Product Selection of Face Masks for Sensitive Skin Using the Composite Performance Index (CPI) Method

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ABSTRACT

The more face mask products for sensitive facial skin that are created, consumers also feel confused by several considerations such as excessive side effects for the mask products they will use so as not to worsen the condition of the facial skin. Therefore, to help consumers in choosing the right face mask in terms of consideration of benefits, side effects that will be caused, and affordable prices, the authors compiled a study with the title "Selection of Face Mask Products for Sensitive Skin Using the Composite Performance Index (CPI) Method". Composite Performance Index (CPI) was chosen because this method is good at decision making and the calculation process of the CPI method only requires the criteria value of several alternatives which when compared to the CPI method process is shorter. This method can be used to determine the assessment or ranking of various alternatives based on several criteria. Criteria values are inputs that have been entered and converted into numbers. While the alternative value is the weighting obtained from the calculation of multiplication, addition of ingredients or division of each criterion. The result of this research is that the assessment process can be carried out from each mask product using the criteria of price, skin condition, mask benefits and consumer age. The system can determine the best mask for sensitive skin by implementing the Composite Performance Index (CPI) method with the results of the website validity test getting a percentage of 85.34% with a very good interpretation.

1. Introduction

Human skin tends to be sensitive to various foreign objects that come from outside the body, therefore it is important for humans to always maintain and maintain healthy skin, especially facial skin. There are various ways that can be done to maintain and maintain healthy facial skin, one of which is by regularly using face masks. However, each person has a different type of facial skin. There are several factors that cause sensitive skin, including direct exposure to UV rays, cold weather, hot weather or the use of chemicals such as those in cosmetics, care products, soaps, and pollutants that cannot be tolerated by the skin.

To prevent some of the symptoms of sensitive skin, there are several things that can be done, namely by using face masks that do not contain additional elements such as fragrances and also excessive chemicals that can cause irritation to the skin. As more and more face mask products for sensitive facial skin are created, consumers will feel confused by several considerations such as excessive side effects for the mask products they will use so as not to worsen the condition of their facial skin. The side effects referred to here are excessive symptoms that appear such as redness,

inflammation or acne that can aggravate the condition of the facial skin, so they prefer face masks for all types of facial skin that are not too burdensome for consumers at a set price.

In this study, researchers created a Web-based designed system with the Composite Performance Index (CPI) method which is used in selecting face masks according to price, skin condition, mask benefits so that the output / result of the Composite Performance Index (CPI) decision support system is a list of face masks arranged by rank with the highest value. By implementing the Composite Performance Index (CPI) method, it will help the community in choosing the face mask products needed to simplify the assessment process of each mask product according to price, skin condition, mask benefits and consumer age.

2. Theoretical Foundation

2.1. Face Masks

According to Safitri, N. I. (2019, February), Face masks are one of the beauty products that can be in the form of gels or pastes that are applied to provide certain benefits such as tightening facial skin, fading fine wrinkles on the face, and brightening and moisturizing the face. Yulianti, N. A. P., Rostamailis, R., & Rahmiati, R. (2014) argue that the variety of face masks depends on skin type and problems. Some masks help keep skin dry and healthy, and some masks contain ingredients that help skin look brighter and healthier. Just remember, masks don't have to be used every day, just a few times a week. When you wear a face mask, you will feel more relaxed and the mask also has several benefits. Your skin will feel softer and look younger again.

2.2. Sensitive Facial Skin

According to Iswandi, A.K., 2019, that sensitive skin is the onset of symptoms on the facial skin as a reaction to an excessive stimulus such as redness, burning and skin becomes very dry and even irritated. Sensitive skin is usually very sensitive and prone to allergies or irritation and rashes in reaction to certain things, such as the environment, food, or cosmetic products. Sensitive facial skin is especially prone to peeling, itching, dryness, redness and breakouts when it comes into contact with things that can trigger sensitive skin symptoms. Alfiza, L., Lubis, M. R., & Saragih, I. S. (2020) argues that the pH condition of sensitive skin is very high, which is in the range of 5.5 and above. The trigger for uncontrolled skin pH is influenced by direct exposure to UV rays, excessive use of chemicals in cosmetics and air pollution.

2.3. Decision Support System

Khoirudin, F. (2023) argues that a Decision Support System (SPK) is a computer-based system that assists in decision making, while DSS is an adaptive, interactive, and flexible computer-based information system specifically designed to support the solution of unstructured management problems. Adaptive, flexible, and interactive computer-based systems are used to solve unstructured problems, thereby increasing the value of decisions taken.

2.4. Composite Performance Index (CPI) Method

According to Andri Anto Tri Susilo, the Composite Performance Index (CPI) method is a way of making decisions based on a composite performance index, which can be used to rank or rank various alternatives. The various criteria used to create this index can vary, but all aim to provide a more accurate and complete picture of individual or organizational performance. The Composite Performance Index method is used to select several alternatives. The CPI technique is a composite index that can be used to determine the assessment or ranking of various alternatives. Completion of the CPI, in search of the best alternative as follows; (1) Positive trend when the number of things that happen increases. Negative trends are when the number of things that happen goes down; (2) For positive trend criteria, the minimum value on each criterion is transformed to one hundred, while other values are transformed proportionally higher; (3) For negative trend criteria, the minimum value on each criterion is transformed to one hundred, while other values are transformed proportionally lower. The index used to determine the assessment or ranking of various decision alternatives based on several criteria from each alternative, is formulated as follows:

2.4.1. Matrix Normalization

Matrix normalization is done by adjusting the criteria value with a predetermined weight value.

2.4.2. Determining the Value of Criteria:

$$A_{ij} = \frac{xij}{Xij(min)} \times 100 ; i = 1, 2, \ldots, n\, dan\, j = 1, 2 \tag{1}$$

2.4.3. Determine the CPI Value:

$$I_i = \sum_{j=i}^{m} A_{ij} B_j ; i = 1, 2, \ldots, n\, dan\, j = 1, 2, \ldots, m$$

Where, A_{ij} is the Value of alternative to i on criterion j, X_{ij} is the Initial value of alternative to i on criterion j, $X_{ij}(min)$ is the Alternative value to i on the minimum criterion to j , B_j is the Criterion importance weight to j, I_i is the Combined index of criteria on the alternative to i.

2.5. Black Box Testing

According to Kadir Abdul, the black box testing approach is a test method where the test data comes from the specified functional requirements without regard to the final program structure. Black box testing is a way of testing code that is different from white box testing. A. Haris Rangkuti, argues that black box testing assumes that the code becomes a black box that can be input with different things and will then produce different things. Testing focuses on what the code does when different things are entered into it. This type of testing also focuses on validating the code, measuring how fast it runs, and looking for security issues.

Black box testing involves testing interfaces to ensure that the code meets functional requirements and works. Some reasons for using black box testing in this research are as follows: (1) This test is easier to perform than other methods, so it can be used to determine if the system is abnormal; (2) System testing can be done without having to access the program code directly; (3) By seeing what comes out of the system based on what comes in and what the system is designed to do, you can find problems that occur.

2.6. Validity Testing

Validity is a measure that indicates the extent to which a product that has been developed is reliable in various aspects of assessment. There are two important aspects that must be met to ensure validity, namely content validity and construct validity. According to Alfiza, L., Lubis, M. R., & Saragih, I. S. (2020), content validity refers to an adequate theoretical basis in product development, while construct validity examines the consistency of the relationship between product components.

3. Method

The research flow carried out in this study is as follows: the first step in a research or development project is to collect existing information. After the literature study, observations are made to gain a direct understanding of the situation or problem. The results of the observations are then documented. Then analyze based on the documentation and observations to understand the problem in more depth. After analyzing, the problem is clearly formulated along with its limitations. The next step is designing or designing a solution to the problem that has been identified, namely using Draw.io.Special steps related to product inventory to be input into the web. After design, the system that has been designed is implemented in the form of a web application using the PHP Programming Language and MySQL database. As a final step before completion, the system is tested through black box testing techniques, where its functionality is tested. The flow of research carried out in the study can be presented in Fig. 1.
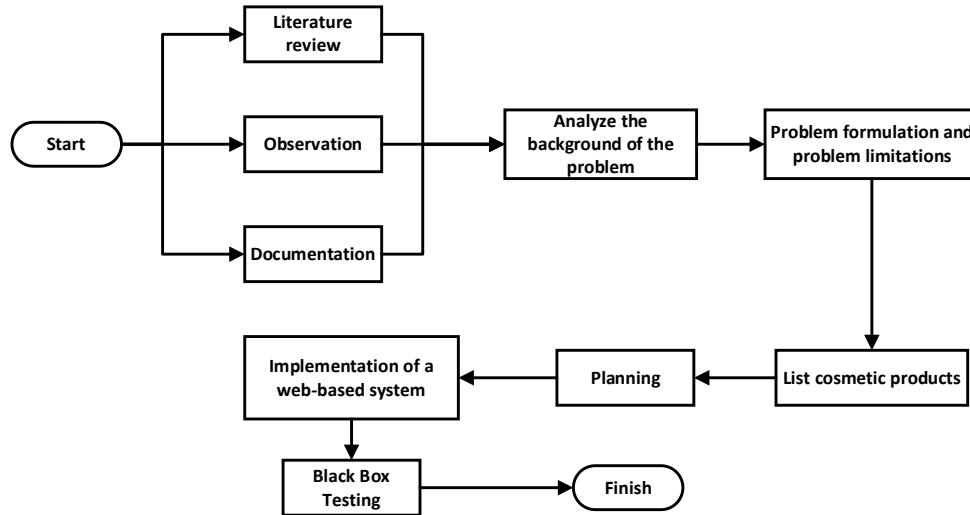
Fig. 1. Research Flow

This black box testing method in research consists of 14 tests as follows; Admin Login; Add Mask Data; Edit Mask Data; Delete Mask Data; Add Criteria; Edit Criteria; Delete Criteria; Add Assessment Data; Edit Assessment Data; Display List of Users; Delete Assessment; Consumer List Testing; Consumer Login Testing; Displaying CPI Method Results.

4. Results and Discussion

4.1. Solution Design

The design must be able to overcome the initial problem without causing other problems. Design is a system of activities carried out to design a system that has logically arranged stages of work, starting from the collection of data needed for the implementation of the design. The next step is to analyze the data that has been collected to determine the boundaries of the system, then go further, namely designing the system. Input design is the beginning of the information process. The raw material of information is data that occurs from transaction transactions carried out by the organization. Forms are important tools for controlling work flow and are used to capture data that occurs, often called basic documents. Output design is a product of an information system that can be seen. In research on the selection of facial mask products for sensitive skin using the Composite Performance Index (CPI) Method, data analysis is carried out with the following steps: Collecting facial mask product data; Calculating the criteria value of each data input; Performing numerical weighting of the results of the previous criteria value calculation; Black Box system testing.

In this study, a system analysis was also carried out with the following steps: (1) Input needs (Entering data in the form of data on sensitive skin face mask products and their descriptions and assessments of each mask product); (2) Process needs (The process of determining decisions using the Composite Performance Index (CPI) method using price criteria, skin condition, mask benefits, consumer age); (3) Output needs (The results of the system, namely consumers can see mask recommendations for sensitive skin); (4) Testing needs (Testing using the Black Box method by analyzing each input function, process and result on the system to find out whether the system runs according to the design and expected results).

4.2. Database Design

In general, the inputted data will be stored in the storage media. The table design is as follows:

Table 1. User database design

No	Field Name	Data Type	Size
1	Id_users	Int	11
2	Name	Varchar	40
3	Username	Varchar	30
4	Password	Varchar	255
5	Level	Enum	-

Table 2. Mask alternative database design

No	Field Name	Data Type	Size
1	id_alternatif	Int	11
2	nama_masker	Varchar	40
3	Username	Varchar	30
4	Password	Varchar	150
5	File	Varchar	255

Table 3. Criteria database design

No	Field Name	Data Type	Size
1	id_kriteria	Int	11
2	nama_kriteria	Varchar	40
3	Bobot	Double	11

Table 4. Sub Criteria database design

No	Field Name	Data Type	Size
1	id_subkriteria	Int	11
2	nama_sub	Varchar	30
3	Nilai	Double	-

Table 5. Relationship database design

No	Field Name	Data Type	Size
1	id_relasi	Int	11
2	id_kriteria	Int	11
3	id_alternatif	Int	11
4	Nilai	Double	-

Table 6. CPI database design

No	Field Name	Data Type	Size
1	id_peringkat	Int	11
2	id_kriteria	Int	11
3	id_alternatif	Int	11
4	Nilai	Double	-

Table 7. Rating database design

No	Field Name	Data Type	Size
1	id_peringkat	Int	11
2	id_alternatif	Int	11
3	Nilai	Double	-

4.3. Implementation of Composite Performance Index (CPI)

The implementation of CPI with the flow that can be done by the admin can be presented in the following Fig. 2.
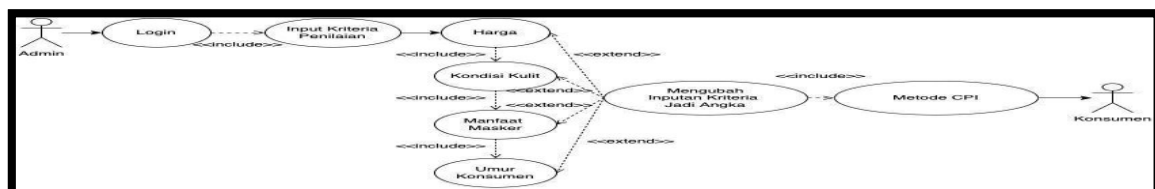
Fig. 2. Use Case Diagram Admin

Implementation of the Composite Performance Index (CPI) with the flow that can be done by users / consumers can be presented in the following Fig. 3.
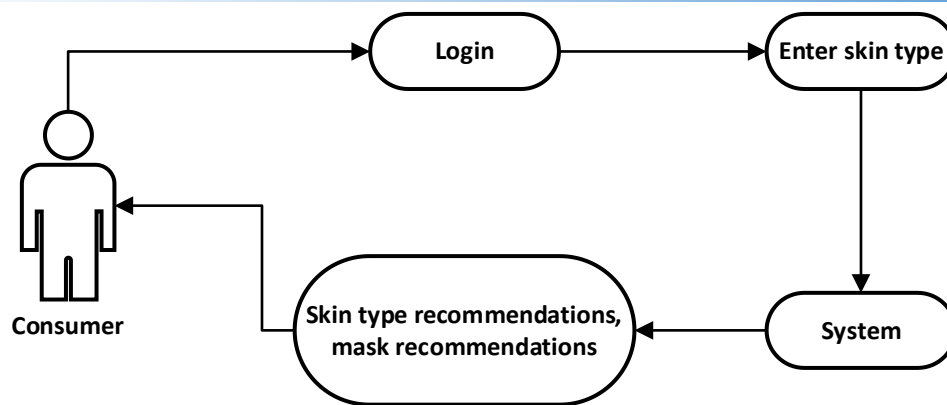
Fig. 3. Use Case Diagram Consumer

Implementation of the Admin Interface

In Fig. 4 shows the login page, namely inputting the username and password then clicking login, if the login uses the admin username and password, the system displays the home page with a welcome message. In Fig. 5 is an admin home page that displays a list of menus. In Fig. 6 Is a page for adding alternative face mask data with a mask name input column. Fig. 7 is a data list page that has a button to edit mask data, the admin can make changes to the data by editing the data in the available columns then clicking save to save the changes.

Fig. 4. Admin Login Page

Fig. 5. Admin Home Page

Fig. 6. Page Add Mask Name

Fig. 7. Mask Data List Page

In Fig. 8 is a criteria page that can be accessed by the admin in the criteria menu, the input fields include criteria names and weights. The list of criteria has a criteria edit button that can be accessed via the criteria menu> select criteria> edit> save and if the change is successful the web displays a saved criteria message. In Fig. 3.9 is an added assessment page as a rating of mask data matches from each criterion.

Fig. 8. Criteria List Page

Fig. 9. Add Assessment Page

In Fig. 10 is a criteria list page that can be used to make changes to the data on the assessment that has been inputted into the web, the information section that can be updated by the admin is the value column. Fig. 11 is an assessment results page using the Composite Performance Index (CPI) method and displays rankings.

Fig. 10. Assessment List Page

Kriteria (C)	A1	A2	A3	A4	A5
C1	1	2	2	3	3
C2	1	3	1	2	1
C3	1	3	1	1	2
C4	3	3	1	2	1

Peringkat	Kode	CPI
1	A2	290
2	A4	170
3	A5	160
4	A1	140
5	A3	110

Fig. 11. Assessment Results Page

Implementation of the Users Interface

In Fig. 3.12 is the login page for users. Fig. 13 is the skin type selection page for users. Fig. 14 is a mask recommendation page for users.

Fig. 12. Users Login Page

Fig. 13. Select Users Skin Type Page

Fig. 14. Mask Recommendation Results Page for Users

4.4. Research results

Based on the Black Box testing technique that has been carried out, in general, the results of web testing can be summarized in Table 8.

Table 8. Black Box Testing

No	Test Scenario	Expected Result	Testing Result
1	Admin Login	Login Successful	As expected
2	Add Mask Data	Data Saved	As expected
3	Edit Mask Data	Mask Saved	As expected
4	Delete Mask Data	Mask Successfully Deleted	As expected
5	Add Criteria	Criteria Saved	As expected
6	Edit Criteria	Criteria Saved	As expected
7	Delete Criteria	Criteria Successfully Deleted	As expected
8	Add Assessment	Assessment Data Saved	As expected
9	Edit Assessment	Assessment Data Saved	As expected
10	Display List of Users	Users Successfully Displayed	As expected
11	Delete Assessment	Assessment Successfully Deleted	As expected
12	Testing Consumer List	Registration Successfully	As expected
13	Testing Consumer Login	Login Successfully	As expected
14	Displaying CPI Method Results	Displaying the Ranking Process	As expected

From the test results Table 8 using 14 test scenarios, it can be concluded that the web can run according to the functionality and as expected and get test results with a percentage of 100%. The percentage results of each questionnaire question can be seen as follows:

4.4.1. Does the website display a list of masks that you often use?

Table 9. Question 1

No	Description	Frequency of Answer	Total Percentage
1	Strongly Agree	7	21.8%
2	Agree	22	68.7%
3	Agree Enough	1	3.1%
4	Disagree	2	6.2%
5	Don't agree	-	0%
6	Strongly Disagree	-	0%

4.4.2. Does the website provide recommendations for masks that suit your skin type?

Table 10. Question 2

No	Description	Frequency of Answer	Total Percentage
1	Strongly Agree	6	18.7%
2	Agree	23	71.8%
3	Agree Enough	2	6.2%
4	Disagree	1	3.1%
5	Don't agree	-	0%
6	Strongly Disagree	-	0%

4.4.3. Is the price displayed in accordance with the general price that you often get?

Table 11. Question 3

No	Description	Frequency of Answer	Total Percentage
1	Strongly Agree	10	31.2%
2	Agree	18	56.2%
3	Agree Enough	2	6.2%
4	Disagree	2	6.2%
5	Don't agree	-	0%
6	Strongly Disagree	-	0%

4.4.4. Do the benefits of the mask that you feel match the description on the website?

Table 12. Question 4

No	Description	Frequency of Answer	Total Percentage
1	Strongly Agree	18	25%
2	Agree	7	53.1%
3	Agree Enough	5	15.6%
4	Disagree	11	3.1%
5	Don't agree	-	3.1%
6	Strongly Disagree	1	0%

4.4.5. Is the information about the age of consumers displayed in accordance with the product procedure?

Table 13. Question 5

No	Description	Frequency of Answer	Total Percentage
1	Strongly Agree	14	43.7%
2	Agree	12	40.6%
3	Agree Enough	4	9.3%
4	Disagree	1	6.2%
5	Don't agree	1	0%
6	Strongly Disagree	-	0%

4.4.6. Does this website provide clear information about mask products?

Table 14. Question 6

No	Description	Frequency of Answer	Total Percentage
1	Strongly Agree	15	46.8%
2	Agree	11	34.3%
3	Agree Enough	5	15.6%
4	Disagree	1	3.1%
5	Don't agree	-	0%
6	Strongly Disagree	-	0%

Calculation of the percentage of questionnaire recapitulation, Strongly Agree = (60^* 6)/6 = 60, Agree = (103^* 5)/6 = 85.83, Moderately Agree = (18*4)/6 = 12, Disagree = (8^* 3)/6 = 4, Disagree = (1*2)/6 = 0.33, Strongly Disagree = (0*1)/6 = 0.1.

So the total value obtained from the above calculation is 163.5. Then the assessment of respondents' interpretation of the application can be obtained in a way:

$$Result = \frac{Total\ value}{Y} \times 100 \tag{2}$$

Calculation Process:

$$Result = \frac{162.26}{190} \times 100 = 85.34\%$$

Table 14. Susceptible Percentage

Percentage Range	Interpretation
0% - 50%	Very Not Good
51% - 60%	Not good
61% - 70%	Enough
71% - 80%	Good
81% - 90%	Very good
91% - 100%	Perfect

5. Conclusion

Based on the results of the research that has been carried out, it can be concluded that. Can be used as a decision support solution to help consumers in assessing the best mask based on objective considerations according to the criteria of price, skin condition, benefits of the mask and consumer's age. Using the Composite Performance Index (CPI) method which functions as a method in the decision support system. Consumers choose recommendations according to their skin type and the system provides results from the decision support system in the form of mask recommendation information. Based on validity testing, the website obtained a percentage with very good interpretation of 85.34%. The suggestions given in this research are. It is hoped that in the future the system can be developed to display product photos of recommended masks. As a form of web promotion, it can be developed to have a notification system for consumers.

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