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Electronic Tourism Using Decision Support Systems to Optimize the Trips

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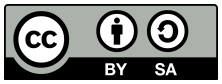
ABSTRACT

Pagar Alam is a tourist destination city in the province of South Sumatra, which has many very diverse tourist destinations. The problem is that there is still a lack of information about tourism that tourists can access. This research aimed to build electronic tourism to make it easier for tourists to get the best information and recommendations about tourism in the city of Pagar Alam, which can be accessed anytime and anywhere, as well as improve tourist experience in planning their tourist trips because this electronic tourism platform includes decision making support system, which helps tourists manage their tours according to their needs and abilities. The research method used was analysis by collecting data by observing tourist attractions, calculating predictions using the simple additive weighting method, and from the results of testing with several alternatives, it can be concluded that electronic tourism meets the criteria chosen by tourists after being carried out. The calculation produced the highest preference value for tourist attractions, namely Tugu Rimau, with a value of 13.25. The highest preference value for hotels is Villa Gunung Gare Pagar Alam, with a score of 8.91, and the highest preference score for eating places is Warung Ridwan, with a score of 13.25. The next stage was system design using data flow diagrams, and the final stage was implementation by building electronic tourism using the CodeIgniter framework.



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1. INTRODUCTION

Tourism is a sector that has an important [1] and strategic role in improving and developing a country, [2] including Indonesia, which has many tribes and cultures and very diverse tourist destinations. [3] Pagar Alam City, one of the cities in South Sumatra Province, has quite a large tourism potential with its natural and cultural beauty [4]. The problem is that many tourists still do not know what destinations, hotels, and restaurants are in Pagar Alam. So tourists have difficulty in determining a tour package according to their needs and funds owned by tourists; this is because there is still a lack of media promotional places that can provide information related to tourism in the city of Pagar Alam, which can be accessed anytime and anywhere. In research conducted by [5] tourism in Pagar Alam, The results are still less than optimal due to the lack of promotion, and the system offered is still very simple. Even though tourism is an important sector and is the mainstay of regional income for the city of Pagar Alam, its management is still not optimal, which has resulted in a lack of tourists visiting, resulting in a decline in the local revenue (PAD) of the city of Pagar Alam.

To make it easier for tourists to get clear information about tourism in Pagar Alam, a media was created that utilizes information and communication technology, namely e-tourism, which is a change from traditional methods to digital. [6] to improve tourists' experience in planning and managing their tourist trips. [7] In e-tourism, tourists look for information and recommendations. [8] E-tourism is a business model used in the tourism industry that can be used to increase tourist interest with media services that are easily accessible anytime and anywhere. [9] about tourist destinations, arranging travel itineraries, booking accommodation and transportation tickets, and their various experiences with other people. E-tourism embodies digital-based tourism development [10], which is easy to access anytime and anywhere [9]. Also, as a digital marketing strategy, it benefits tourism service providers and tourists and unites stakeholders on one tourism platform. Research conducted by the resulting e-tourism only focuses on concentrating attention on assessing the situation of e-tourism use on Lombok Island in terms of elements that influence it from within and outside, which can be used as a basis for evaluation by the West Nusa Tenggara Province Culture and Tourism Office. According to research [11], e-tourism aims to make its benefits accessible to the entire community. Having information about facilities makes it easier to find details about accommodation, dining options, travel agencies, and tourism management. Additionally, utilizing an integrated location map with a direction service enhances the ease of locating a place on the map. [12] In research conducted by [13], a tourism information system utilizing a decision support system using the Analytical Hierarchy Process (AHP) method helps tourists determine the best tourist attractions according to their wishes.

The difference between this research and the previous one is that the e-tourism that was built cannot help tourists by providing the best recommendations about tourism, so to optimize the performance of e-tourism, a decision support system is included to help tourists make better decisions in planning and managing their trips as state of the art. A decision support system is an information system designed to assist decision-making by providing relevant information, modeling, and data analysis [14] to solve structural or unstructured problems. [15] DSS can provide decisions to solve problems [16] to provide alternatives to solve a problem to produce better decisions. In the context of e-tourism, DSS can help tourists choose the right tourist destination, [17] choose a hotel that suits their needs, and get a place to eat that suits their tastes, using the simple additive weighting (SAW) method, which is one of the common methods and is often used to help decision making, [18] because this method can determine the weight value for each attribute, then proceed with the ranking process. This method is the simplest and easiest to apply fuzzy Multi-Attribute Decision Making (MADM) method because it has a simple algorithm [19]. This method involves calculating alternative preference values using the weights given to each criterion considered important in decision-making. In e-tourism applications, the SAW method can help tourists choose tourist destinations [20] according to their needs. Tourists can give certain weight to criteria such as price, location, facilities, and ratings from other users. The SAW method will provide a score for each tourist spot; [21] hotels and restaurants are calculated based on tourist preference scores and the weight given to each criterion.

A decision support system based on the SAW method is employed in e-tourism to aid tourists in comparing alternative tourist destinations and selecting the most suitable one based on their requirements. This system can enhance the tourist experience by considering various criteria and preferences that are important to them while selecting the right tourist destination. The SAW method can optimize e-tourism-based tourism services by finding the weighted sum of the rating criteria for each alternative. With the implementation of DSS in e-tourism, it will be very easy for tourists to plan and do the right calculations to get their holiday packages [22] because tourists can know the amount of costs that must be paid when traveling to the city of Pagar Alam, besides that, tourists also know accurate information regarding the distance to tourist locations and also the travel distance, this will make it easier for tourists to make decisions about traveling to tourist locations. So by optimizing e-tourism-based services with DSS, we can increase the number of tourists visiting the city of Pagar Alam, resulting in an increase in regional income for the city of Pagar Alam, as well as making a positive contribution to the development of the tourism industry in Indonesia.

2. RESEARCH METHOD

The methodology is a very important thing in supporting the implementation of research. The method used in this research is the quantitative method, where the data is obtained from the results of direct interviews at the tourism office of the city of Pagar Alam and from tourism site managers as a result of observations at the tourist object location. The stages of this research are analysis, prediction calculations, system design, and implementation [23], as seen in Figure 1 below.

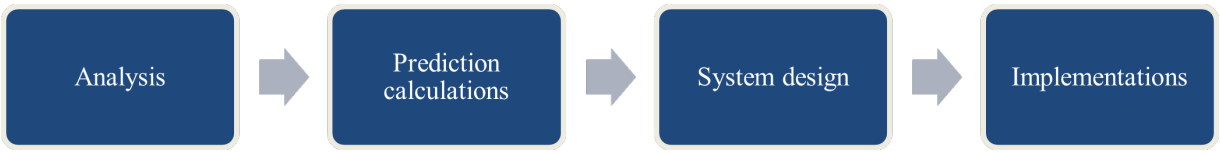

Figure 1. Research method

2.1. Analysis

At this stage, the process involves gathering necessary data through direct observation [24] to learn about the tourism services available in Pagar Alam. Apart from that, to get more information, direct interviews were conducted with tourists who had visited and distributed questionnaires to find out the advantages and disadvantages of the tourist attractions they visited. Also, information was obtained from the Pagar Alam city tourism office.

2.2. Prediction calculations

Steps in calculations using the SAW method, [24] namely: identifying the alternative (Ai) that is evaluated, determining the criteria (Ci) that will be used as a reference in decision making, setting the preference weight or level of importance (W) for each criterion, calculating the suitability value for each criterion by describing the extent of the alternative (Ai) fulfills each criterion (Ci), creates a decision matrix (X) based on the suitability rating of each alternative (Ai) against the criteria (Ci), normalizes the decision matrix (X) by calculating the normalized performance rating value (rij) of the alternative (Ai) on the criteria (Ci) using a predetermined formula.

Formula (1) is used if criterion (j) is a category in the form of benefits, then the max criterion (max Xij) is used with the formula.

$$rij = \frac{xij}{\text{Max Xij}} \tag{1}$$

Formula (2) is used if criterion (j) is a category in the form of costs, then the min criterion (min Xij) is used with the formula.

$$rij = \frac{\text{Max Xij}}{Xij} \tag{2}$$

After the normalization process (rij) is carried out, the results form a normalized matrix (R), which then calculates the final paraphrase value (Vi) by adding up the product of the elements in each row of the normalized matrix (R) with the appropriate preference weight (W), namely elements in the matrix column (W), with formula (3).

$$Vi = \Sigma_{j=1}^{n} WjRij \tag{3}$$

With:

Vi = ranking for each alternative
Wj = weight value of each criterion
Rij = normalized performance rating value

2.3. System design

After the prediction results are obtained, this application is planned to be run via a web platform. This application will integrate an intelligent decision support system with a simple additive weighting method into e-tourism for designing e-tourism using data flow diagrams.

2.4. Implementation

At the implementation stage, it is namely creating a web-based e-tourism application using the PHP programming language and the CodeIgniter framework, following the design results in the previous stage.

3. RESULT AND ANALYSIS

3.1. Result

This research produces a system that utilizes web-based information and communication technology, namely e-tourism, by including a decision support system with a simple additive weighting method, which can be accessed at https://e-tourismpagaralam.com/. This e-tourism displays three main components in tourism, namely tourist attractions, hotels, and restaurants, with several criteria that are used as assessment material in recommending the best tourist attractions, best hotels, and best places to eat as a consideration for tourists who will visit Pagar Alam city according to their needs and abilities.

3.2. Discussion

The findings of this research are that it has produced an e-tourism platform by utilizing a decision support system using a simple additive weighting method, which is capable of determining the weight value for each attribute and then continuing with the ranking process. This method is the simplest and easiest to apply fuzzy Multi-Attribute Decision Making (MADM) because it has a simple algorithm.

The findings of this study are consistent with the research conducted by [25], indicating that a tourism information system employing a decision support system with a simple additive weighting method can assist in offering recommendations for tourists to identify the optimal tourist attractions. The following outlines the stages discussed in this research:

The first stage is analysis. At this stage is determining what factors or components are used as guidelines to optimize tourism services in Pagar Alam, namely tourist attractions, hotels, and restaurants, because these factors are always in contact with tourists going on a trip. Tourist attractions are the core component, where tourists would choose which tourist attractions would be their travel destination, and several criteria are taken into consideration in choosing tourist attractions in the city of Pagar Alam, which can be seen in Table 1 below:

Table 1. Criteria for Tourist Attractions

	Criteria	**Kategori**	**Sub-Criteria**	Nilai
C1	Facility and service	Benefit	Standard	1
			Medium	2
			Executive	3
			VIP	4
			VVIP	5
C2	Accessibility	Benefit	Walk	1
			Motorcycle	2
			Car	3
C3	Review	Benefit	1 Star	1
			2 Star	2
			3 Star	3
			4 Star	4
			5 Star	5
C4	Security	Benefit	Not Important	1
			Currently	2
			Important	3
			Very Important	4
C5	Cost	Cost	<10.000	1
			10.000 39.500	2
			40.000 79.500	3
			80.000 99.500	4
			> 100.000	5

From data collected using interviews at the tourism office and direct observation of tourist attractions by asking the managers, we obtained a list of the top 10 tourist attractions most frequently visited by tourists in Pagar Alam, which can be seen in Table 2.

Table 2. List of Tourist Attractions

	Name of tourist attractions
A1	Air Terjun Lematang Indah
A2	Tangga 2001
A3	Kebun Teh
A4	Green Paradise
A5	Ayik Pacar
A6	Ozil Amazing Garden
A7	Curup Embun
A8	Taman Bunga Mr. D
A9	Rizal Camping Ground Pelangkenidai
A10	Tugu Rimau

Next is the hotel, which is also a supporting component in traveling, especially tourists from outside the city who do not have family at the tourist destination, and tourists need a place for them to rest. Several criteria are taken into consideration in determining a hotel as a place for tourists to rest, which can be seen in Table 3 as follows:

Table 3. Hotel Criteria

	Criteria	Category	Sub-Criteria	Value
C1	Room facilities	Benefit	Standard	1
			Standard	2
			Medium	3
			Executive	4
			VIP	5
C2	Location	Cost	VVIP	1
			Near	2
			Currently	3
C3	Review	Benefit	Very Far	1
			1 Satr	2
			2 Star	3
			3 Star	4
			4 Star	5
C4	Service quality	Benefit	5 Star	1
			Not good	2
			Normal	3
			Good	4
C5	Cost	Cost	$<$ 200.000	1
			10.000 399.500	2
			400.000 599.500	3
			600.000 800.000	4
			$>$ 800.000	5

From data collection carried out using interviews at the tourism office and direct observation of places to stay or hotels by asking the management, a list of the top 10 hotels or places to stay most often used by tourists in Pagar Alam city was obtained, which can be seen in Table 4 below:

Table 4. List of Hotel

	Hotels Name
A1	Hotel Perdana
A2	Hotel Garuda ZZ
A3	Hotel Legenda
A4	Hotel Orchid Dempo
A5	Hotel Favour
A6	Hotel Syaidah
A7	Vila Pesona Alam
A8	Villa Dempo Flower
A9	Villa Gunung Gare Pagar Alam
A10	Villa Pagar Alam

Restaurants are also a very important component, where no trip is complete without tasting the local culinary delights of the destination tourist destination. Table 5 shows that there are criteria that can be used as a reference in choosing a restaurant that suits tourists' tastes.

Table 5. Criteria for Restaurants

	Criteria	Category	Sub-Criteria	Value
C1	Service quality	Benefit	Not good	1
			Normal	2
			Good	3
			Very good	4
C2	Location	Cost	Near	1
			Currently	2
			Very Far	3
C3	Reviewer	Benefit	1 Satr	1
			2 Star	2
			3 Star	3
			4 Star	4
			5 Star	5
C4	Menu variations	Benefit	Single menus	1
			Simple menus	2
			Complete menus	3
C5	Biaya	Cost	$<$ 10.000	1
			11.000 25.000	2
			26.000 40.000	3
			41.000 60.000	4
			$>$ 60.000	5

Data was collected through interviews at the tourism office and direct observation at restaurants in the city of Pagar Alam by asking the managers, as shown in Table 6. You can see a list of the top 10 restaurants most frequently visited by tourists as places to eat in the city of Pagar Alam, namely :

Table 6. List of Restaurants

	Name of restaurants
A1	Warung Kuliner Mitra Selero
A2	Sido Mulyo
A3	Ayam Bakar MS
A4	Zayan Resto Caf
A5	Keday Nongkrong
A6	Warung Ridwan
A7	Resto 88
A8	Pondok Tete Resto caf
A9	Karjak
A10	Nyenyat Resto

The second stage is calculating predictions in case studies to determine or provide the best recommendations for tourist attractions, hotels, and restaurants with sub-criteria chosen by tourists with explanations, namely in case studies on e-tourism to determine the best tourist attractions with sub-criteria selected by tourists in Table 7 below:

Table 7. Sub-Criteria for Selected Tourist Attractions

	Criteria	**Sub-Criteria**	**Value**
C1	Facilities and service	Executive	3
C2	Accessibility	Motorcycle	2
C3	Review	5 Star	5
C4	Security	Important	3
C5	Cost	10.000 - 39.500	2

Next, calculate using the simple additive weighting method, with the initial step, namely determining the weight of each criterion, the value of which is obtained from the sub-criteria - sub-criteria chosen by tourists according to their abilities and needs and is made in Table 8.

Table 8. The Weight of The Criteria for Tourist Attractions

	C1	**C2**	**C3**	**C4**	**C5**
Weight	3	2	5	3	2

The next step is to form a matrix consisting of alternatives and criteria, whose values are sub-criteria values that correspond to the real situation of the alternatives. This value is an initial guideline in the simple additive weighting method, displayed in Table 9 below.

Table 9. Alternative Matrix and Criteria

	C1	C2	C3	C4	C5
A1	1	3	1	2	1
A2	3	1	2	3	1
A3	1	3	4	1	1
A4	2	2	3	5	1
A5	2	3	2	4	2
A6	3	3	3	4	1
A7	2	3	4	4	2
A8	4	3	3	5	1
A9	3	2	3	5	3
A10	3	3	5	5	2

The next step is to normalize alternative matrices and criteria using a formula that matches the criteria they have, whether the criteria are benefit or cost criteria, because the calculation process will be different. The recommendation results could be wrong if the formula used is not correct. At C1 tourism destinations, the criteria have a type of benefit, so that :

$$r11 = \frac{1}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{1}{4} = 0,25 \quad r16 = \frac{3}{max\{1;3;1;2;2;3;2;4;3;3\}} = \frac{3}{4} = 0,75$$
$$r12 = \frac{3}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{1}{4} = 0,25 \quad r17 = \frac{2}{max\{1;3;1;2;2;3;2;4;3;3\}} = \frac{2}{4} = 0,50$$
$$r13 = \frac{1}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{1}{4} = 0,25 \quad r18 = \frac{4}{max\{1;3;1;2;2;3;2;4;3;3\}} = \frac{4}{4} = 1,00$$
$$r14 = \frac{2}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{2}{4} = 0,50 \quad r19 = \frac{3}{max\{1;3;1;2;2;3;2;4;3;3\}} = \frac{3}{4} = 0,75$$
$$r15 = \frac{2}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{2}{4} = 0,50 \quad r110 = \frac{3}{max\{1;3;1;2;2;3;2;4;3;3\}} = \frac{3}{4} = 0,75$$

At C2 tourism destinations, criteria have a type of benefit, so:

$$r21 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00 \quad r26 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00$$
$$r22 = \frac{1}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{1}{3} = 0,33 \quad r27 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00$$
$$r23 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00 \quad r28 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00$$
$$r24 = \frac{2}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{2}{3} = 0,67 \quad r29 = \frac{2}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{2}{3} = 0,67$$
$$r25 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00 \quad r210 = \frac{3}{max\{3;1;3;2;3;3;3;3;2;3\}} = \frac{3}{3} = 1,00$$

At C3 tourism destinations, criteria have a type of benefit, so :

$$r31 = \frac{1}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{1}{5} = 0,20 \quad r36 = \frac{3}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{3}{5} = 0,60$$
$$r32 = \frac{2}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{2}{5} = 0,40 \quad r37 = \frac{4}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{4}{5} = 0,80$$
$$r33 = \frac{4}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{4}{5} = 0,80 \quad r38 = \frac{3}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{3}{5} = 0,60$$
$$r34 = \frac{3}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{3}{5} = 0,60 \quad r39 = \frac{3}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{5}{5} = 1,00$$
$$r35 = \frac{2}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{2}{5} = 0,40 \quad r310 = \frac{5}{max\{1;2;4;3;2;3;4;3;3;5\}} = \frac{5}{5} = 1,00$$

At C4 tourism destinations, criteria have a type of benefit, so :

$$r41 = \frac{2}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{2}{5} = 0,40 \quad r46 = \frac{4}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{4}{5} = 0,80$$
$$r42 = \frac{3}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{3}{5} = 0,60 \quad r47 = \frac{4}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{4}{5} = 0,80$$
$$r43 = \frac{1}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{1}{5} = 0,20 \quad r48 = \frac{5}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{5}{5} = 1,00$$
$$r44 = \frac{5}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{5}{5} = 1,00 \quad r49 = \frac{5}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{5}{5} = 1,00$$
$$r45 = \frac{4}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{4}{5} = 0,80 \quad r410 = \frac{5}{max\{2;3;1;5;4;4;4;5;5;5;5\}} = \frac{5}{5} = 1,00$$

At C5 tourism destinations, the criteria have a cost type, so :

$$r51 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{1} = \frac{1}{1} = 1,00 \quad r56 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{1} = \frac{1}{1} = 1,00$$
$$r52 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{1} = \frac{1}{1} = 1,00 \quad r57 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{2} = \frac{1}{2} = 0,50$$
$$r53 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{1} = \frac{1}{1} = 1,00 \quad r58 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{1} = \frac{1}{1} = 1,00$$
$$r54 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{1} = \frac{1}{1} = 1,00 \quad r59 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{3} = \frac{1}{3} = 0,33$$
$$r55 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{2} = \frac{1}{2} = 0,50 \quad r510 = \frac{min\{1;1;1;1;2;1;2;1;3;2\}}{2} = \frac{1}{2} = 0,50$$

After the calculation process using the simple additive weighting method, the results are recapitulated in the form of alternative matrices and criteria, which can be seen in Table 10, which displays the results of the recapitulation of calculations for the criteria using formulas according to the categories of these criteria, which have the type cost or has a type of benefit.

Table 10. Normalization Results

	C1	C2	C3	C4	C5
A1	0,25	1,00	0,20	0,40	1,00
A2	0,75	0,33	0,40	0,60	1,00
A3	0,25	1,00	0,80	0,20	1,00
A4	0,50	0,67	0,60	1,00	1,00
A5	0,50	1,00	0,40	0,80	0,50
A6	0,75	1,00	0,60	0,80	1,00
A7	0,50	1,00	0,80	0,80	0,50
A8	1,00	1,00	0,60	1,00	1,00
A9	0,75	0,67	0,60	1,00	0,33
A10	0,75	1,00	1,00	1,00	0,50

Multiplying the weights by each row of normalized values.

$$A1 = (3^*0,25) + (2^*1,00) + (5^*0,20) + (3^*0,40) + (2^*1,00) = 6,95$$
$$A2 = (3^*0,75) + (2^*0,33) + (5^*0,40) + (3^*0,60) + (2^*1,00) = 8,72$$
$$A3 = (3^*0,25) + (2^*1,00) + (5^*0,80) + (3^*0,20) + (2^*1,00) = 9,35$$
$$A4 = (3^*0,50) + (2^*0,67) + (5^*0,60) + (3^*1,00) + (2^*1,00) = 10,83$$
$$A5 = (3^*0,50) + (2^*1,00) + (5^*0,40) + (3^*0,80) + (2^*0,50) = 8,90$$
$$A6 = (3^*0,75) + (2^*1,00) + (5^*0,60) + (3^*0,80) + (2^*1,00) = 11,65$$
$$A7 = (3^*0,50) + (2^*1,00) + (5^*0,80) + (3^*0,80) + (2^*0,50) = 10,90$$
$$A8 = (3^*1,00) + (2^*1,00) + (5^*0,60) + (3^*1,00) + (2^*1,00) = 13,00$$
$$A9 = (3^*0,75) + (2^*0,67) + (5^*0,60) + (3^*1,00) + (2^*0,33) = 10,25$$
$$A10 = (3^*0,75) + (2^*1,00) + (5^*1,00) + (3^*1,00) + (2^*0,50) = 13,25$$

From the results of the ranking, it can be seen that the value of A10 gets the greatest value, so it can be concluded that Alternative 10, namely Tugu Rimau, is the best recommendation for tourist attractions according to the criteria chosen by tourists for e-tourism.

Next, the e-tourism case study is to determine the best hotel from 10 hotels determined as alternatives with the sub-criteria chosen by tourists, which are shown in Table 7, where the sub-criteria that have been selected are expected to provide the best recommendation results according to their wishes and tourist capabilities.

Table 11. Sub-Criteria for Selected Hotels

	Criteria	Sub-Criteria	Value
C1	Facilities and services	Medium	2
C2	Locations	near	1
C3	Review	4 Star	4
C4	Service quality	Normal	2
C5	Cost	200.000 39 900	2

Next, carry out calculations using the Simple Additive Weighting method, with the initial step, namely determining the weight of each criterion, the value of which is obtained from the sub-criteria chosen by tourists according to their abilities and needs and is made in Table 12.

Table 12. The Weight of The Hotel Criteria

	C1	C2	C3	C4	C5
Weight	2	1	4	2	2

The next step is to form a matrix consisting of alternatives and criteria, whose values are sub-criteria values that correspond to the real situation of the alternatives. This value is the initial guideline in the simple additive weighting method, displayed in Table 13 below.

Table 13. Alternative Matrix and Criteria

	C1	C2	C3	C4	C5
A1	1	1	4,6	2	1
A2	1	1	4,4	2	1
A3	2	2	4,4	3	2
A4	2	2	4,3	3	3
A5	3	2	4	3	3
A6	2	2	4,4	4	3
A7	3	1	4	4	4
A8	3	2	4,9	4	3
A9	4	1	4,3	4	5
A10	4	2	4,3	4	4

The next step is to normalize alternative matrices and criteria using a formula that matches the criteria they have, whether the criteria are benefit or cost criteria, because the calculation process would be different. The recommendation results could be wrong if the formula used is not correct. At C1 hotels, the criteria have benefit types, so that:

$$r11 = \frac{1}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{1}{4} = 0,25 \quad r16 = \frac{2}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{2}{4} = 0,50$$
$$r12 = \frac{1}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{1}{4} = 0,25 \quad r17 = \frac{3}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{3}{4} = 0,75$$
$$r13 = \frac{2}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{2}{4} = 0,50 \quad r18 = \frac{3}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{3}{4} = 0,75$$
$$r14 = \frac{2}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{2}{4} = 0,50 \quad r19 = \frac{4}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{4}{4} = 1,00$$
$$r15 = \frac{3}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{3}{4} = 0,75 \quad r110 = \frac{4}{max\{1;1;2;2;3;2;3;3;4;4\}} = \frac{4}{4} = 1,00$$

At C2 hotels, criteria have a cost type, so :

$$r21 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{1} = \frac{1}{1} = 1,00 \quad r26 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{2} = \frac{1}{2} = 0,50$$
$$r22 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{1} = \frac{1}{1} = 1,00 \quad r27 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{1} = \frac{1}{1} = 1,00$$
$$r23 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{2} = \frac{1}{2} = 0,50 \quad r28 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{2} = \frac{1}{2} = 0,50$$
$$r24 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{2} = \frac{1}{2} = 0,50 \quad r29 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{1} = \frac{1}{1} = 1,00$$
$$r25 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{2} = \frac{1}{2} = 0,50 \quad r210 = \frac{min\{1;1;2;2;2;2;1;2;1;2\}}{2} = \frac{1}{2} = 0,50$$

At C3 hotels, criteria have a type of benefit, so :

$$r31 = \frac{4,6}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,6}{4,9} = 0,94$$
$$r32 = \frac{4,4}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,6}{4,9} = 0,90$$
$$r33 = \frac{4,4}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,3}{4,9} = 0,90$$
$$r34 = \frac{4,3}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,3}{4,9} = 0,88$$
$$r35 = \frac{4}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4}{4,9} = 0,82$$
$$r36 = \frac{4,4}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,4}{4,9} = 0,59$$
$$r37 = \frac{4}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4}{4,9} = 0,82$$
$$r38 = \frac{4,9}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,9}{4,9} = 1,00$$
$$r39 = \frac{4,3}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,3}{4,9} = 0,88$$
$$r310 = \frac{4,3}{max\{4;6;4;4;4;4;4;3;4;4;4;4,9;4;3;4;3\}} = \frac{4,3}{4,9} = 0,88$$

At C4 hotels, criteria have a type of benefit, so :

$$r41 = \frac{2}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{2}{4} = 0,50 \quad r46 = \frac{4}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{4}{4} = 1,00$$
$$r42 = \frac{2}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{2}{4} = 0,50 \quad r47 = \frac{4}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{4}{4} = 1,00$$
$$r43 = \frac{3}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{3}{4} = 0,75 \quad r48 = \frac{4}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{4}{4} = 1,00$$
$$r44 = \frac{3}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{3}{4} = 0,75 \quad r49 = \frac{4}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{4}{4} = 1,00$$
$$r45 = \frac{3}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{3}{4} = 0,75 \quad r410 = \frac{4,3}{max\{2;2;3;3;4;4;4;4;4\}} = \frac{4}{4} = 1,00$$

At C5 hotels, the criteria have a cost type, so :

$$r51 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{1} = \frac{1}{1} = 1,00 \quad r56 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{3} = \frac{1}{3} = 0,33$$
$$r52 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{1} = \frac{1}{1} = 1,00 \quad r57 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{4} = \frac{1}{4} = 0,25$$
$$r53 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{2} = \frac{1}{2} = 0,50 \quad r58 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{3} = \frac{1}{3} = 0,33$$
$$r54 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{3} = \frac{1}{3} = 0,33 \quad r59 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{5} = \frac{1}{5} = 0,20$$
$$r55 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{3} = \frac{1}{3} = 0,33 \quad r510 = \frac{min\{1;1;2;3;3;3;4;3;5;4\}}{4} = \frac{1}{4} = 0,25$$

After the calculation process using the simple additive weighting method, the results are recapitulated in the form of alternative matrices and criteria, which can be seen in Table 14, which displays the results of the recapitulation of calculations for the criteria using formulas according to the categories of these criteria, which have the type cost or has a type of benefit.

Table 14. Normalization Results

	C1	C2	C3	C4	C5
A1	0,25	1,00	0,20	0,40	1,00
A2	0,75	0,33	0,40	0,60	1,00
A3	0,25	1,00	0,80	0,20	1,00
A4	0,50	0,67	0,60	1,00	1,00
A5	0,50	1,00	0,40	0,80	0,50
A6	0,75	1,00	0,60	0,80	1,00
A7	0,50	1,00	0,80	0,80	0,50
A8	1,00	1,00	0,60	1,00	1,00
A9	0,75	0,67	0,60	1,00	0,33
A10	0,75	1,00	1,00	1,00	0,50

Multiplying the weights by each row of normalized values.

$$A1 = (3^*0,25) + (2^*1,00) + (5^*0,20) + (3^*0,40) + (2^*1,00) = 6,95$$
$$A2 = (3^*0,75) + (2^*0,33) + (5^*0,40) + (3^*0,60) + (2^*1,00) = 8,72$$
$$A3 = (3^*0,25) + (2^*1,00) + (5^*0,80) + (3^*0,20) + (2^*1,00) = 9,35$$
$$A4 = (3^*0,50) + (2^*0,67) + (5^*0,60) + (3^*1,00) + (2^*1,00) = 10,83$$
$$A5 = (3^*0,50) + (2^*1,00) + (5^*0,40) + (3^*0,80) + (2^*0,50) = 8,90$$
$$A6 = (3^*0,75) + (2^*1,00) + (5^*0,60) + (3^*0,80) + (2^*1,00) = 11,65$$
$$A7 = (3^*0,50) + (2^*1,00) + (5^*0,80) + (3^*0,80) + (2^*0,50) = 10,90$$
$$A8 = (3^*1,00) + (2^*1,00) + (5^*0,60) + (3^*1,00) + (2^*1,00) = 13,00$$
$$A9 = (3^*0,75) + (2^*0,67) + (5^*0,60) + (3^*1,00) + (2^*0,33) = 10,25$$
$$A10 = (3^*0,75) + (2^*1,00) + (5^*1,00) + (3^*1,00) + (2^*0,50) = \mathbf{13,25}$$

Conducting the ranking reveals that the A9 value, attaining the highest score among the available alternatives, is 8.91. Hence, it can be inferred that A9, specifically Villa Gunung Gare in Pagar Alam, is the top-recommended hotel or accommodation choice based on the criteria tourists select.

Next, in the e-tourism case study, to determine the best restaurant frequently visited by tourists, from the ten restaurants determined as alternatives, the sub-criteria chosen by tourists are shown in Table 15, where the sub-criteria that have been selected are expected to provide the best recommendations according to the wishes and tastes of tourists regarding the culinary fence of nature.

Table 15. Sub-Criteria for Selected Restaurants

	Criteria	Sub-Criteria	Value
C1	Facilities and service	Good	3
C2	Location	Near	1
C3	Review	5 Star	5
C4	Menu variations	Simple menu	2
C5	Cost	40.000 60.000	4

Next, in the calculation using the SAW method, with the following steps, namely carrying out calculations using the Simple Additive Weighting method, with the initial step, namely determining the weight of each criterion, the value of which is obtained from the sub-criteria - sub-criteria selected by tourists according to their abilities and needs, and is made in table 16.

Table 16. Weight Criteria for Restaurants

	C1	C2	C3	C4	C5
Weight	3	1	5	2	4

The next step is to form a matrix consisting of alternatives and criteria, whose values are sub-criteria values that correspond to the real situation of the alternatives. This value is the initial guideline for the simple additive weighting method, displayed in Table 17 as follows.

Table 17. Alternative Matrix and Criteria

	C1	C2	C3	C4	C5
A1	2	1	5	1	2
A2	3	1	4,3	1	2
A3	2	1	4,1	2	3
A4	2	2	4	2	2
A5	3	1	4,5	2	3
A6	3	2	4,5	3	2
A7	3	1	4,3	3	4
A8	4	1	4,2	3	5
A9	4	2	4,3	3	5
A10	4	2	4,4	3	5

The next step is to normalize alternative matrices and criteria by using a formula that matches the criteria they have, whether the criteria are benefit or cost criteria, because the calculation process would be different, and the recommendation results could be wrong if the formula used is not correct. In C1 restaurants, the criteria have a type of benefit, so that:

$$r11 = \frac{2}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{2}{4} = 0,50 \quad r16 = \frac{3}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{3}{4} = 0,75$$
$$r12 = \frac{3}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{3}{4} = 0,75 \quad r17 = \frac{3}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{3}{4} = 0,75$$
$$r13 = \frac{2}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{2}{4} = 0,50 \quad r18 = \frac{4}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{4}{4} = 1,00$$
$$r14 = \frac{2}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{2}{4} = 0,50 \quad r19 = \frac{4}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{4}{4} = 1,00$$
$$r15 = \frac{3}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{3}{4} = 0,75 \quad r110 = \frac{4}{max\{2;3;2;2;3;3;3;4;4;4\}} = \frac{4}{4} = 1,00$$

At C2, restaurant criteria have a cost type, so :

$$r21 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{1} = \frac{1}{1} = 1,00 \quad r26 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{2} = \frac{1}{2} = 0,50$$
$$r22 = \frac{max\{1;1;1;2;1;2;1;1;2;2\}}{1} = \frac{1}{1} = 1,00 \quad r27 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{2} = \frac{1}{1} = 1,00$$
$$r23 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{1} = \frac{1}{1} = 1,00 \quad r28 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{2} = \frac{1}{1} = 1,00$$
$$r24 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{1} = \frac{1}{2} = 0,50 \quad r29 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{2} = \frac{1}{1} = 0,50$$
$$r25 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{1} = \frac{1}{2} = 0,50 \quad r210 = \frac{min\{1;1;1;2;1;2;1;1;2;2\}}{2} = \frac{1}{2} = 0,50$$

At C3, restaurant criteria have a type of benefit, so :

$$r31 = \frac{5}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{5}{5} = 1,00$$
$$r32 = \frac{4,3}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,3}{5} = 0,86$$
$$r33 = \frac{4,1}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,1}{5} = 0,82$$
$$r34 = \frac{4}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4}{5} = 0,80$$
$$r35 = \frac{4,5}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,5}{5} = 0,90$$
$$r36 = \frac{4,5}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,5}{5} = 0,90$$
$$r37 = \frac{4,3}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,3}{5} = 0,86$$
$$r38 = \frac{4,2}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,2}{5} = 0,84$$
$$r39 = \frac{4,3}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,3}{5} = 0,86$$
$$r310 = \frac{4,4}{max\{5;4;3;4;1;4;4;5;4;3;4;3;4,4\}} = \frac{4,4}{5} = 0,88$$

At C4, restaurant criteria have a type of benefit, so:

$$r41 = \frac{1}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{1}{3} = 0,33 \quad r46 = \frac{3}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{3}{3} = 1,00$$
$$r42 = \frac{1}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{1}{3} = 0,33 \quad r47 = \frac{3}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{3}{3} = 1,00$$
$$r43 = \frac{2}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{2}{3} = 0,67 \quad r48 = \frac{3}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{3}{3} = 1,00$$
$$r44 = \frac{2}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{2}{3} = 0,67 \quad r49 = \frac{3}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{3}{3} = 1,00$$
$$r45 = \frac{2}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{2}{3} = 0,67 \quad r410 = \frac{3}{max\{1;1;2;2;2;3;3;3;3;3\}} = \frac{3}{3} = 1,00$$

At C5, restaurant criteria have a cost type, so :

$$r51 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{2} = \frac{2}{2} = 1,00 \quad r56 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{2} = \frac{2}{2} = 1,00$$
$$r52 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{2} = \frac{2}{2} = 1,00 \quad r57 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{4} = \frac{2}{4} = 0,50$$
$$r53 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{3} = \frac{2}{3} = 0,67 \quad r58 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{5} = \frac{2}{5} = 0,40$$
$$r54 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{2} = \frac{2}{2} = 1,00 \quad r59 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{5} = \frac{2}{5} = 0,40$$
$$r55 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{3} = \frac{2}{3} = 0,67 \quad r510 = \frac{min\{2;2;3;2;3;2;4;5;5;5\}}{5} = \frac{2}{5} = 0,40$$

After the calculation process using the simple additive weighting method, the results are recapitulated in the form of alternative matrices and criteria, which can be seen in Table 18, which displays the results of the recapitulation of calculations for criteria using formulas according to the categories of these criteria, which have the type cost or has a type of benefit.

Table 18. Normalization Results

	C1	C2	C3	C4	C5
A1	0,50	1,00	1,00	0,33	1,00
A2	0,75	1,00	0,86	0,33	1,00
A3	0,50	1,00	0,82	0,67	0,67
A4	0,50	0,50	0,80	0,67	1,00
A5	0,75	1,00	0,90	0,67	0,67
A6	0,75	0,50	0,90	1,00	1,00
A7	0,75	1,00	0,86	1,00	0,50
A8	1,00	1,00	0,84	1,00	0,40
A9	1,00	0,50	0,86	1,00	0,40
A10	1,00	0,50	0,88	1,00	0,40

Multiplying the weights by each row of normalized values.

$$A1 = (3^*0,50) + (1^*1,00) + (5^*1,00) + (2^*0,33) + (4^*1,00) = 12,17$$
$$A2 = (3^*0,75) + (1^*1,00) + (5^*0,86) + (2^*0,33) + (4^*1,00) = 12,22$$
$$A3 = (3^*0,50) + (1^*1,00) + (5^*0,82) + (2^*0,67) + (4^*0,67) = 10,60$$
$$A4 = (3^*0,50) + (1^*0,50) + (5^*0,80) + (2^*0,67) + (4^*1,00) = 11,33$$
$$A5 = (3^*0,75) + (1^*1,00) + (5^*0,90) + (2^*0,67) + (4^*0,67) = 11,75$$
$$A6 = (3^*0,75) + (1^*0,50) + (5^*0,90) + (2^*1,00) + (4^*1,00) = 13,25$$
$$A7 = (3^*0,75) + (1^*1,00) + (5^*0,86) + (2^*1,00) + (4^*0,50) = 11,55$$
$$A8 = (3^*1,00) + (1^*1,00) + (5^*0,84) + (2^*1,00) + (4^*0,40) = 11,80$$
$$A9 = (3^*1,00) + (1^*0,50) + (5^*0,86) + (2^*1,00) + (4^*0,40) = 11,40$$
$$A10 = (3^*1,00) + (1^*0,50) + (5^*0,88) + (2^*1,00) + (4^*0,40) = 11,50$$

During the ranking, it's clear that A6, or Warung Ridwan, achieved the highest score of 13.25 among the available options. Hence, it can be concluded that A6, specifically Warung Ridwan, is the top restaurant recommendation based on the criteria chosen by tourists.

The third stage is designs, where in building the natural fence e-tourism, the design uses data flow diagrams. Starting by creating a context diagram, which is a diagram that shows the overall process and describes the scope of the system [26]. Generally speaking, the system to be developed involves three users: admin, user, and tourism department. Admin is responsible for making criteria data input, while the user plays a role in viewing information and choosing criteria to get the best recommendations, as shown in Figure 2.

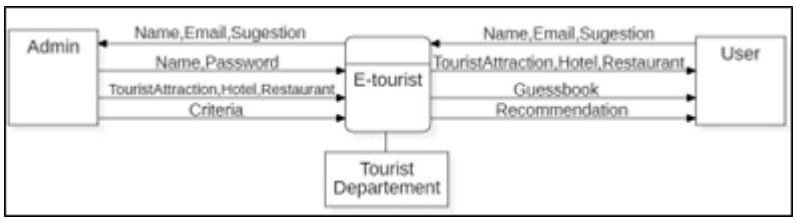

Figure 2. Context diagram

Next, create a data flow diagram (DFD), a data logic model [27] model or process created to describe entries and outputs that are objects whose resulting data will flow out of a software or system. A level 1 Data Flow Diagram (DFD) for an e-tourism system will provide an overview of how data flows through the various processes in the system. DFD level 1 shows the interaction between the main entity (admin) and the system, as shown in Figure 3.

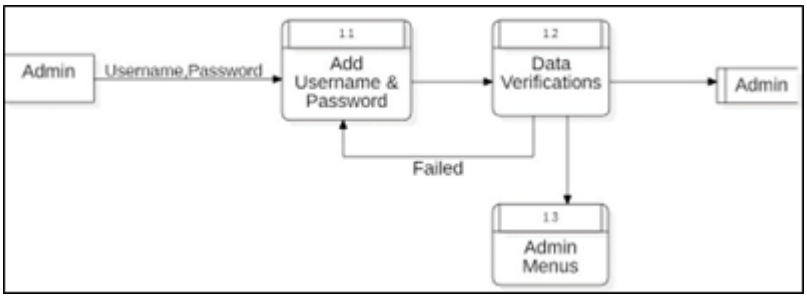

Figure 3. Data flow diagram level 1

Level 2 Data Flow Diagram (DFD) is a more detailed visual representation of the Level 1 Data Flow Diagram in the system. DFD Level 2 shows more details about the processes in a system. In the context of an e-tourism system, DFD Level 2 can include sub-processes or steps that are more detailed than the processes depicted in DFD Level 1., as shown in Figure 4.

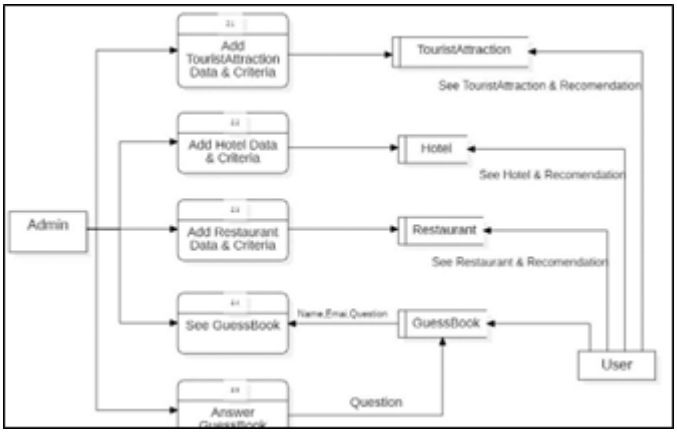

Figure 4. Data flow diagram level 2

The fourth stage is the implementation of E-tourism, which was built to meet tourists' needs to obtain tourism information that can be accessed anytime and anywhere by including a decision support system using a simple additive weighting method. The simple additive viewing method can be used to assist in analyzing and selecting the best alternative to optimize tourism in the city of Pagar Alam with various existing alternatives, namely the most recommended tourist attractions, hotels, and restaurants, based on predetermined criteria. E-tourism can also promote tourism in the city of Pagar Alam online and help facilitate tourists to plan

their trips to the city of Pagar Alam by considering the results of recommendations from e-tourism, which utilizes a decision support system.

So, the results of this research are compared with previous research which discussed tourism in the city of Pagar Alam. The previous study only displayed tourism information, but in this research, a decision support system was added, which can provide recommendations for the best tourism spots in Pagar Alam as a state of the art of this research.

4. CONCLUSION

This research concludes that Pagar Alam e-tourism can help provide the information needed by tourists visiting the city of Pagar Alam, which can be accessed anytime and anywhere. This e-tourism utilizes a decision support system that can provide recommendations for tourists about the best tourist attractions, hotels, and restaurants that suit the needs and abilities of tourists who will travel. Based on the results of testing with several alternatives, it can be concluded that e-tourism by utilizing a decision support system using a simple additive weighting method with stages carried out, with sub-criteria chosen by tourists, can provide the best results and recommendations based on the calculation results and rankings that have been carried out so that e-tourism can be a solution for tourists in determining tourist attractions, hotels, and restaurants, which suit their capabilities. The SAW method has very simple stages so that the accuracy of the recommendation results cannot fully be used as a reference for tourists in making decisions. Therefore, the researcher provides suggestions in the next research. It is hoped that e-tourism can use other methods in decision-making so that it can be compared to which one is better and more accurate in decision-making.

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6. DECLARATIONS

AUTHOR CONTIBUTION

Dedi Setiadi conducted fieldwork, wrote and revised the manuscript, and designed the application. Yogi Isro Mukti provided research ideas and reviewed, revised the manuscript, provided reference files, and built the application.

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COMPETING INTEREST

The author declares that there is no conflict of interest related to the publication of this paper.

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