

Implementation of Simple Multi Attribute Rating Technique Method using Decision Support System Concept (Case Recommendation of Salon Place in Pematangsiantar City)

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Abstract

The purpose of the research is to determine the ideal salon place considering the salon is a place visited by women to beautify themselves. This research can also be used as recommendations in the form of information in deciding whether consumers visit the salon or not based on research results. The method used in decision making is the SMART (Simple Multi Attribute Rating Technique) method. To determine the evaluation of the salon, researchers used 5 assessment criteria, among others: service (C1), facilities (C2), products (C3), price (C4) and Purchase Decision (C5). For alternatives used as a salon, among others: salon Sukim (A1), Necis (A2), Endah (A3), Crown (A4) and Chan Dhai (A5). The results obtained by Sukim (A1) with a final value of 0.8835 as the first rank, Endah Salon (A2) with a final score of 0.5530 as the second rank and Chan Dai (A5) with a final value of 0.45 as the third rank.

Keywords: Decision Support System, SMART Method, Salon Place, Ranking.

1. Introduction

Salon is a place that is often visited by women as a place to beautify themselves. Considered consumers are spoiled and given satisfying services without making consumers bother. Most consumers use the salon as a place to beautify and beautify themselves, with good and clean treatments such as: facials, cream baths, hair spas, body massages, steam, manicure and pedicure. This has become a trend and much in demand by consumers. Researchers are interested in recommending the ideal salon in the town of Pematangsiantar based on consumer choice. This needs to be done considering that every individual needs refreshing. One of them is Salon. It is hoped that this research can provide input to consumers, especially pematangsiantar community in choosing destinations to pamper themselves in accordance with consumer criteria. In this case the researchers used a questionnaire / questionnaire in evaluating the ideal salon. In this case a decision support system is needed to rank the ideal salon recommendations so that a decision support system is a solution offered to resolve the problem.

Many branches of computer science can solve complex problems. Among them is Artificial Intelligence [1]–[10]. Decision support systems are part of artificial intelligence that can be used to avoid the assessment of subjectivity that is produced [11]. Objectivity assessment is needed so that the decision support system can help consumers in choosing the ideal salon with consumer needs. Researchers used the SMART (Simple Multi Attribute Rating Technique) method. This is because the SMART method is able to solve problems with multi criteria. The following are some of the previous studies that used the SMART method to solve problems. One of them is done [11] with the title selection of cattle for beef cattle breeders using the SMART method. The results of the study explained that the SMART method can be applied to the selection of cattle types with the result that the Lemosin cattle (A1)

type is the first recommendation with a final score of 1 and Bali cattle (A3) as the second recommendation with a final value of 0.702543.

2. Research Methodology

2.1. Decision Support System

Decision support system is an application of information systems aimed at assisting leaders in the decision making process [12]. There are stages that must be carried out in the Decision Making System process, among others: Understanding Phase, Design Phase and Selection Phase [12]–[15].

2.2. SMART Method

SMART (Simple Multi Attribute Rating Technique) is a multi-criteria decision making technique based on the theory that each alternative consists of a number of criteria that have values and weights that illustrate how important compared to other criteria [16], [17].

2.3. Data source

This section explains how SMART stages and processes determine the ideal salon place in Pematangsiantar. This study uses 5 assessment criteria, including: Services (C1), Facilities (C2). Products (C3), Prices (C4) and Purchasing Decisions (C5). Alternatives used in the study include 5 best salons according to consumers in the city of Pematangsiantar through a questionnaire / questionnaire given to 150 respondents. The list of alternative salons includes: Sukin (A1), Necis Salon (A2), Endah (A3), Mahkota (A4) and Chan Dai (A5). The following is the normalized questionnaire data:

Table 1. Normalized Data

Alternatif	Kriteria				
	C1	C2	C3	C4	C5
Sukim	0.81	0.62	0.77	0.68	0.56
Necis	0.74	0.76	0.72	0.67	0.63
Endah	0.77	0.50	0.69	0.62	0.68
Mahkota	0.73	0.51	0.59	0.61	0.67
Chan Dhai	0.72	0.60	0.76	0.69	0.57
Max	0.81	0.76	0.77	0.69	0.68
Min	0.72	0.50	0.59	0.61	0.56

Information :

- C1: Service (weight = 45%)
- C2: Facilities (weight = 10%)
- C3: Product (weight = 25%)
- C4: Price (weight = 15%)
- C5: Purchase decision (weight = 5%)

3. Results and Discussion

Here are the results of calculations in recommending the ideal salon place using the SMART method.

- a) Give criteria weights with a value of 100-1 based on the importance of the criteria. The value given to the weight of this criterion is based on the judgment of the decision maker.

Table 2. Criteria Weight Value

Criteria	Weight
Service	0.45

Criteria	Weight
Facilities	0.1
Product	0.25
Price	0.15
Purchase decision	0.05
Total	1

b) Normalization of Criteria Weight

Table 3. Criteria Weight Normalization

Criteria	Criteria Weight (w_j)	Normalization of Criteria Weight
Service	0.45	$0.45 / 1 = 0.45$
Facilities	0.1	$0.1 / 1 = 0.1$
Product	0.25	$0.25 / 1 = 0.25$
Price	0.15	$0.15 / 1 = 0.15$
Purchase decision	0.05	$0.05 / 1 = 0.05$

- c) Provide parameter values for each criterion. This step is required for qualitative data, for example for quality criteria (Strongly Agree (SS) = 4, Agree (S) = 3, Doubt - Ragu (RR) = 2, Disagree (TS) = 1). In this study, the value for each criterion is in the form of quantitative so that no parameter values are needed anymore.
- d) Determine the utility value. The value of this utility depends on the nature of each criterion. Utility value for each criterion.

Table 4. Determining Utility Value

Criteria	Nature of Criteria
Service	The sooner the better
Facilities	More complete is better
Product	More complete is better
Price	Cheaper is better
Purchase decision	The sooner the better

The following service values, facilities, products, prices, purchase decisions for each criterion:

Max Service = 0,81
 Min Service = 0,72

$$A1 (\text{Service}) = \frac{(0.81 - 0.72)}{(0.81 - 0.72)} * 100\% = 1$$

$$A2 (\text{Service}) = \frac{(0.81 - 0.72)}{(0.77 - 0.72)} * 100\% = 0.22$$

$$A3 (\text{Service}) = \frac{(0.81 - 0.72)}{(0.73 - 0.72)} * 100\% = 0.55$$

$$A4 (\text{Service}) = \frac{(0.81 - 0.72)}{(0.72 - 0.72)} * 100\% = 0.11$$

$$A5 (\text{Service}) = \frac{(0.81 - 0.72)}{(0.81 - 0.72)} * 100\% = 0$$

Max (Facilities) = 0.76
 Min (Facilities) = 0.50

$$A1 (\text{Facilities}) = \frac{(0.76 - 0.62)}{(0.76 - 0.50)} * 100\% = 0.53$$

$$A2 (\text{Facilities}) = \frac{(0.76 - 0.50)}{(0.76 - 0.50)} * 100\% = 0$$

$$A3 (\text{Facilities}) = \frac{(0.76 - 0.50)}{(0.76 - 0.50)} * 100\% = 1$$

$$A4 (\text{Facilities}) = \frac{(0.76 - 0.51)}{(0.76 - 0.50)} * 100\% = 0.96$$

$$A5 (\text{Facilities}) = \frac{(0.76 - 0.51)}{(0.76 - 0.50)} * 100\% = 0.61$$

Max (Product) = 0.77
 Min (Product) = 0.59

$$A1 (\text{Product}) = \frac{(0.77 - 0.59)}{(0.77 - 0.59)} * 100\% = 1$$

$$A2 (\text{Product}) = \frac{(0.77 - 0.59)}{(0.72 - 0.59)} * 100\% = 0.72$$

$$A3 (\text{Product}) = \frac{(0.77 - 0.59)}{(0.69 - 0.59)} * 100\% = 0.55$$

$$A4 (\text{Product}) = \frac{(0.77 - 0.59)}{(0.59 - 0.59)} * 100\% = 0$$

$$A5 (\text{Product}) = \frac{(0.77 - 0.59)}{(0.77 - 0.59)} * 100\% = 0.94$$

Max (Price) = 0.69
 Min (Price) = 0.61

$$A1 (\text{Price}) = \frac{(0.68 - 0.61)}{(0.69 - 0.61)} * 100\% = 0.87$$

$$\begin{aligned}
 A2 \text{ (Price)} &= \left(\frac{0.67 - 0.61}{0.69 - 0.61} \right) * 100\% = 0.75 & A1 \text{ (Purchase)} &= \left(\frac{0.56 - 0.56}{0.68 - 0.56} \right) * 100\% = 0 \\
 A3 \text{ (Price)} &= \left(\frac{0.69 - 0.61}{0.62 - 0.61} \right) * 100\% = 0.12 & A2 \text{ (Purchase)} &= \left(\frac{0.68 - 0.56}{0.63 - 0.56} \right) * 100\% = 0.58 \\
 A4 \text{ (Price)} &= \left(\frac{0.61 - 0.61}{0.69 - 0.61} \right) * 100\% = 0 & A3 \text{ (Purchase)} &= \left(\frac{0.68 - 0.56}{0.68 - 0.56} \right) * 100\% = 1 \\
 A5 \text{ (Price)} &= \left(\frac{0.69 - 0.61}{0.69 - 0.61} \right) * 100\% = 1 & A4 \text{ (Purchase)} &= \left(\frac{0.67 - 0.56}{0.68 - 0.56} \right) * 100\% = 0.91 \\
 \text{Max (Purchase decision)} &= 0.68 & A5 \text{ (Purchase)} &= \left(\frac{0.57 - 0.56}{0.68 - 0.56} \right) * 100\% = 0.08 \\
 \text{Min (Purchase decision)} &= 0.56 & &
 \end{aligned}$$

Following the complete results of the utility value calculation matrix can be seen in the following table:

Table 5. Alternative Value Utility Matrix F

Alternative	Criteria				
	C1	C2	C3	C4	C5
Sukim	1	0.53	1	0.87	0
Necis	0.22	0	0.72	0.75	0.58
Endah	0.55	1	0.55	0.12	1
Mahkota	0.11	0.96	0	0	0.91
Can Dhai	0	0.61	0.94	1	0.08

e) Determine the final grade

$$\begin{aligned}
 \text{Sukim} - A1 \text{ (Service)} &= 1 * 0.45 = 0.45 \\
 \text{Sukim} - A1 \text{ (Facilities)} &= 0.53 * 0.1 = 0.053 \\
 \text{Sukim} - A1 \text{ (Product)} &= 1 * 0.25 = 0.25 \\
 \text{Sukim} - A1 \text{ (Price)} &= 0.87 * 0.15 = 0.1305 \\
 \text{Sukim} - A1 \text{ (Purchase decision)} &= 0 * 0.05 = 0
 \end{aligned}$$

$$\begin{aligned}
 \text{Necis} - A2 \text{ (Service)} &= 0.22 * 0.45 = 0.099 \\
 \text{Necis} - A2 \text{ (Facilities)} &= 0 * 0.1 = 0 \\
 \text{Necis} - A2 \text{ (Product)} &= 0.72 * 0.25 = 0.18 \\
 \text{Necis} - A2 \text{ (Price)} &= 0.75 * 0.15 = 0.1125 \\
 \text{Necis} - A2 \text{ (Purchase decision)} &= 0.58 * 0.05 = 0.029
 \end{aligned}$$

$$\begin{aligned}
 \text{Endah} - A3 \text{ (Service)} &= 0.55 * 0.45 = 0.2475 \\
 \text{Endah} - A3 \text{ (Facilities)} &= 1 * 0.1 = 0.1 \\
 \text{Endah} - A3 \text{ (Product)} &= 0.55 * 0.25 = 0.1375 \\
 \text{Endah} - A3 \text{ (Price)} &= 0.12 * 0.15 = 0.18 \\
 \text{Endah} - A3 \text{ (Purchase decision)} &= 1 * 0.05 = 0.05
 \end{aligned}$$

$$\begin{aligned}
 \text{Mahkota} - A4 \text{ (Service)} &= 0.1 * 0.45 = 0.045 \\
 \text{Mahkota} - A4 \text{ (Facilities)} &= 0.96 * 0.1 = 0.096 \\
 \text{Mahkota} - A4 \text{ (Product)} &= 0 * 0.25 = 0 \\
 \text{Mahkota} - A4 \text{ (Price)} &= 0 * 0.15 = 0 \\
 \text{Mahkota} - A4 \text{ (Purchase decision)} &= 0.91 * 0.05 = 0.045
 \end{aligned}$$

$$\begin{aligned}
 \text{Chan Dhai} - A5 \text{ (Service)} &= 0 * 0.45 = 0 \\
 \text{Chan Dhai} - A5 \text{ (Facilities)} &= 0.61 * 0.1 = 0.061 \\
 \text{Chan Dhai} - A5 \text{ (Product)} &= 0.94 * 0.25 = 0.235 \\
 \text{Chan Dhai} - A5 \text{ (Price)} &= 1 * 0.15 = 0.15 \\
 \text{Chan Dhai} - A5 \text{ (Purchase decision)} &= 0.08 * 0.05 = 0.004
 \end{aligned}$$

Following are the complete results of the SMART calculation method:

Table 6. Final Value Results

Alt	Criteria					Score End
	C1	C2	C3	C4	C5	
A1	0.45	0.053	0.25	0.1305	0	0.8835
A2	0.099	0	0.18	0.1125	0.029	0.4205
A3	0.2475	0.1	0.1375	0.018	0.05	0.553
A4	0.045	0.096	0	0	0.045	0.186
A5	0	0.061	0.235	0.15	0.004	0.45

4. Conclusion

Based on the research results of the decision support system for selecting an ideal place in Pematangsiantar City using the SMART method, it can be concluded:

- a) Recommendations for an ideal salon based on consumers in Pematangsiantar City based on 5 assessment criteria include: services, facilities, products, prices and purchasing decisions using the Simple Multi Attribute Rating Technique (SMART) method effective enough to be applied in determining the ideal salon place in Pematangsiantar City.
- b) Based on the research results obtained Sukim (A1) with a final value of 0.8835 as the first rank, Endah Salon (A2) with a final value of 0.5530 as the second rank and Chan Dai (A5) with a final value of 0.45 as the third rank.

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