

Application of the MOORA Method in Determining the Best Women's Shampoo Product for Dandruff-Prone Skin Based on Consumer Preferences

Ratih Manalu^{*}, Wahyuni, Najiyah Nah'Dah Lubis, Siva Maya Sari, Heru Satria Tambunan, Irfa Sudahri Damanik

Information Technology Study Program, Sekolah Tinggi Ilmu Komputer Tunas Bangsa, Pematangsiantar, Indonesia
Jl. Sudirman, Banjar, Kec. Siantar Bar., Kota Pematang Siantar, Sumatera Utara 21142, Indonesia

Email: ^{1,*}ratihmanalu01@gmail.com, ²yuni47512@gmail.com, ³najiyahnahidahlubis@gmail.com, ⁴sivamayasariiii13@gmail.com, ⁵heru@amiktunasbangsa.ac.id, ⁶irfansudahri@amiktunasbangsa.ac.id

Correspondence Author Email: ratihmanalu01@gmail.com

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Abstract—The problem in choosing anti-dandruff shampoo for female consumers arises because of the many marketing claims and testimonials that do not always reflect the actual effectiveness of a product. This condition makes it difficult for consumers to determine which shampoo is truly suitable for their dandruff-prone scalp. This study aims to apply the MOORA (Multi-Objective Optimization on the Basis of Ratio Analysis) method as an analytical approach to help determine product choices objectively based on consumer assessments. A total of six shampoo alternatives were evaluated using five main criteria, namely active ingredient content (C1), moisture (C2), hair softness (C3), effectiveness in reducing dandruff (C4), and price as cost (C5). Data were obtained through a survey of 51 female respondents, while the criteria weights were determined through an expert panel and normalized so that the total weight was equal to one. The MOORA calculation results showed that alternative A5 had the highest preference value ($Y_i = 0.1362$), followed by A1 and A4. Sensitivity analysis to weight changes of $\pm 20\%$ indicated that the highest rankings remained stable, while the middle rankings experienced minor variations. These findings show that the MOORA method is capable of providing consistent and measurable decision results. In conclusion, MOORA is effective as a tool in selecting anti-dandruff shampoos based on consumer preferences. The limitations of this study include the limited sample size and subjective weighting, so further studies are recommended to expand the sample size and consider clinical trials of active ingredients.

Keywords: MOORA; Women's Shampoo Products; Dandruff-Prone Skin; Multi-Criteria Analysis; Customer Satisfaction

1. INTRODUCTION

Dandruff is one of the most common hair health problems experienced by women and has a direct impact on comfort, self-confidence, and daily quality of life. Although often considered a minor problem, dandruff can cause itching, irritation, and flaking of the scalp, which can interfere with social and professional activities (Almeida, 2025; Das, 2025). This condition arises from a complex interaction of various factors, including the growth of the *Malassezia* fungus, excessive sebum production, scalp sensitivity, hormonal changes, stress, and reactions to chemicals in hair care products. The complexity of these causes shows that dandruff is not a problem that can be solved with a single simple approach, so choosing the right care product is important for users, especially women, who are statistically more likely to report complaints of dandruff and scalp sensitivity than men. Given the high prevalence of this problem, anti-dandruff shampoo is the most widely used solution (Soetjipto, 2023). These products generally contain active ingredients such as zinc pyrithione, selenium sulfide, ketoconazole, or tea tree oil, which inhibit fungal growth, control sebum, or relieve irritation. However, the wide variety of active ingredients and formulations available on the market means that the effectiveness of each shampoo differs for each individual (Ajay, 2025). Two users with similar scalp conditions may experience opposite results. This is influenced by factors such as scalp sensitivity, compatibility with certain active ingredients, differences in oiliness, and irritation tendencies. This situation makes the process of selecting an anti-dandruff shampoo often subjective and reliant on trial and error (Dhanalakshmi, 2025). The problem is further complicated by the rapid development of the hair care product market. Every manufacturer competes to present attractive marketing claims, such as “effectively eliminates dandruff from the first use,” “safe for sensitive skin,” “contains natural ingredients,” or “longer lasting” (Vellingiri, 2025). Although attractive, these claims are not always accompanied by objective comparative information at the consumer level (Safi, 2022). As a result, many women choose products based on unstandardized testimonials, social media trends, or personal preferences, rather than data-based evaluations (Shafiq, 2025). These decisions often lead to dissatisfaction, wasted money, and prolonged trial and error. This situation indicates a clear gap between consumers' need for objective selection guidelines and the limited amount of structured information available as a reference (Prabhu, 2025).

Previous research on anti-dandruff shampoo has generally been partial in nature, with some studies focusing on dermatological aspects such as the effectiveness of the active ingredients zinc pyrithione and ketoconazole, while other studies have examined consumer behavior based on brand preferences, price, or product claims, thus failing to integrate various important criteria such as effectiveness, safety, price, convenience, and availability into a single analytical framework (Khelfaoui, 2024). In the field of decision support systems, Putra et al. (2021) (Raj, 2024) used the AHP method for selecting anti-dandruff shampoo, but this method has weaknesses in the complexity of pairwise comparisons and dependence on respondent consistency, while Sari et al (2022) [11] applied the simpler SAW method, but the results were highly dependent on the subjectivity of the criteria weights and were not optimal in distinguishing between benefit and

cost criteria. Based on this search(Raju, 2024), no research has been found that comprehensively applies the MOORA method in selecting anti-dandruff shampoo, even though product selection in the field involves a combination of various criteria, so the MOORA method is needed to produce more objective and efficient decisions.

The Multi-Objective Optimization by Ratio Analysis (MOORA) method is a multi-criteria decision-making technique that excels in normalization, weighting, and ratio calculation processes, resulting in objective alternative rankings(Baraily, 2024). Compared to other methods, such as SAW, which is too simple, or AHP, which requires a more complex pairwise comparison process, MOORA offers a balance between accuracy and ease of application(Ghoushchi, 2023; Riahi, 2023). In addition, MOORA has good calculation stability, is transparent in the evaluation process, and does not require complex mathematical assumptions, making it suitable for evaluating product alternatives with various different criteria(Yontar, 2024). In the context of selecting anti-dandruff shampoo, MOORA is able to accommodate all important aspects both in terms of benefits (such as the effectiveness of active ingredients) and costs (such as price and potential irritation). The use of MOORA in this study aims to provide a comprehensive assessment of anti-dandruff shampoo products based on indicators that are relevant to women as the main users(Handrizal, 2024). This data-driven approach is expected to reduce reliance on subjective perceptions, marketing claims, and biased testimonials(Nwankiti, 2024; Pandey, 2024; Prabiantissa, 2024). By presenting measurable comparisons, this study allows for a clearer identification of the strengths and weaknesses of each product. The evaluation results are not only in the form of a final ranking, but also information about the contribution of each criterion to the overall quality of the product(Jati, 2024).

This study was designed to present an objective, structured, and evidence-based product assessment model. In addition to providing practical contributions in the form of more accurate recommendations for consumers, this study also provides academic contributions through the application of the MOORA method in the domain of hair care product selection an area that is still rarely explored in the literature on multi-criteria decision making. Thus, this study is expected to bridge the gap between the wide variety of products on the market and the needs of consumers, especially women, for more rational and effective guidance in selecting anti-dandruff shampoo.

2. RESEARCH METHODOLOGY

2.1 Data Set

Table 1. Types of databases

Respondent	Altertnative	Criteria				
		C1	C2	C3	C4	C5
Respondent 1	Dove	5	5	5	4	4
Respondent 2	Head & Shoulders	4	5	5	5	5
Respondent 3	Lifebouy	3	4	4	4	4
Respondent 4	Pantene	4	4	5	4	4
Respondent 5	Clear	4	3	4	4	4
....
Respondent 51	Sunsluk	3	4	4	4	3

Table 1 shows the assessment data from 51 respondents on several shampoo brand alternatives based on five criteria (C1–C5). Each respondent gave a score on a scale of 1–5 for each criterion, where a higher value indicates a better assessment. The ALTERNATIVE column contains the names of the brands being assessed, while the C1–C5 columns contain the assessment scores according to the predetermined criteria. This data forms the basis for the analysis and calculation process in the MOORA method to determine the final ranking of each alternative.

2.2 Criteria Data

This study was conducted in Pematangsiantar. The criteria data in Table 2 contains five criteria used in the assessment of shampoo alternatives, namely content, moisture, softness, effectiveness, and price. Each criterion was classified as a benefit or cost according to the nature of the assessment and was given a weight that reflected its level of importance in the decision-making process. The highest weight was given to content and effectiveness, followed by moisture, softness, and price. These criteria were used as the basis for calculations in the MOORA method to determine the objective ranking of shampoos.

Table 2. Criteria Data

Criteria	Description	Jenis	Bobot
C1	Contents	Benefit	5
C2	Moisture	Benefit	3
C3	Softness	Benefit	4
C4	Effectiveness	Benefit	4
C5	Price	Cost	2

The following is an explanation of four selection criteria that can be adjusted for women's shampoo for dandruff-prone skin: The following is an explanation of the five criteria used in the alternative shampoo assessment, as listed in Table 2:

- a. Contents (C1)
Assessing the quality and suitability of active ingredients in shampoo, especially those that treat dandruff and maintain scalp health.
- b. Moisture (C2)
Measuring the shampoo's ability to moisturize hair so that it does not dry out or become damaged after use.
- c. Softness (C3)
Assessing the effect of shampoo on hair texture and softness after use, so that hair is easier to manage and not coarse.
- d. Effectiveness (C4)
Describing how effective shampoo is in treating dandruff and maintaining a clean and healthy scalp.
- e. Price (C5)
Assessing the suitability between the product price and its quality, benefits, and consumer purchasing power. This criterion is cost-based, so the lower the price, the better.

Table 3. Alternative Data

Alternative	Code
Dove	A1
Head & Shoulders	A2
Lifebouy	A3
Pantene	A4
Clear	A5
Sunsluk	A6

Table 3 presents a list of six alternative shampoo brands that were the subject of assessment in this study. Each brand was given an identification code, ranging from A1 to A6, to facilitate data processing and calculation using the MOORA method. The alternatives assessed included Dove, Head & Shoulders, Lifebouy, Pantene, Clear, and Sunsluk.

2.3 Research Framework

Below is an illustration of the framework for applying the Moora method in determining the best women's shampoo product for dandruff-prone skin.

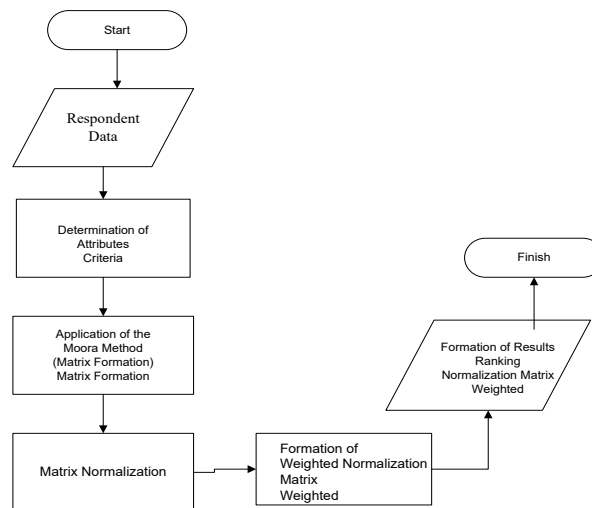


Figure 1. Research framework

The research framework in Figure 1 is designed to provide a systematic overview of the workflow in applying the MOORA method. Each stage in the framework shows the processes that must be carried out sequentially so that the analysis can run consistently and produce valid outputs(Nguyen, 2021)(Rane, 2021). The explanation of each stage in the framework is as follows:

- a. Data Set
This initial stage focuses on collecting respondent data that will be used as the basis for analysis. Data quality greatly determines the validity of the final results. Therefore, data must be collected systematically, relevant to the research objectives, and free from recording errors or inconsistencies.
- b. Determination of Criteria Attributes
Once the data has been collected, the next step is to determine the attributes or criteria to be used in the assessment process. Each criterion needs to be determined based on theoretical considerations and analysis requirements. In

addition, the nature of each criterion must be determined, whether it falls into the benefit or cost category, so that the MOORA calculation process can be carried out accurately.

c. chApplication of the MOORA Method (Matrix Formation)

This stage involves the formation of a decision matrix that compiles all alternatives and criteria. The matrix must be structured according to the MOORA method, where rows represent alternatives and columns represent criteria. Accuracy in constructing the matrix is very important because it forms the basis for all subsequent calculations.

d. Matrix Normalization

Normalization is performed to standardize the value scale of each criterion so that all variables can be compared fairly. This process eliminates bias due to differences in measurement units. Proper normalization ensures that each criterion contributes objectively to the final value calculation.

e. Formation of Weighted Normalization Matrix

This stage assigns weights to each normalization value according to the level of importance of each criterion. The weight of the criteria affects their level of influence in determining the final value. Therefore, the weighting must be based on strong methodological considerations so that the final results have clear meaning and relevance.

f. Ranking Results

The final stage is to calculate preference values and produce alternative rankings. The final value is obtained from the aggregation of all weighted criteria, so that the resulting ranking reflects the alternative with the best performance based on all criteria used. This stage is the final output of the MOORA method application.

2.4 Moora Method (Multi-Objective Optimization method based on Ratio Analysis)

The MOORA method is an analytical approach designed to optimize multiple conflicting and complex objectives(Anggrawan, 2022). Using a sophisticated mathematical framework, this method enables more effective and efficient decision-making in solving multi-objective optimization problems(Wankhede, 2022). One of the advantages of MOORA is its high flexibility and good selection capabilities. This is because the method can set goals for conflicting criteria, both beneficial (benefit) and non-beneficial (cost). In addition, MOORA is able to easily separate subjectivity in the evaluation process by integrating criterion weights into decision-making involving various attributes(Ranjith, 2022). The procedures used to complete this include:

a. Enter reference values and alternatives

b. Substitute reference values into the Decision Matrix

The decision matrix is a measure of alternative performance. A ratio system is then developed that compares the performance of each option on an attribute with a denominator representing all options for that attribute

$$X = \begin{bmatrix} X_{11} & X_{1j} & X_{1n} \\ X_{j1} & X_{ij} & X_{jn} \\ X_{m1} & X_{m1} & X_{mn} \end{bmatrix} \tag{1}$$

c. Matrix normalization aims to combine the elements of a matrix so that each member has the same value. Normalization in Moora can be calculated using the following equation:

$$X * ij = \frac{xij}{\sqrt{\sum_{j=1}^m X^{2ij}}} \tag{2}$$

d. Calculating the optimization value. The optimization value calculation process is done by multiplying the criteria weight by the maximum attribute value.

$$y_i = \sum_{j=0}^g W_j X^* i_j - \sum_j^n = g + 1 W_j X^* i_j \tag{3}$$

e. Determine the ranking results. Calculate by ranking the scores using the Moora method.

3. RESULT AND DISCUSSION

3.1 Data Set

Table 4. Types of databases

Respondent	Altertnative	Criteria				
		C1	C2	C3	C4	C5
Respondent 1	Dove	5	5	5	4	4
Respondent 2	Head & Shoulders	4	5	5	5	5
Respondent 3	Lifebouy	3	4	4	4	4
Respondent 4	Pantene	4	4	5	4	4
Respondent 5	Clear	4	3	4	4	4
....
Respondent 51	Sunslik	3	4	4	4	3

Table 4 shows the assessment data from 51 respondents on several shampoo brand alternatives based on five criteria (C1–C5). Each respondent gave a score on a scale of 1–5 for each criterion, where a higher value indicates a better assessment. The ALTERNATIVE column contains the names of the brands being assessed, while the C1–C5 columns contain the assessment scores according to the predetermined criteria. This data forms the basis for the analysis and calculation process in the MOORA method to determine the final ranking of each alternative.

3.2 Alternatives and Weightings

Table 5. Criteria, Alternatives, and Weightings

Alternatif	Criteria				
	C1	C2	C3	C4	C5
Dove	5	5	5	4	4
Head & Shoulders	4	4	5	3	4
Lifebouy	3	4	5	5	4
Pantene	4	4	5	4	4
Clear	5	3	3	4	4
Sunsluk	3	4	4	3	3
Weight	5	3	4	4	2

Table 5 shows the assessment of six product alternatives, namely DOVE, HEAD & SHOULDERS, LIFEBOUY, PANTENE, CLEAR, and SUNSILK based on five criteria (C1–C5). Each alternative is rated on a scale of 1–5, where a higher score indicates a better level of fulfillment of the criteria. In addition to the alternative scores, this table also includes the weight of each criterion, namely C1 at 5, C2 at 3, C3 and C4 at 4, and C5 at 2, which reflects the relative importance of each criterion in decision making. The data in Table 4 is used as the basis for further analysis, where the value of each alternative will be combined with the criterion weight to obtain a preference value and determine the best alternative ranking according to the level of importance of the criteria that has been determined.

3.3 Application of the MORA Method

a. Determining the Decision Matrix

$$X_{ij} = \begin{bmatrix} 5 & 5 & 5 & 4 & 4 \\ 4 & 4 & 5 & 3 & 4 \\ 3 & 4 & 5 & 5 & 4 \\ 4 & 4 & 5 & 4 & 4 \\ 5 & 3 & 3 & 4 & 4 \\ 3 & 4 & 4 & 3 & 3 \end{bmatrix}$$

b. Perform Matrix Normalization

The next step is to create a matrix for normalization using equations.

For Criterion C1

$$X_{1,1} = \frac{5}{\sqrt{[5^2+4^2+3^2+4^2+5^2+3^2]}} = \frac{5}{100} = 0,05$$

$$X_{2,1} = \frac{4}{\sqrt{[5^2+4^2+3^2+4^2+5^2+3^2]}} = \frac{4}{100} = 0,04$$

$$X_{3,1} = \frac{3}{\sqrt{[5^2+4^2+3^2+4^2+5^2+3^2]}} = \frac{3}{100} = 0,03$$

$$X_{4,1} = \frac{4}{\sqrt{[5^2+4^2+3^2+4^2+5^2+3^2]}} = \frac{4}{100} = 0,04$$

$$X_{5,1} = \frac{5}{\sqrt{[5^2+4^2+3^2+4^2+5^2+3^2]}} = \frac{5}{100} = 0,05$$

$$X_{6,1} = \frac{3}{\sqrt{[5^2+4^2+3^2+4^2+5^2+3^2]}} = \frac{3}{100} = 0,04$$

For Criterion C2

$$X_{1,2} = \frac{5}{\sqrt{[5^2+4^2+4^2+4^2+3^2+4^2]}} = \frac{5}{98} = 0,051$$

$$X_{2,2} = \frac{4}{\sqrt{[5^2+4^2+4^2+4^2+3^2+4^2]}} = \frac{4}{98} = 0,041$$

$$X_{3,2} = \frac{4}{\sqrt{[5^2+4^2+4^2+4^2+3^2+4^2]}} = \frac{4}{98} = 0,041$$

$$X_{4,2} = \frac{4}{\sqrt{[5^2+4^2+4^2+4^2+3^2+4^2]}} = \frac{4}{98} = 0,041$$

$$X_{5,2} = \frac{3}{\sqrt{[5^2+4^2+4^2+4^2+3^2+4^2]}} = \frac{3}{98} = 0,031$$

$$X_{6,2} = \frac{4}{\sqrt{[5^2+4^2+4^2+4^2+3^2+4^2]}} = \frac{4}{98} = 0,041$$

For Criterion C3

$$X_{1,3} = \frac{5}{\sqrt{[5^2+5^2+5^2+5^2+3^2+4^2]}} = \frac{5}{125} = 0,04$$

$$X_{2,3} = \frac{5}{\sqrt{[5^2+5^2+5^2+5^2+3^2+4^2]}} = \frac{5}{125} = 0,04$$

$$X_{3,3} = \frac{5}{\sqrt{[5^2+5^2+5^2+5^2+3^2+4^2]}} = \frac{5}{125} = 0,04$$

$$X_{4,3} = \frac{5}{\sqrt{[5^2+5^2+5^2+5^2+3^2+4^2]}} = \frac{5}{125} = 0,04$$

$$X_{5,3} = \frac{3}{\sqrt{[5^2+5^2+5^2+5^2+3^2+4^2]}} = \frac{3}{125} = 0,024$$

$$X_{6,3} = \frac{4}{\sqrt{[5^2+5^2+5^2+5^2+3^2+4^2]}} = \frac{4}{98} = 0,032$$

For Criterion C4

$$X_{1,4} = \frac{4}{\sqrt{[4^2+3^2+5^2+4^2+4^2+3^2]}} = \frac{4}{91} = 0,044$$

$$X_{2,4} = \frac{3}{\sqrt{[4^2+3^2+5^2+4^2+4^2+3^2]}} = \frac{3}{91} = 0,033$$

$$X_{3,4} = \frac{5}{\sqrt{[4^2+3^2+5^2+4^2+4^2+3^2]}} = \frac{5}{91} = 0,055$$

$$X_{4,4} = \frac{4}{\sqrt{[4^2+3^2+5^2+4^2+4^2+3^2]}} = \frac{4}{91} = 0,044$$

$$X_{5,4} = \frac{4}{\sqrt{[4^2+3^2+5^2+4^2+4^2+3^2]}} = \frac{4}{91} = 0,044$$

$$X_{6,4} = \frac{3}{\sqrt{[4^2+3^2+5^2+4^2+4^2+3^2]}} = \frac{3}{91} = 0,033$$

For Criterion C5

$$X_{1,5} = \frac{4}{\sqrt{[4^2+4^2+4^2+4^2+4^2+3^2]}} = \frac{4}{89} = 0,045$$

$$X_{2,5} = \frac{4}{\sqrt{[4^2+4^2+4^2+4^2+4^2+3^2]}} = \frac{4}{89} = 0,045$$

$$X_{3,5} = \frac{4}{\sqrt{[4^2+4^2+4^2+4^2+4^2+3^2]}} = \frac{4}{89} = 0,045$$

$$X_{4,5} = \frac{4}{\sqrt{[4^2+4^2+4^2+4^2+4^2+3^2]}} = \frac{4}{89} = 0,045$$

$$X_{5,5} = \frac{4}{\sqrt{[4^2+4^2+4^2+4^2+4^2+3^2]}} = \frac{4}{89} = 0,045$$

$$X_{6,5} = \frac{3}{\sqrt{[4^2+4^2+4^2+4^2+4^2+3^2]}} = \frac{3}{89} = 0,034$$

After performing normalization calculations, the following normalized matrix results were obtained:

$$X_{ij} = \begin{bmatrix} 0,05 & 0,051 & 0,04 & 0,044 & 0,045 \\ 0,04 & 0,041 & 0,04 & 0,033 & 0,045 \\ 0,03 & 0,041 & 0,04 & 0,055 & 0,045 \\ 0,04 & 0,041 & 0,04 & 0,044 & 0,045 \\ 0,05 & 0,031 & 0,024 & 0,044 & 0,045 \\ 0,04 & 0,041 & 0,032 & 0,033 & 0,034 \end{bmatrix}$$

c. Optimizing Attributes

The stage of optimizing attributes must include weights. This stage uses Equation

$$C_1$$

$$A_{1,1} = 0,5 * 0,05 = 0,025$$

$$\begin{aligned}
 A_{1,2} &= 0,5 * 0,04 = 0,02 \\
 A_{1,3} &= 0,5 * 0,03 = 0,015 \\
 A_{1,4} &= 0,5 * 0,04 = 0,02 \\
 A_{1,5} &= 0,5 * 0,05 = 0,025 \\
 A_{1,6} &= 0,5 * 0,04 = 0,02 \\
 C_2 \\
 A_{2,1} &= 0,3 * 0,051 = 0,0153 \\
 A_{2,2} &= 0,3 * 0,041 = 0,0123 \\
 A_{2,3} &= 0,3 * 0,041 = 0,0123 \\
 A_{2,4} &= 0,3 * 0,041 = 0,0123 \\
 A_{2,5} &= 0,3 * 0,031 = 0,093 \\
 A_{2,6} &= 0,3 * 0,041 = 0,0123 \\
 C_3 \\
 A_{3,1} &= 0,4 * 0,04 = 0,016 \\
 A_{3,2} &= 0,4 * 0,04 = 0,016 \\
 A_{3,3} &= 0,4 * 0,04 = 0,016 \\
 A_{3,4} &= 0,4 * 0,04 = 0,016 \\
 A_{3,5} &= 0,4 * 0,024 = 0,0096 \\
 A_{3,6} &= 0,4 * 0,032 = 0,0128 \\
 C_4 \\
 A_{4,1} &= 0,4 * 0,044 = 0,0176 \\
 A_{4,2} &= 0,4 * 0,033 = 0,0132 \\
 A_{4,3} &= 0,4 * 0,055 = 0,022 \\
 A_{4,4} &= 0,4 * 0,044 = 0,0176 \\
 A_{4,5} &= 0,4 * 0,044 = 0,0176 \\
 A_{4,6} &= 0,4 * 0,033 = 0,0132 \\
 C_5 \\
 A_{5,1} &= 0,2 * 0,045 = 0,009 \\
 A_{5,2} &= 0,2 * 0,045 = 0,009 \\
 A_{5,3} &= 0,2 * 0,045 = 0,009 \\
 A_{5,4} &= 0,2 * 0,045 = 0,009 \\
 A_{5,5} &= 0,2 * 0,045 = 0,009 \\
 A_{5,6} &= 0,2 * 0,034 = 0,0068
 \end{aligned}$$

Study can be stated so that improvements can be made in further research. The contents of the conclusion are not in the form of points, but in

$$X_{ij} = \begin{bmatrix} 0,025 & 0,0153 & 0,016 & 0,0176 & 0,009 \\ 0,02 & 0,0123 & 0,016 & 0,0132 & 0,009 \\ 0,015 & 0,0123 & 0,016 & 0,022 & 0,009 \\ 0,02 & 0,0123 & 0,016 & 0,0176 & 0,009 \\ 0,025 & 0,093 & 0,0096 & 0,0176 & 0,009 \\ 0,02 & 0,0123 & 0,0128 & 0,0132 & 0,0068 \end{bmatrix}$$

Next, the Y_i value is calculated by subtracting the maximum value from the minimum value, which is done by adding the benefit criteria values and subtracting the cost criteria values for each alternative. The result of this process will be the final output in the MOORA method solution. The calculation can be seen in the following table.

Table 6. Y_i List

Alternative	Max (C1 + C2 + C3 + C4)	Min (C5)	$Y_i = \text{Max} - \text{Min}$
A1	$(0,025 + 0,0153 + 0,016 + 0,0176) = (0,0739)$	0,009	0,0649
A2	$(0,02 + 0,0123 + 0,016 + 0,0132) = (0,0615)$	0,009	0,0525
A3	$(0,015 + 0,0123 + 0,016 + 0,022) = (0,0653)$	0,009	0,0563
A4	$(0,02 + 0,0123 + 0,016 + 0,0176) = (0,0659)$	0,009	0,0569
A5	$(0,025 + 0,093 + 0,0096 + 0,0176) = (0,1452)$	0,009	0,1362
A6	$(0,02 + 0,0123 + 0,0128 + 0,0132) = (0,0583)$	0,0068	0,0515

Table 6 presents a list of Y_i values for each shampoo alternative analyzed using the MOORA method. The Y_i calculation is performed by subtracting the total benefit criteria values (C1, C2, C3, and C4) from the cost criteria value (C5) after all data has been normalized and weighted according to its level of importance. The Max column shows the

sum of the values derived from the benefit criteria, which represent the content, moisture, softness, and effectiveness aspects of each alternative. Meanwhile, the Min column shows the value of the cost criteria, namely price, which reduces the total value of an alternative. The difference between these two components produces the Y_i value shown in the last column. This Y_i value is the main indicator in determining the ranking of each alternative; the greater the Y_i value, the better the alternative is in meeting all the criteria that have been set.

Table 7. Ranking Results

No	Alternative Name	Final Score	Ranking
1	A1	0,0649	2
2	A2	0,0525	5
3	A3	0,0563	4
4	A4	0,0569	3
5	A5	0,1362	1
6	A6	0,0515	6

Table 7 shows the final results of the alternative ranking process based on the Y_i values calculated earlier using the MOORA method. Each alternative is shown along with its final value, then sorted from highest to lowest to determine the overall ranking. These final values describe how well each shampoo meets the predetermined combination of benefit and cost criteria, so that the alternative with the largest Y_i value receives the highest ranking. From the table, it can be seen that alternative A5 has the highest final value, thus occupying the first rank and considered the best choice in the context of this study. This is followed by A1, A4, A3, and A2. Meanwhile, alternative A6 obtained the lowest value, thus occupying the last rank. These results provide a clear picture of the most optimal alternative compared to others based on all the criteria used.

4. CONCLUSION

Based on the results of applying the MOORA (Multi-Objective Optimization by Ratio Analysis) method, this study successfully determined the ranking of women's shampoo products for dandruff-prone skin objectively by considering five criteria, namely content, moisture, softness, effectiveness, and price. The calculation results show that alternative A5 obtained the highest Y_i value, making it the best product compared to other alternatives. This indicates that the MOORA method is capable of systematically integrating benefit and cost criteria in the decision-making process. Thus, the application of the MOORA method has been proven to be effective as a decision-making tool that can provide more rational and structured shampoo product recommendations based on consumer preferences.

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