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Recommendations for Selection of Skincare Products Using the Promethee Method

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ABSTRACT

This research aims to implement the Promethee method (Preference Ranking Organization Method for Enrichment Evaluation) in recommending appropriate skincare products based on facial skin type. With so many skincare products on the market, consumers may have difficulty choosing the right product. The Promethee method helps make multi-criteria decisions by considering various relevant factors such as skin type, price, user ratings, product quality, and price suitability based on the preferences of people who have used skincare products before as a reference in recommending skincare products. Recommendations are made based on data from the preferences of students who have used skincare products and provide an assessment of the products they have used. Researchers used the Promethee method as research to see how effective its use is in providing skincare product recommendations. The data used as a basis for manual calculations uses 10 data points for normal skin types. With the highest net flow value for normal skin types of 3.44444444 for Wardah Lightning and Ponds Men products. The highest net flow value for combination skin type is 24.250000, net flow for oily skin type is 14.222222, net flow for sensitive skin type is 14.722222, and net flow for dry skin type is 8.166667. The research results show that the Promethee method can provide appropriate recommendations regarding the selection of skincare products based on facial skin type.

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1. Introduction

Facial skin is the skin that protects the inner parts of the face such as the eyes, nose, mouth, and others [1]. Many health analysts explain that the health and beauty of the body's skin are greatly influenced by daily lifestyle and diet. [2]. If your lifestyle and diet are not maintained properly, it will affect facial skin conditions such as premature aging, acne, etc. Skincare is a series of care products used to maintain the health, cleanliness, and appearance of facial skin. Many people want healthy and clean skin but don't understand the products to use according to their skin type. With so many skincare products on the market, people are confused about choosing products that suit their skin type. The importance of this skincare recommendation system is also to make it easier to choose skincare, especially for those who want to start using skincare products for the first time so that there are no problems when using skincare. If you use facial

skin care products or skincare products that are not suitable for your skin type, it will cause damage to the skin. [3].

Decision Support Systems (DSS) are systems that provide support for semi-structured problem solving and problem formulation that supports various levels, both individuals and groups, and there are many ways to support decision making [4]. Semi-structured decisions are decisions that involve two aspects. Some decisions can be made by computers, and others by decision makers [5]. Many decision-support developments have been carried out using various methods, such as simple additive weighting (SAW) [6], Weighted Product (WP) [7], Analytical Hierarchy Process (AHP) [8], Promethee [9], and many more. Like research [10] which aims to choose a type of breast pump for mothers that functions to facilitate exclusive breastfeeding. The results of calculations using the SAW method provide a recommendation for the Moom Uung breast pump with a value of 15.67. A decision support system using the SAW method has been carried out by research to determine the best fiber optic internet service provider in North Jakarta with appropriate weighting. The steps of the WP method include determining the priority value of each criterion, calculating the weight of the criteria, calculating the vector Si, calculating the vector Vi, and making decisions based on the results of calculating the vector Vi. The largest Vi value is the best alternative. The results of this research are proven to provide an objective alternative in choosing the best internet service provider in the North Jakarta area. Using the AHP method chosen by the researcher [12] because it has the ability to choose the best alternative among many alternatives. In this case, the alternative is to designate those who are worthy of receiving scholarships based on certain criteria. Writing is done by identifying aspects and sub-aspects and looking for the weight value of each sub-aspect, looking for the distance between the student profile and the condition of the data using this method by determining the representation of the two component aspects and the total, then carrying out a ranking procedure to identify optimal alternatives, especially the best students.

Promethee is a method commonly used to make decisions. Promethee is a type of multi-criteria decision-making (MCDM) method that has become one of the fastest-growing areas of operational research over the last few decades.[13]. The Promethee Method, or Preference Ranking Organization Method for Enrichment Evaluations, is an approach method in decision analysis that helps decision makers rank alternatives based on certain criteria. The Promethee method used gets ranking values from the results of comparisons between one product and another so that a value can be obtained from which the highest value can later be determined. From this problem, the solution offered in this research is to create a model that is able to recommend skincare products that suit the user's skin type. The promethee model used will produce a raking value, which the user will later use to determine which product to use. The skincare products used as a basis for recommendations are products that have previously been used by other people so that the criteria for each skincare product can be known.

Research using the Promethee method has been carried out as in many studies [14] who conducts research to provide major recommendations so that students can determine a major that suits their abilities. On research uses a combination of TOPSIS and Promethee methods to be able to provide an assessment of the results of the performance of students who receive college KIP and obtain a very high percentage level of compliance with requirements. On research [16] conducting research to provide recommendations for skincare products using the Weighted Product (WP) method to get alternative care products that are cheap and provide maximum benefits for teenagers. In this research, the author used 10 product data points to compare as the best alternative, then carried out calculations using Microsoft Excel and got the results that Wardah was the best alternative with a preference value of 3.7 and Garnier was in second place with a preference value of 3.6. On research [17] conducting research related to selecting skincare products using the SAW method, which can help provide skincare recommendations to users based on criteria chosen by the user and also make it easier for users to find recommendations for skincare products, especially women. Other research that discusses the Promethee method is research [18] create a Decision Support System (SPK) implementation program using the Promethee method, which can be applied to the selection of outstanding teachers at SMAN 1 Tegalombo. The system built has the ability to solve existing problems and shows high accuracy in assisting the principal in making decisions on selecting outstanding teachers at SMAN 1 Tegalombo, and this system has the ability to become a reference in decision-making. with better results compared to the methods or methods currently used at SMAN 1 Tegalombo, namely those that use a subjective system or the results of direct nomination by the school principal. On research [19] Based on the research results, it was concluded that the Promethee method could be applied to a decision support system to assess the level of community welfare in order to determine the priority ranking of disadvantaged families compared to prosperous families. This software can be a tool and consideration in decision-making when assessing community welfare and can help the government distribute aid to suit its goals. On research [20] Based on the results of applying the Promethee II method in selecting subjects who will receive surgical support at home, it can be concluded that the decision support system for determining subjects who will receive surgical support at home is a system that can be designed to provide the best results for identifying

the most appropriate subjects. to get surgical support at home. Apart from that, determining criteria and weights is the first step that must be carried out in the Promethee II method before continuing with calculations and ranking. On research [21] The intervention carried out as a recommendation to overcome the stunting problem in South Central Timor Regency was carried out through the Posyandu program. The main objective of the Posyandu program is to carry out outreach, observation, and health education activities directly to the community regarding stunting problems to help reduce stunting rates. Community service activities are carried out through outreach activities, observation, and policy advocacy in the community. Promethee is a preference evaluation method used to compare and rank alternatives based on different criteria. Application of the Promethee method to products specifically for stunting children provides an accuracy value of 100% and an error rate of 0%. Therefore, it can be concluded that the application of the Promethee method to special SPKs whose development is slow is classified as very good.

From previous research regarding the use of the Promethee method as a recommendation system, it can convince researchers to conduct research related to skincare product recommendations using the Promethee method.

2. Research methods

This research uses the research methodology flow as a stage in the process. This research methodology contains the stages of the promethee process, which can be used as a method to determine recommended skincare products. The initial stage determines the problem so that it can be identified and analyzed. After identifying the problem, the researcher determines the research objective as the desired achievement. Furthermore, data was then collected through three methods, namely questionnaires as the main data obtained from respondents, which are referred to as primary data, literature studies to examine relevant literature, and literature studies used to support the theory and methodology used. Then create a skincare product recommendation system by implementing the web-based Promethee method. The final condition is that it is hoped that the formation of a website will make it easier to determine which skincare products the system recommends based on skin type.

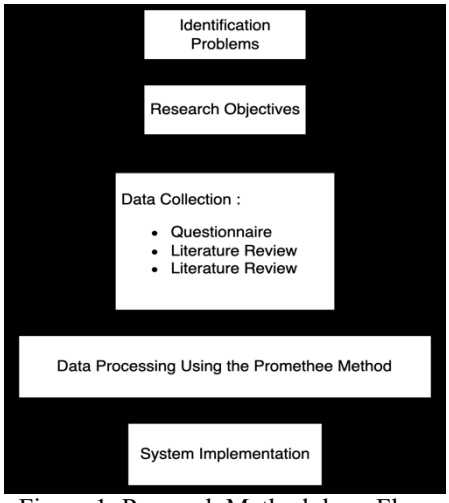


Figure 1. Research Methodology Flow

The methodology flow shown in Figure 1 explains how a process starts from looking for problems and finding solutions using the Promethee method, including :

2.1 Identification of problems

In the early stages of development, researchers need to identify the problem thoroughly. This problem identification process aims to determine specific problems that will be used as objects of research or system development. Problem identification is very important because it ensures that researchers have a clear and in-depth understanding of the issue they want to solve. By formulating the right problem, solution steps can be taken in a more focused manner. At this stage, the problems faced are clearly defined so that they can become a solid basis for further research or system development. In the context of this research, the problem faced by the author is the difficulty in making decisions regarding selecting skincare products that best suit individual needs, such as skincare products based on each individual's skin type. Therefore, appropriate

decision-making methods are needed to help solve these problems. Thus, the method used must be able to provide effective and objective solutions, such as the Promethee method, which allows product comparisons based on various relevant criteria. This method offers a systematic approach to help users determine the most appropriate choice based on an in-depth analysis of existing product alternatives.

2.2 Research purposes

After the problem identification stage has been completed, the next step is to clearly determine the research objectives. Setting this goal is very important because it is the main reference for answering the problems that have been previously identified. Research objectives must be formulated specifically to ensure that research moves in the right direction in providing solutions to the problems faced.

In this research, the main objective is to implement a system that is able to provide recommendations for skincare products that suit the user's skin type. This system is expected to be able to process various criteria for the selected leather type, such as product material quality, price category, ranking, and product suitability, so that it can provide accurate and relevant results for users. By using appropriate decision-making methods, such as the Promethee method, the system is expected to be able to display more objective recommendations. Thus, this research aims to overcome the difficulties often experienced by users in choosing skincare products that best suit their skin type through a systematic approach that utilizes technology and effective decision-making methods.

2.3 Data collection

Data was collected through three methods, namely through questionnaires, literature studies and literature studies.

1. Questionnaire: Collecting primary data from respondents provided they are students or the same age as students who have previously used skincare products. This data is the basis for research so that it can be processed as an ingredient in skincare product recommendations..
2. Literature Study: The sources obtained can then be studied more deeply, which are relevant to the topic raised, so that they can be more convincing for further research..
3. Literature study: To support the chosen theory and methodology, literature sources are very important as an in-depth understanding of the topic raised..

2.4 Data processing using the Promethee Method

The Promethee method (Preference Ranking Organization Method for Enrichment Evaluation) is a method in a decision support system for processing and processing data to produce preferences that support decision-making. The Promethee method is included in the problem solving group of multi-criteria decision making or complex criteria decision making, which is a very important principle in decision making or a problem that has more than one criterion (multicriteria) [22]. The promethee method is suitable for use in this research because, in the process, it compares criteria between products so that the preference results obtained are more accurate. Several stages carried out in this method include::

1. Data normalization
2. Calculating the preference function
3. Leaving Flow
4. Entering flow
5. Net Flow
6. Ranking

2.5 System Implementation

To prove the accuracy and validity of the implementation of the Promethee method used in this research, researchers also developed a web-based application using the Python programming language and the Flask framework. This application is designed to display the results of net flow calculations and the ranking of each product based on predetermined criteria. Thus, this research not only demonstrates the theoretical application of the Promethee method, but also tests its application through a web-based system.

Using Flask as a framework allows flexibility in developing lightweight but functional applications, so that analysis results from the Promethee method can be displayed in a format that is easy for users to understand and access. This system provides empirical evidence that the Promethee method can be applied well using programming code, which supports the reliability of this method in multi-criteria decision-making. This Python-based implementation also facilitates direct evaluation of results by researchers and users to verify calculation steps, starting from normalization to calculating leaving flow, entering flow, and net flow for each skincare product alternative.

3. Results and Discussion

A decision support system based on the Promethee method is used to determine the order of the best products that can be recommended to users according to predetermined criteria and the type of skin the user has. This method works by comparing each product alternative based on relevant criteria. The process involves quite complex calculation steps because each product is evaluated in pairs with other products for each criterion. The results of this comparison are then used to calculate leaving flow, entering flow, and net flow, which ultimately determines product ranking.

In its application, Promethee provides more objective decisions because it considers many criteria simultaneously, so that the recommended product is the one that best suits the user's preferences based on a comprehensive multi-criteria analysis. This method is effective in helping users choose the most optimal product among the various options available, with an in-depth and data-based approach.

3.1 Alternative Data

Data taken through questionnaires was collected from 165 respondents who were students or the same age. To implement the Promethee method manually, the author filtered the data using only data on skincare products for normal skin types. In this case, the author uses several criteria to be calculated using the Promethee method, such as price, quality of product materials, rating, and product suitability, which can be seen in Table 1.

Table 1. Skincare product data for normal skin types

Code	Product Brand	Price Category	Product Material Quality	Ratings	Product Conformity
a	Pons	4	3	3	3
b	Wardah lightning	4	4	5	5
c	kafh biru	3	4	5	5
d	Ponds Men	4	4	5	5
e	Kahf Hitam	3	3	3	3
f	Emina bright stuff facial wash	2	5	4	4
g	YOU Hy!	4	5	4	4
h	Kahf	4	5	4	4
i	skintific Amino Acid Ultra-Gentle cleansing mousse	1	4	5	5
j	YOU face wash	4	3	4	4

Each criterion value has its own meaning, such as the price details have a value level from 1 to 5 based on the product; the higher the value, the cheaper the price of the skincare product, which can be seen in Table 2. In terms of product quality criteria, product ratings and suitability have the same information, namely having a value level of 1 to 5, where the higher the value of a skincare product, the better the skincare product, as seen in Table 3..

Table 2. Price Category Criteria Details

Information	Value
Very Cheap	5
Cheap	4
Enough	3
Expensive	2
Very Expensive	1

Table 3. Detailed product material quality criteria, ratings, and product suitability

Information	Value
Very good	5
Good	4
Enough	3
Deficient	2
Not Good	1

3.2 Promethee Method Calculation

This method was developed to assist decision-makers in assessing and comparing complex and diverse alternatives by considering different preferences and priorities. Promethee uses a preference function to evaluate the extent to which one alternative is preferable to another alternative in each criterion. This process involves comparison steps between products to produce a final ranking that reflects the overall level

of preference. The advantage of the Promethee method lies in its flexibility to handle various types of data and criteria, as well as its ability to provide clear and easy-to-understand results, making it very useful in complex decision-making. In implementing the promethee method, the stages carried out are as follows :

1. The first stage is normalizing the data

When normalizing data, each criterion usually has a different scale or units. To make the comparison fairer, the first step is to normalize the data. Normalization can be done using the Min-Max normalization method with the following equation 1 [23]:

$$Normalized\ Value = \frac{(x-\min)}{(\max-\min)} \quad (1)$$

Information :

x = The original value of the data to be normalized
min = The minimum value of the data in these criteria
max = The maximum value of the data in that criterion
$(x-\min)$ = The difference between the data value and the minimum value, which shows how far the value is from the lower limit (lowest value)
$(\max-\min)$ = The range between the maximum and minimum values shows how large the variation is in the data

The results of the calculation for equation 1 can be seen in Table 4 which contains the results of the normalized values for each criterion per product.

Table 4. Normalization Results

Code	Price Category	Product Quality	Ratings	Product Conformity
a	1	0	0	0
b	1	0,5	1	1
c	0,666666667	0,5	1	1
d	1	0,5	1	1
e	0,666666667	0	0	0
f	0,333333333	1	0,5	0,5
g	1	1	0,5	0,5
h	1	1	0,5	0,5
i	0	0,5	1	1
j	1	0	0,5	0,5

2. The second stage, calculating the preference function

After the normalization process is complete, the Promethee method continues by comparing each product alternative in pairs based on predetermined criteria. According to Brans, J. P., and Vincke, P. (1985), the preference function is used to assess how far alternative product α is superior to alternative product b for each particular criterion. This preference function plays an important role in determining the level of dominance of a product over other products by considering the criteria values of each product.

In this comparison process, two criterion values of product α and product b are analyzed. If product α has a higher score than product b for the same criteria, then product α is considered better in that criterion. The preference values resulting from this comparison are then used in calculating leaving flow and entering flow, which functions to assess the level of dominance and dominance of each product. Thus, the preference function plays a key role in determining the order of product alternatives based on objectively evaluated criteria. The preference function can be calculated as :

$$P(\alpha_i, b_i) = \max(0, \alpha_i - b_i) \quad (2)$$

Information :

$P(\alpha_i, b_i)$ = Preference value of alternatives α_i towards alternatives b_i. This preference value is used to determine how many alternatives there are α_i preferred compared to b_i on certain criteria.
α_i = Alternative performance values α on criteria i
b_i = Alternative performance values b on criteria i
$\max(0, \alpha_i - b_i)$ = This function calculates the difference between values α_i and b_i. If the result of this difference is negative or zero, then the preference value is 0 (It means $\alpha_i$no better than

b_i). If the difference result is positive, then the preference value is the same as the difference value, indicating that α_i better than b_i on these criteria.

From equation 2, you can see the results of calculating preferences for price category criteria in Table 5 below.

Table 5. Results of the Explanation of Preference Functions for Price Categories

Ø	a	b	c	d	e	f	g	h	i	j
a	0	0	0,33333333	0	0,33333333	0,666666667	0	0	1	0
b	0	0	0,33333333	0	0,33333333	0,666666667	0	0	1	0
c	0	0	0	0	0	0,333333333	0	0	0,666666667	0
d	0	0	0,33333333	0	0,33333333	0,666666667	0	0	1	0
e	0	0	0	0	0	0,333333333	0	0	0,666666667	0
f	0	0	0	0	0	0	0	0	0,333333333	0
g	0	0	0,33333333	0	0,33333333	0,666666667	0	0	1	0
h	0	0	0	0	0	0	0	0	0	0
i	0	0	0,33333333	0	0,33333333	0,666666667	0	0	1	0
j	0	0	0,33333333	0	0,33333333	0,666666667	0	0	1	0

From this formula, you can see the results of calculating preferences for product quality criteria in Table 6 below.

Table 6. Results of the Description of Preference Functions for Product Quality

Ø	a	b	c	d	e	f	g	h	i	j
a	0	0	0	0	0	0	0	0	0	0
b	0,5	0	0	0	0,5	0	0	0	0	0,5
c	0,5	0	0	0	0,5	0	0	0	0	0,5
d	0,5	0	0	0	0,5	0	0	0	0	0,5
e	0	0	0	0	0	0	0	0	0	0
f	1	0,5	0,5	0,5	1	0	0	0	0,5	1
g	1	0,5	0,5	0,5	1	0	0	0	0,5	1
h	1	0,5	0,5	0,5	1	0	0	0	0,5	1
i	0,5	0	0	0	0,5	0	0	0	0	0,5
j	0	0	0	0	0	0	0	0	0	0

From this formula, you can also see the results of calculating preference rating criteria in Table 7 below.

Table 7. Results of the Explanation of Preference Functions for Ratings

Ø	a	b	c	d	e	f	g	h	i	j
a	0	0	0	0	0	0	0	0	0	0
b	1	0	0	0	1	0,5	0,5	0,5	0	0,5
c	1	0	0	0	1	0,5	0,5	0,5	0	0,5
d	1	0	0	0	1	0,5	0,5	0,5	0	0,5
e	0	0	0	0	0	0	0	0	0	0
f	0,5	0	0	0	0,5	0	0	0	0	0
g	0,5	0	0	0	0,5	0	0	0	0	0
h	0,5	0	0	0	0,5	0	0	0	0	0
i	1	0	0	0	1	0,5	0,5	0,5	0	0,5
j	0,5	0	0	0	0,5	0	0	0	0	0

From this formula, you can also see the results of calculating preferences for price suitability criteria in Table 8 below.

Table 8. Results of Preference Function Explanation for Price Matching

Ø	a	b	c	d	e	f	g	h	i	j
a	0	0	0	0	0	0	0	0	0	0

b	1	0	0	0	1	0,5	0,5	0,5	0	0,5
c	1	0	0	0	1	0,5	0,5	0,5	0	0,5
d	1	0	0	0	1	0,5	0,5	0,5	0	0,5
e	0	0	0	0	0	0	0	0	0	0
f	0,5	0	0	0	0,5	0	0	0	0	0
g	0,5	0	0	0	0,5	0	0	0	0	0
h	0,5	0	0	0	0,5	0	0	0	0	0
i	1	0	0	0	1	0,5	0,5	0,5	0	0,5
j	0,5	0	0	0	0,5	0	0	0	0	0

Finally, the overall preference function for each criterion is combined by adding up so that the results can be seen in Table 9 below.

Table 9. Total Overall Results of Preference Functions

∅	a	b	c	d	e	f	g	h	i	j
a	0	0	0,333333333	0	0,333333333	0,666666667	0	0	1	0
b	2,5	0	0,333333333	0	2,833333333	1,666666667	1	1	1	1,5
c	2,5	0	0	0	2,5	1,333333333	1	1	0,666666667	1,5
d	2,5	0	0,333333333	0	2,833333333	1,666666667	1	1	1	1,5
e	0	0	0	0	0	0,333333333	0	0	0,666666667	0
f	2	0,5	0,5	0,5	2	0	0	0	0,833333333	1
g	2	0,5	0,833333333	0,5	2,333333333	0,666666667	0	0	1,5	1
h	2	0,5	0,833333333	0,5	2,333333333	0,666666667	0	0	1,5	1
i	2,5	0	0	0	2,5	1	1	1	0	1,5
j	1	0	0,333333333	0	1,333333333	0,666666667	0	0	1	0

3. The third stage, calculating the leaving flow

Leaving flow is the intensity value at which a particular alternative outperforms other alternatives [24]. Leaving flow or outranking flow is the average of alternative preferences α against all other alternatives. Leaving flow calculates how many alternatives there are α better than others, with n is the total number of alternatives. High leaving flow indicates that this alternative tends to dominate other alternatives. The results of the leaving flow formulation can be seen in Table 10.

$$\emptyset^{+}(\alpha) = \frac{1}{n-1}\sum_{x\epsilon A}\varphi(a,x) \quad (3)$$

Information :

$\emptyset^{+}(\alpha)$ = Leaving flow for alternatives α. This shows the extent of the alternatives α dominates other alternatives in the set of alternatives A

$\sum_{x\epsilon A}$ = Addition of preference values between alternatives a against each alternative x in the set A.

$\varphi(a,x)$ = Preference function to measure the degree of preference between a and x for each criterion

n = Total alternatives

Table 10. Leaving Flow

Product Code	∅+(α)
a	0,77777778
b	3,94444444
c	3,5
d	3,94444444
e	0,33333333
f	2,44444444
g	3,11111111
h	3,11111111
i	3,16666667
j	1,44444444

4. The fourth stage, calculating the entering flow

The entering flow value is the value of the alternative preference index which has a direction approaching a node [25]. Entering flow or incoming flow is the average preference of all other alternatives to an alternative α. Entering flow calculates how bad an alternative is α compared to others. Low entering flow

indicates that the alternative is preferred by other alternatives. The results of the leaving flow formulation can be seen in Table 11.

$$\emptyset^{-}(\alpha) = \frac{1}{n-1}\sum_{x \epsilon A} \varphi(x, a) \quad (4)$$

Information:

$\emptyset^{-}(\alpha)$ = Entering flow for alternatives α. It measures the extent to which other alternatives in set A dominate the alternatives α. The higher the entering flow value, the more alternatives there are α dominated by other alternatives.

$\sum_{x \epsilon A}$ = The sum of the preference values for each alternative x towards alternatives a in set A

$\varphi(x, a)$ = preference function to measure the degree of preference for alternatives x compared with a for each criterion

n = Total alternatives in set A

Table 11. Entering Flow

Product Code	Ø-(α)
a	5,66666667
b	0,5
c	1,16666667
d	0,5
e	6,33333333
f	2,88888889
g	1,33333333
h	1,33333333
i	3,05555556
j	3

5. Fifth stage, calculating net flow

Net flow is the difference between leaving flow and entering flow or by subtracting leaving flow from entering flow. Net flow provides a general figure of the total preferences for an alternative. The alternative with the highest net flow is the best, because it shows that this alternative is preferable to the others in most criteria, net flow can be seen in equation 5. The results of the net flow formulation can be seen in Table 12.

$$\emptyset(\alpha) = (\emptyset^{+}(\alpha)) - (\emptyset^{-}(\alpha)) \quad (5)$$

Information :

$\emptyset^{+}(\alpha)$ = *Leaving flow*

$\emptyset^{-}(\alpha)$ = *Entering flow*

$\emptyset(\alpha)$ = *Net flow*

Table 12. Net Flow

Product Code	Ø(α)
a	-4,8888889
b	3,44444444
c	2,33333333
d	3,44444444
e	-6
f	-0,4444444
g	1,77777778
h	1,77777778
i	0,11111111
j	-1,5555556

6. The final stage is sorting based on the ranking presented in Table 13 below.

Table 13. Ranking Order

Code	Product Brand	Net flow	Rank
b	Wardah lightning	3,44444444	1
d	Ponds Men	3,44444444	2
c	kafh biru	2,33333333	3
g	YOU Hy!	1,77777778	4
h	Kahf	1,77777778	5
i	skintific Amino Acid Ultra-Gentle cleansing mousse	0,11111111	6
f	Emina bright stuff facial wash	-0,4444444	7

j	YOU face wash	-1,5555556	8
a	Pons	-4,8888889	9
e	Kahf	-6	10

3.3 Implementation

The system implementation uses the flask-based python programming language to be able to display the results of the net flow values and ranking order which are presented in web form to provide the same comparison as manual calculations. The web display for normal skin type products can be seen in Figure 2.

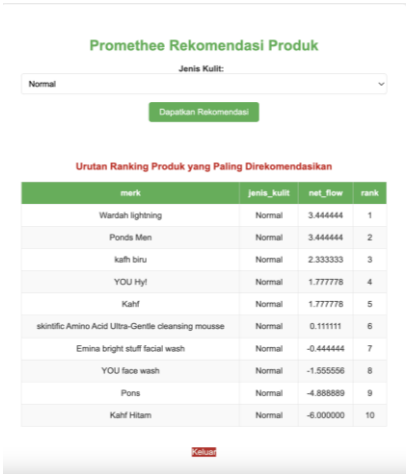


Figure 2. Ranking results for normal skin type in web view

There are also ranking results for combination skin, using the same program code. Filtering for oily skin types has an original total of 49 which is then calculated using the Promethee method which can be seen in Figure 3.

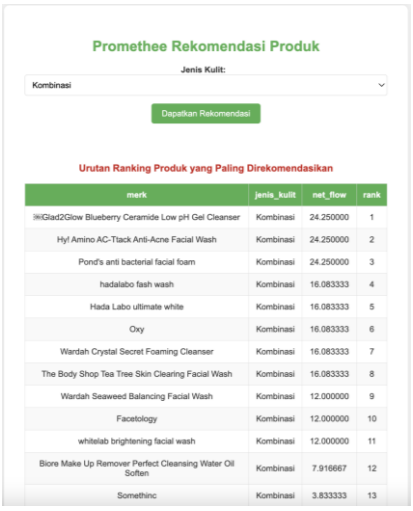
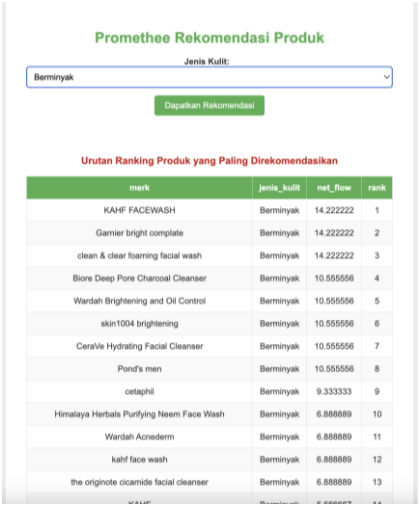


Figure 3. Some of the ranking results for combination skin types on the web

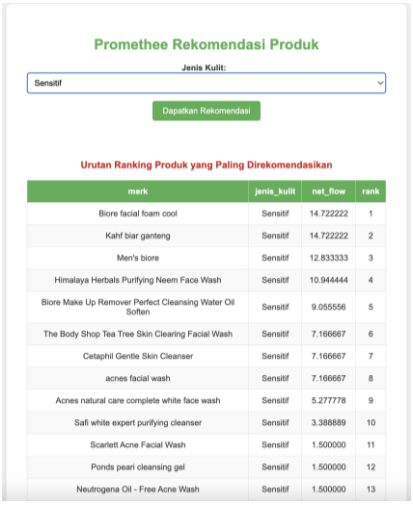
There are also ranking results for oily skin, using the same program code. Filtering for oily skin types has an original total of 44 which is then calculated using the Promethee method which can be seen in Figure 4.



merk	jenis_kulit	net_flow	rank
KAHF FACEWASH	Berminyak	14.222222	1
Garnier bright complate	Berminyak	14.222222	2
clean & clear foaming facial wash	Berminyak	14.222222	3
Biore Deep Pore Charcoal Cleanser	Berminyak	10.555556	4
Wardah Brightening and Oil Control	Berminyak	10.555556	5
skin1004 brightening	Berminyak	10.555556	6
CeraVe Hydrating Facial Cleanser	Berminyak	10.555556	7
Pond's men	Berminyak	10.555556	8
cetaphil	Berminyak	9.333333	9
Himalaya Herbals Purifying Neem Face Wash	Berminyak	6.888889	10
Wardah Acnederm	Berminyak	6.888889	11
kahf face wash	Berminyak	6.888889	12
the originote cicamide facial cleanser	Berminyak	6.888889	13

Figure 4. Some of the ranking results for oily skin types on the web

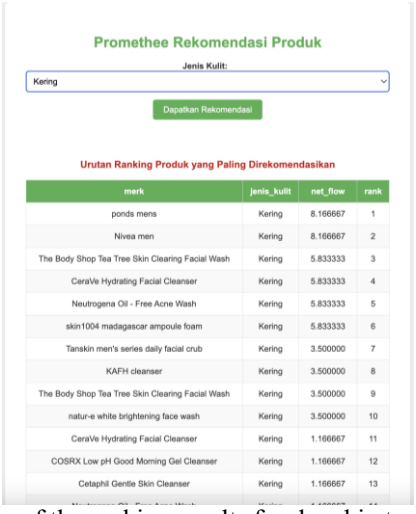
There are also ranking results for sensitive skin, using the same program code. Filtering for oily skin types has an original total of 34 which is then calculated using the Promethee method which can be seen in Figure 5.



merk	jenis_kulit	net_flow	rank
Biore facial foam cool	Sensitif	14.722222	1
Kahf biar ganteng	Sensitif	14.722222	2
Men's biore	Sensitif	12.833333	3
Himalaya Herbals Purifying Neem Face Wash	Sensitif	10.944444	4
Biore Make Up Remover Perfect Cleansing Water Oil Soften	Sensitif	9.055556	5
The Body Shop Tea Tree Skin Clearing Facial Wash	Sensitif	7.166667	6
Cetaphil Gentle Skin Cleanser	Sensitif	7.166667	7
acnes facial wash	Sensitif	7.166667	8
Acnes natural care complete white face wash	Sensitif	5.277778	9
Safi white expert purifying cleanser	Sensitif	3.388889	10
Scarlett Acne Facial Wash	Sensitif	1.500000	11
Ponds pearl cleansing gel	Sensitif	1.500000	12
Neutrogena Oil - Free Acne Wash	Sensitif	1.500000	13

Figure 5. Some of the ranking results for sensitive skin types on the web

There are also ranking results for dry skin, using the same program code. The original total of filters for oily skin types is 28 which is then calculated using the Promethee method which can be seen in Figure 6



merk	jenis_kulit	net_flow	rank
ponds mens	Kering	8.166667	1
Nivea men	Kering	8.166667	2
The Body Shop Tea Tree Skin Clearing Facial Wash	Kering	5.833333	3
CeraVe Hydrating Facial Cleanser	Kering	5.833333	4
Neutrogena Oil - Free Acne Wash	Kering	5.833333	5
skin1004 madagascar ampoule foam	Kering	5.833333	6
Tanskin men's series daily facial crub	Kering	3.500000	7
KAFH cleanser	Kering	3.500000	8
The Body Shop Tea Tree Skin Clearing Facial Wash	Kering	3.500000	9
natur-e white brightening face wash	Kering	3.500000	10
CeraVe Hydrating Facial Cleanser	Kering	1.166667	11
COSRX Low pH Good Morning Gel Cleanser	Kering	1.166667	12
Cetaphil Gentle Skin Cleanser	Kering	1.166667	13

Figure 6. Some of the ranking results for dry skin types on the web

4. Conclusion

From the results of research using the Promethee method, it is hoped that it will be able to provide recommendations for skincare products. Based on the results of netflow, the ranking can be sorted based on its value, where the highest value is the first ranking and so on. In the process, the researcher first filtered the data according to the desired skin type, in this case the author chose normal skin type, then the data was processed using the Promethee method with manual calculations and then implemented on the web so that for skin types other than normal, such as combination , oily, sensitive and dry results can also be seen. Several conclusions were also obtained as follows:

1. The ranking order can be based on the criteria value of each product for normal skin types, namely, the product order starts from Wardah lightning, Ponds Men, Kafh Biru, YOU Hy!, Kahf, skintific Amino Acid Ultra-Gentle cleansing mousse, Emina bright stuff facial wash, YOU face wash, Pons, and Kahf Black. With the highest netflow value of 3.44444444 for Wardah Lightning and Ponds Men products.
2. From the results of implementation using the web, the highest ranking results were obtained for skincare products with combination skin types, namely Glad2Glow Blueberry Ceramide Low pH Gel Cleanser with a net flow value of 24.250000. Then for skincare products for oily skin types, namely KAHF FACEWASH with a net flow value of 14.222222. Then for skincare products for sensitive skin types, namely Biore facial foam cool with a net flow value of 14.722222. Then for skincare products for dry skin types, namely ponds mens with a net flow value of 8.166667.
3. By using the Promethee method, in this research skincare products can be used as appropriate recommendations because the process stages involve comparing products per criteria to obtain accurate ranking results..
4. The next stage of this research can be continued by adding various product criteria. Because this research only uses one type of skincare product, namely facial cleanser, the research can be continued by adding various kinds of products such as serum, sunscreen, etc. And you can also increase the number of criteria so that the resulting product recommendations are more complex in calculation.

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