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Abstract. Skincare is currently growing very fast. The community, especially women, both teenagers and parents, now believes more in Skincare services and products that change consumers' faces to be cleaner, and shine for their appearance. However, until now there are still obstacles that are often faced by consumers in choosing Skincare that is in accordance with the needs of their skin type. This study aims to recommend the selection of Skincare products based on consumers using the ELECTRE method. The data collection method was carried out by means of interviews and questionnaires on 250 samples of consumers who use Skincare products in the city of Pematangsiantar. Based on these results the criteria for evaluating prices (X1), ingredient content (X2), side effects (X3), availability of goods (X4), and packaging (X5). The alternatives used are 4 namely: A1 = Garnier, A2 = Nature Republic, A3 = Pond's, A4 = Wardah. The results of the research using the ELECTRE method show that Skincare Garnier (A1) products are recommended to be the best Skincare based on consumers. It is expected that research results can provide understanding to consumers in choosing Skincare products.

1. Introduction

Skincare is part of cosmetics that serves to treat the skin to look clean, beautiful, shining and healthy. This makes the industry in the health and beauty sector increasingly develop. Early development of the Skincare industry was first developed by the Egyptian community in 4000 years BC. Then in the 19th century, in America began to produce beauty tools. Good skincare is skincare that is safe to use by various types of skin and has a price that is in accordance with the quality. There are several types of skin care, such as Body-lotion, Facial wash, Serum, Mask and Sun Protection. The development of Skincare products in the past decade has left consumers confused in choosing Skincare that suits their skin type needs.

In computer science there are many settlement techniques that can be done to solve complex problems. Among artificial intelligence. Artificial intelligence has many branches of science including: Decision support systems [1]–[4], Data mining [5], Expert Systems [6], [7], Artificial Neural Networks [8]–[22] and others [23]–[26]. Each method has a different solution according to the example case. Based on these problems, the researchers used a Decision Support System with the

ELECTRE method. Related research has been conducted [25]. This study uses a fuzzy logic approach in determining cosmetics that are appropriate to the type of facial skin. The difference with the research being carried out is the final result in the form of a ranking of Skincare product recommendations and the methods used. The use of the ELECTRE Method has several advantages, namely multic Criteria decision based on the concept of Outranking by using pairwise comparisons of alternatives based on each appropriate criterion [26] so that it corresponds to cases with many alternatives but only a few criteria are involved. The purpose of this study is to analyze and test the accuracy of the ELECTRE method in recommending Skincare product selection.

2. Methodology

The study was conducted in the city of Pematangsiantar. Researchers collected data through interviews and gave questionnaires to 250 samples consumers who use Skincare products. The assessment criteria used include: Price (X1), Material Content (X2), Side Effects (X3), Availability of Goods (X4), and Packaging (X5) and alternative skincare products used A1 = Garnier, A2 = Nature Republic , A3 = Pond's, A4 = Wardah. The design of the use case diagram in this study is shown in the following figure where the research is carried out according to the SPK development stage with 4 phases of decision making namely: intelligence, design, choice, and implementation.
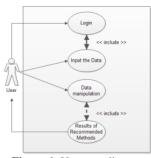

Figure 1. Use case diagram

3. Results and Discussion

The criteria used in recommending the selection of Skincare products based on consumers are Price (X1), Material Content (X2), Side Effects (X3), Availability of Goods (X4), and Packaging (X5). In this study, sample data of four Skincare is used as an alternative in performing manual calculations with the ELECTRE method, including:

A1= Garnier
A2= Nature Republic
A3= Pond's
A4= Wardah

As a level of importance criteria (reference weight) has a limit between 0 to 1, including:

0.9 = Very Good
0.75 = Agree
0.5 = Enough
0.25 = Disagree

Table 1. Determine the suitability rating of each alternative on each criterion

	X1	X2	X3	X4	X5
A1	0,7917	0,7500	0,7500	0,6500	0,8300
A2	0,8188	0,7250	0,7063	0,5906	0,7825
A3	0,9000	0,7500	0,8250	0,6000	0,8250
A4	0,8173	0,7808	0,7154	0,7288	0,8208

Table 1 shows the match rating of each alternative on each criterion. Because each value given to each alternative in each criterion is a match value where the largest value is the best, all criteria given are assumed to be profit criteria. then in decision makers, first give weight preference:
W = { 0.8, 0.7, 0.7, 0.6, 0.8}

The next steps that must be done are:
a) Normalization of the decision matrix

$$r_{11} = \frac{x_{11}}{\sqrt{x_{11}^2 + x_{21}^2 + x_{31}^2 + x_{41}}}$$

$$r_{11} = \frac{0,7917}{\sqrt{0,7917^2 + 0,8188^2 + 0,9000^2 + 0,8173^2}}$$

$$r_{11} = \frac{0,7917}{\sqrt{0,6267 + 0,6704 + 0,8100 + 0,6680}}$$

$$r_{11} = \frac{0,7917}{1,6659}$$

Following are the results of the complete Matrix Decision Normalization calculation presented in the following table:

Table 2. Result of Normalization of Decision Matrix

0,4752	0,4989	0,4996	0,5041	0,5093
0,4915	0,4822	0,4704	0,4581	0,4802
0,5403	0,4989	0,5495	0,4653	0,5063
0,4906	0,5193	0,4765	0,5653	0,5037

b) Weighting on a normalized matrix

$V_{11} = W_1 R_{11}$
$V_{11} = 0,8 * 0,4752$

The result of multiplying the preference weights for each criterion with the normalized decision matrix can be seen in the following table:

Table 3. Weighting of the Normalized Matrix

0,3802	0,3492	0,3497	0,3025	0,4075
0,3932	0,3376	0,3293	0,2748	0,3842
0,4322	0,3492	0,3847	0,2792	0,4050
0,3925	0,3635	0,3336	0,3392	0,4029

c) Determine the set of concordance and discordance index
The following results from the Concordance and Discordance set are shown in the following table:

Table 4. Concordance Set

Ckl	The set
C12	{2,3,4,5)
C13	{2,4,5}
C14	{3,5}
C21	{1}
C23	{0}
C24	{1}
C31	{1,2,3}
C32	{1,2,3,4,5}
C34	{1,3,5}
C41	{1,2,4}
C42	{2,3,4,5}
C43	{2,4}

Table 5. Discordance Set

Dkl	The set
D12	{1)
D13	{1,3}
D14	{1,2,4}
D21	{2,3,4,5}
D23	{1,2,3,4,5}
D24	{2,3,4,5}
D31	{4,5}
D32	{0}
D34	{2,4}
D41	{3,5}
D42	{1}
D43	{1,3,5}

d) Calculate the concordance and discordance matrices

The following results of the calculation of the concordance and discordance matrices are shown in the following table:

Tabel 6. Matrix *Concordance*

-	2,8000	2,1000	1,5000
0,8000	-	0	0,8000
2,2000	3,6000	-	2,3000
2,1000	2,8000	1,3000	-

Table 7. Matrix *Discordance*

-	0,4707	1,0000	1,0000
1,0000	-	1,0000	1,0000
0,4472	0,0000	-	1,0000
0,4399	0,0108	0,8525	-

e) Determine the Concordance And Discordance Dominant Matrices

1) Calculates the concordance dominant matrix, Threshold value (c) is:

$$c = \frac{\begin{matrix} 2,8000 + 2,1000 + 1,5000 \\ 0,8000 + 0 + 0,8000 + 2,2000 \\ 3,6000 + 2,3000 + 2,1000 \\ 2,8000 + 1,3000 \end{matrix}}{4(4-1)}$$

$$c = \frac{22,3000}{12} = 1,8583$$

So the matrix element F is determined as follows:

$$f_{kl} = \begin{cases} 1, jika\ c_{kl} \geq c \\ 0, jika\ c_{kl} < c \end{cases}$$

Table 8. Concordance Dominant Matrix

-	1	1	1
0	-	0	0
1	1	-	1
1	1	0	-

2) Calculates the discordance dominant matrix, Threshold value (c) is:

$$c = \frac{\begin{matrix} 0,4707 + 1,0000 + 1,0000 \\ 1,0000 + 1,0000 + 1,0000 \\ 0,4472 + 0,0000 + 1,0000 \\ 0,4399 + 0,0108 + 0,8525 \end{matrix}}{4(4-1)}$$

$$c = \frac{8,2211}{12} = 0,6851$$

So the matrix element G is determined as follows:

$$g_{kl} = \begin{cases} 1, jika\ d_{kl} \geq d \\ 0, jika\ d_{kl} < d \end{cases}$$

Table 9. Discordance Dominant Matrix

-	0	1	1
1	-	1	1
0	0	-	1
0	0	1	-

f) Determine the aggregate dominance matrix.

The matrix formula for members of the aggregate dominance matrix is $E_{kl} = F_{kl} \times G_{kl}$, So the aggregate dominance matrix if shown in the table is as follows:

Table 10. Dominance aggregate matrix

-	0	1	1
0	-	0	0
0	0	-	1
0	0	0	-

g) Eliminate alternatives that are less favorable

Matrix E gives a sequence of choices for each alternative, i.e. if $e_{kl} = 1$ then the alternative A_k is a better alternative than A1. Thus, the rows in matrix E that have the least number = 1 can be eliminated. In table 10, the lines with the product Garnier $e_{kl} = 2$, Nature republice $e_{kl} = 0$, Pond's $e_{kl} = 1$, and Wardah $e_{kl} = 0$. Then it can be concluded that based on the ELECTRE method the selection of the best Skincare is Garnier (A1).

4. Conclusion

Based on the research conducted by the author, it can be concluded that the ELECTRE method can be applied in recommending the selection of Skincare products based on consumers. The results of the study with 5 other evaluation criteria: Price (X1), Material Content (X2), Side Effects (X3), Availability of Goods (X4), and Packaging (X5) and 4 alternatives for choosing skincare products, among others: Garnier (A1) , Nature Republic (A2), Pond's (A3) and Wardah (A4) found that Skincare Garnier (A1) products are recommended to be recommended for Skincare based on consumers..

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