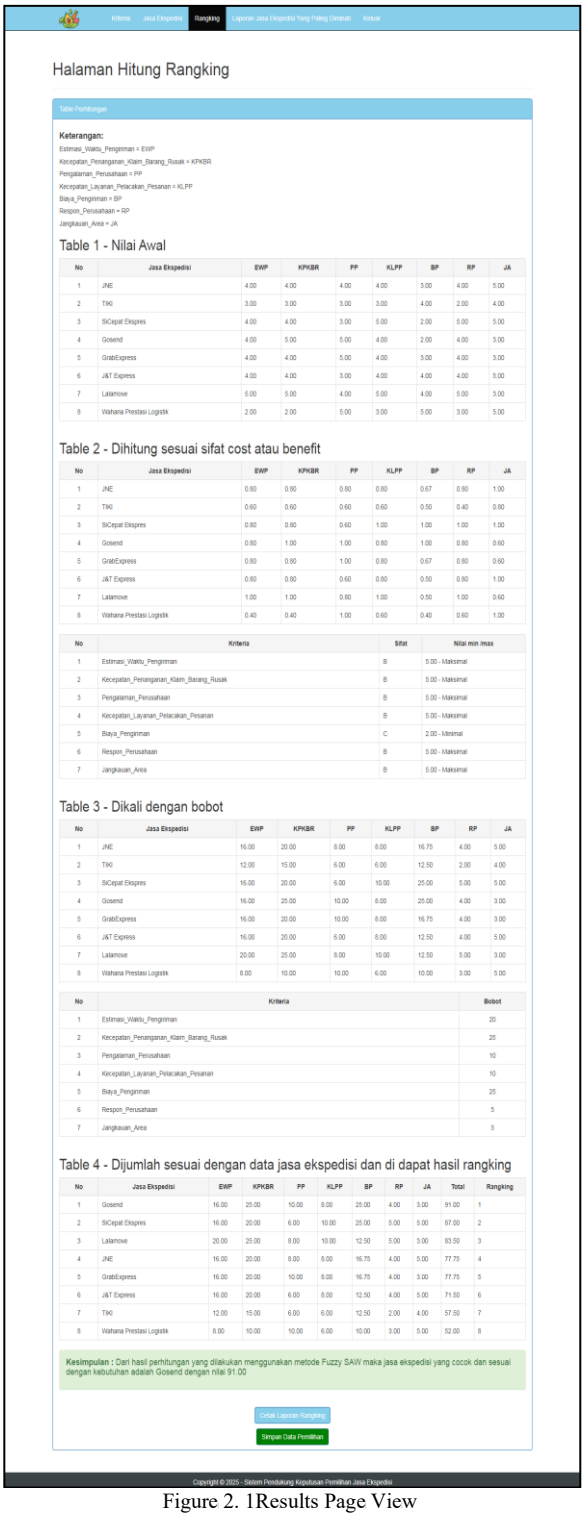

Figure 2. 1Results Page View

3. 4 Testing Results

The test results obtained are divided into 2, namely Black-box Testing to test system functionality such as data input, calculation process, and output results and White-box Testing to test the calculation logic of the Fuzzy SAW method. The following, Table 7 shows the results of the Black-box Testing test.

Table 7. Black-box Testing Results

No	Feature Name	Input	Expected Output	Status
1	Login	Valid/invalid username and password	Login successful if data is valid, rejected if invalid	Succeed
2	Managing Criteria Data - Add	New criteria data (criteria name, type, weight, etc.)	Data is saved and appears in the criteria list.	Succeed
3	Managing Criteria Data - Edit	Changes to existing criteria data	Criteria data is updated according to input	Succeed
4	Manage Criteria Data - Delete	ID or delete button on criteria data	Criteria data removed from list	Succeed
5	Managing Expedition Service Data - Add	New expedition data (name, criteria, value of each criteria)	Expedition data is saved and appears in the list.	Succeed
6	Managing Shipping Service Data - Edit	Changes to existing expedition data	Expedition data is updated according to input	Succeed
7	Manage Shipping Service Data - Delete	ID or delete button on expedition data	Expedition data removed from list	Succeed
8	Viewing the Results of Expedition Service Selection Decisions with the Fuzzy SAW Method	Click the process/view results button	The system displays the results of the SAW calculation in the form of a ranking of expedition services.	Succeed

Next, testing the logic of the Fuzzy SAW method These bugs were fixed directly by the researchers in the first week of the trial.

Table 6. White-box Testing Results

No	Process Name	Testing Techniques	Logical Path	Expected results	Status
1	Decision Matrix Normalization	Condition & Path Testing	1. Take the value of each alternative per criterion 2. Determine the maximum/minimum value (depending on the type of criteria) 3. Calculate the normalized value (benefit/cost)	The normalization value is in the range 0 – 1 and according to the normalization formula	Succeed
2	Weighted Calculation	Statement Coverage	1. Multiply the normalization value by the criteria weight.	Final score = normalization * weight, according to each criteria	Succeed
3	Total Value Aggregation	Decision Coverage	1. Add up the weighted values for each alternative.	The total weighted value is calculated and stored correctly.	Succeed
4	Alternative Ranking	Path Testing	1. Sort the alternatives based on the highest to lowest total value.	The alternative with the highest value is ranked first.	Succeed
5	Show Results	Statement Coverage	1. Take the calculation result data 2. Display it on the interface (ranking & value)	Rankings are displayed in order and according to the calculated value.	Succeed

calculation with White-box Testing, Table 8 shows the results of the White-box Testing.

3. 5 Maintenance Results

After the implementation phase, the decision support system for selecting expedition services at Dedy Segar has undergone a trial period of 1 month starting from April 1, 2025 to April 30, 2025. During the trial period, the system was used by users directly to determine expedition services based on predetermined criteria. During this period, observations were made on system performance, the accuracy of the Fuzzy SAW calculation results, and the ease of use of the system interface by users. The results of the maintenance phase are as follows:

1. Minor Bugs.

Several minor bugs were found in the interface, such as unresponsive table displays on some devices and input validation errors on the assessment form.

2. User Interface Improvements.

Based on user feedback, improvements were made to the system interface, including adding description labels to recommendation results and adjusting button colors to improve ease of use.

Thus, it can be concluded that the system has passed the maintenance stage well and is ready to be fully used by Dedy Segar as a tool to assist in making decisions regarding the selection of expedition services.

3. 6 Discussion

Based on the ranking results, Gosend is in the top position with a score of 91.00, indicating its optimal performance in price, delivery time, and service quality. SiCepat Ekspres is in second place with a score of 87.00, excelling in price and delivery time although slightly inferior in service quality. Lalamove is in third place with a score of 83.50, excelling in delivery time but lacking in price and service quality.

JNE and GrabExpress share the fourth and fifth positions with scores of 77.75, with JNE superior in service quality and GrabExpress in price. J&T Express is in sixth place with a score of 71.50, indicating room for improvement. At the bottom, TIKI and Wahana Prestasi Logistik are in seventh and eighth place respectively, with low scores in almost all criteria. Overall, these results indicate that Gosend and SiCepat Ekspres are the main choices based on efficiency and cost, while other expedition services need to improve their performance.

In the testing phase, the system undergoes two types of testing, namely Black-box Testing and White-box Testing . Black-box testing ensures that the user interface and system functionality work properly, while White-box testing assesses the smoothness of the Fuzzy SAW calculation algorithm, ensuring that the calculation logic runs as expected. All tests produced satisfactory results, with the system functioning optimally and producing output that meets the specified specifications.

During the maintenance phase, the system undergoes repairs and improvements based on user feedback and the discovery of minor bugs, such as unresponsive table display issues and input validation errors. These fixes are done quickly, which improves the convenience and stability of system use. During the maintenance period, the system becomes more stable and responsive, with a more user-friendly interface and more reliable results, ensuring that the system remains usable in the long term.

4. CONCLUSION

Based on the results of the research conducted, the following conclusions can be drawn: The system that was built successfully optimized the selection of expedition services in Dedy Segar, which was previously done manually. Utilizing the FSAW method, this website-based system enables automatic selection based on relevant criteria, thereby speeding up decision-making and reducing errors. The ranking results indicate Gosend in the first position with a score of 91.00, followed by SiCepat Ekspres (87.00), Lalamove (83.50), JNE and GrabExpress (both at 77.75), J&T Express (71.50), and TIKI and Wahana in the lowest positions. The system has proven effective in selecting the best expedition service. Furthermore, the FSAW method within the decision support system assists Dedy Segar in choosing an expedition service that aligns with criteria such as estimated time, cost, and service quality. This system enhances operational efficiency and customer satisfaction by providing optimal expedition service recommendations.

5. REFERENCES

[1] W. Ulfah and H. Yusuf, "Perspektif Hukum Dagang: Perlindungan Hukum Atas Jasa Pengiriman Barang Melalui Jalur Laut," *JIIC J. Intelek Ina. Cendikia*, vol. 1, no. 4, pp. 300–306, 2024, [Online]. Available: https://jicnusantara.com/index.php/jiic.

[2] A. W. Siahaan *et al.*, "Analisis Faktor Yang Paling Mempengaruh Keputusan Pelanggan Dalam Memilih Jasa Ekspedisi," *JIIC J. Intelek Ina. Cendikia*, vol. 1, no. 9, pp. 3499–3513, 2024.

[3] Edi, F. A. Tarigan, and Angeline, "Sistem Pendukung Keputusan Pemilihan Jasa Ekspedisi Untuk Pengantaran Produk Pada PT. Toba Surimi Industries Dengan Metode Fuzzy Simple Additive Weighting," *J. Ilm. Tek. Inform. METHOTIKA*, vol. 1, no. 2, pp. 60–65, 2021.

[4] A. T. Qurrota'ayun, B. S. Mukty, N. F. Amalia, S. A. Putri, and Y. Nabilah, "Sistem Pendukung Keputusan Pemilihan Jasa Pengiriman dengan Metode Analytical Hierarchy Proses (AHP)," *J. Sist. Inf. STMIK Antar Bangsa*, vol. 13, no. 1, pp. 24–33, 2024.

[5] A. Rohamanu and A. H. Tamrin, "Analisis dan Perancangan Sistem Pelacakan Pengiriman Barang Berbasis Web dan Whatsapp Studi Kasus 'PT Adisona Logistic Nusantara,'" *J. Inform. SIMANTIK*, vol. 7, no. 2, pp. 10–16, 2022.

[6] D. F. Majid and S. Wibisono, "Sistem Pendukung Keputusan dalam Pemilihan Jasa Kurir Terbaik Menggunakan Metode AHP-WASPAS," *J. JTIK (Jurnal Teknol. Inf. dan Komunikasi)*, vol. 8, no. 2, pp. 486–490, 2024, doi: 10.35870/jtik.v8i2.1971.

[7] R. Sinaga, A. Yoraeni, and L. Rohimah, "Sistem Pendukung Keputusan Pemilihan Jasa Pengiriman Pada PT HM Sampoerna Dengan Metode Simple Additive Weighting," *SPECTA J. Technol.*, vol. 6, no. 3, pp. 355–365, 2022.

[8] A. Putri and S. Wasiyanti, "Pemilihan Jasa Pengiriman Terbaik Menggunakan Metode Simple Additive Weighting (SAW)," *J. Sist. dan Teknol. Inf.*, vol. 6, no. 1, pp. 10–19, 2020, doi: 10.26418/justin.v6i4.29126.

[9] R. Y. Endra and V. Kartree, "Perbandingan Algoritma Fuzzy Saw Dan AHP untuk Penentuan Siswa Terbaik Pada Aplikasi E-Report Sekolah," *J. Inf. Syst. Informatics*, vol. 3, no. 4, pp. 634–644, 2021, doi: 10.51519/journalisi.v3i4.207.

[10] I. M. Yusuf, S. Sitorus, Sutarman, and A. Syahmarani, "Perbandingan Fuzzy AHP-SAW dan Fuzzy AHP-Vikor Dalam Pemilihan SPF Tabir Surya Wajah," *J. Serunai Mat.*, vol. 16, no. 2, pp. 135–150, 2024.

[11] C. E. Wijaya and A. Farisi, "Penerapan Metode Fuzzy Simple Additive Weighting Pada Sistem Pendukung Keputusan Karyawan Terbaik," *J. Manaj. Teknol. Dan Sist. Inf.*, vol. 4, no. 1, pp. 627–637, 2024, doi: 10.33998/jms.2024.4.1.1621.

[12] N. O. Mangelep, A. Mahniar, I. Amu, and F. O. Rumintjap, "Fuzzy Simple Additive Weighting

Method in Determining Single Tuition Fees for Prospective New Students at Manado State University," *Innov. J. ...*, vol. 4, no. 3, pp. 5700–5713, 2024, [Online]. Available: http://j-innovative.org/index.php/Innovative/article/view/11051.

[13] K. Aliyeva, A. Aliyeva, R. Aliyev, and M. Özdeşer, "Application of Fuzzy Simple Additive Weighting Method in Group Decision-Making for Capital Investment," *Axioms*, vol. 12, no. 8, pp. 1–13, 2023, doi: 10.3390/axioms12080797.

[14] Andi, "Analisis Komparasi Algoritma Fuzzy Dalam Sistem Pendukung Keputusan Pemilihan Sepeda Motor Bekas," *J. TIMES*, vol. 12, no. 2, pp. 71–78, 2023, doi: 10.51351/jtm.12.2.2023711.

[15] Sugiyono, "Metode Penelitian Kuantitatif Kualitatif dan R&D." CV. Alfabeta, Bandung, p. xx+444, 2020.

[16] A. Andi, C. Juliandy, and D. David, "Clustering Analysis of Tweets About COVID-19 Using the K-Means Algorithm," *Sinkron*, vol. 8, no. 1, pp. 543–533, 2023, doi: 10.33395/sinkron.v8i1.12145.

[17] D. Murdiani and M. Sobirin, "Perbandingan Metodologi Waterfall Dan RAD (Rapid Application Development) Dalam Pengembangan Sistem Informasi," *JINTEKS (Jurnal Inform. Teknol. dan Sains)*, vol. 4, no. 4, pp. 302–306, 2022, [Online]. Available: http://www.jurnal.uts.ac.id/index.php/JINTEKS/article/view/2008.

[18] A. A. Wahid, "Analisis Metode Waterfall Untuk Pengembangan Sistem Informasi," *J. Ilmu-ilmu Inform. dan Manaj. STMIK*, pp. 1–5, 2020.

[19] A. Setiawan and V. A. Fitria, "Sistem Pendukung Keputusan Pemilihan Lokasi Agen Garasi Kreatif Metode Fuzzy Saw," *JIPI (Jurnal Ilm. Penelit. dan Pembelajaran Inform.*, vol. 8, no. 1, pp. 1–11, 2023, doi: 10.29100/jipi.v8i1.3272.

[20] K. Septianzah, I. Himawan, and Maftuhin, "Penerapan Metode Simple Addictive Weighting (SAW) untuk Penentuan Lokasi Tempat Fitness," *Technol. J. Ilm.*, vol. 15, no. 4, pp. 666–674, 2024.

[21] R. Prayogi, Y. Sukmono, and S. Gunawan, "Perancangan Sistem Informasi Pemesanan Makanan Dan Minuman E-Menu Berbasis Website," *J. Ilm. Wahana Pendidik.*, vol. 9, no. 21, pp. 622–629, 2023, [Online]. Available: https://doi.org/10.5281/zenodo.10085338.

[22] M. A. Fakhri, I. Aknuranda, and D. Pramono, "Implementasi Sistem Informasi Showroom Mobil (SISMOB) dengan Pemrograman Berbasis Objek (Studi Kasus : UD . Tomaru Oto)," *J. Pengemb. Teknol. Inf. dan Ilmu Komput. Univ. Brawijaya*, vol. 2, no. 9, pp. 2967–2974, 2018.