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Application of Decision Support System in Recommendation for Determining the Best Music Platform for Generation Z

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ABSTRACT

Music streaming services have become the primary choice for many users to enjoy music. However, with the multitude of options available, users often find it challenging to select the most suitable platform. This article discusses the application of the Simple Additive Weighting (SAW) method to evaluate and compare three popular music streaming services: Spotify, YouTube Music, and Apple Music. The assessment is based on five main criteria: audio quality, subscription price, ease of use, song selection and catalog, and application response time. Data were collected through a questionnaire involving 142 respondents. The analysis results indicate that Spotify excels in ease of use and song catalog selection, while YouTube Music stands out in terms of subscription pricing. By utilizing relevant criteria, this analysis aims to provide more informed recommendations for users. The SAW method has proven effective in generating objective and structured recommendations, helping users make better decisions when choosing a music streaming service.

1. Introduction

The development of digital technology has influenced various aspects of human life, including how to enjoy entertainment. Music streaming applications such as Spotify, YouTube Music, and Apple Music have become the main choice for listening to music practically and according to needs. The popularity of these services continues to increase due to the ease of access, diversity of song catalogs, and personalization features offered [1]. However, even though all these applications have their own advantages, users often face difficulties in choosing the platform that best suits their preferences [2]. The need for an objective evaluation of these alternative applications is increasingly pressing given the differences in subscription prices, service quality, and user experience offered by each application.

The main problem faced by users is the lack of objective guidance in choosing the music streaming application that best suits their needs. This is compounded by the variety of criteria such as audio quality, price, ease of use, song selection, and application response

time which are often difficult to compare directly. This study offers a solution by applying the Simple Additive Weighting (SAW) method, a multi-criteria-based method that can assist in decision making [3]–[6]. This method allows comparison of various alternatives based on normalized and weighted criteria [7]–[9], thus producing systematic and objective recommendations.

The selection of the SAW method is based on its advantages in handling decision-making problems with various criteria. SAW provides transparency in the calculation process.[10], allowing users to understand how the weight of each criterion affects the final result. This study aims to evaluate three music streaming applications (Spotify, YouTube Music, and Apple Music) based on five main criteria, identify the best alternatives based on the SAW method, and provide objective guidance to users to choose the music streaming application that suits their needs.

2. Method

Simple Additive Weighting Method

The Simple Additive Weighting (SAW) method is one of the methods in a decision support system that is used to evaluate and determine the best alternative based on a number of predetermined criteria [11], [12]. The main principle of this method is to add up the normalized values for each criterion by considering its weight [13], [14]. In this study, the SAW method is applied to evaluate three popular music streaming applications, namely Spotify, YouTube Music, and Apple Music, based on five main criteria of audio quality, subscription price, ease of use, song selection and catalog, and application response time. The stages in the SAW method begin with identifying alternatives and criteria.

Once the criteria and weights are determined, the next step is to normalize the decision matrix. This normalization is done to change the original data into a uniform scale, thus allowing objective comparison between alternatives [15]. Normalization for benefit criteria is done by dividing the value of each alternative by the maximum value of the criteria, while for cost criteria, the minimum value of the criteria is divided by the value of each alternative. The normalization formula used;

- For the criteria the bigger the better (benefit), the value is normalized using the formula:

$$R_{ij} = \frac{x_{ij}}{\max\left(x_{ij}\right)} \quad (1)$$

- For the criteria the smaller the better (cost), the value is normalized using the formula:

$$R_{ij} = \frac{\min(xij)}{x_{ij}} \quad (2)$$

Calculating the final value (preference), after normalization, the value of each alternative is calculated by adding up the results of multiplying the normalized value and the weight of each criterion:

$$v_i = \sum_{j=1}^{n}(wj \cdot rij) \quad (3)$$

Data source

Data were collected through a questionnaire filled out by 142 respondents. Each respondent rated the three alternatives based on five predetermined criteria.

3. Results and Discussions

Alternative Data and Criteria

Table 1. Evaluated Alternatives

Alternative Code	Alternative
A1	Spotify
A2	Apple Music
A3	YouTube Music

Table 2. Criteria and Weights

Criteria Code	Criteria	Type	Weight
C1	Audio Quality	Benefits	5
C2	Subscription Price	Cost	4
C3	Ease of Use	Benefits	5
C4	Song Selection and Catalog	Benefits	3
C5	Application Response Time	Cost	2

Weight Data and Rating Scale

Table 3. Audio Quality Criteria Weighting

Audio Quality	Information	Mark
Very satisfied	Very high	5
Satisfied	Tall	4
Quite Satisfied	Middle	3
Not satisfied	Low	2
Very Dissatisfied	Very Low	1

Table 4. Subscription Price Criteria Weighting

Subscription Price	Information	Mark
Very Affordable	Very high	5
Affordable	Tall	4
Quite Affordable	Middle	3
Unreachable	Low	2
Very Unaffordable	Very Low	1

Table 5. Weighting of Ease of Use Criteria

Ease of Use	Information	Mark
Very easy	Very high	5
Easy	Tall	4
Quite Easy	Middle	3
Not easy	Low	2
It's Not So Easy	Very Low	1

Table 6. Weighting of Song Selection Criteria and Catalog

Song Selection and Catalog	Information	Mark
Very satisfied	Very high	5
Satisfied	Tall	4
Quite Satisfied	Middle	3
Not satisfied	Low	2
Very Unfasting	Very Low	1

Table 7. Application Response Time Criteria Weighting

Application Response Time	Information	Mark
Very fast	Very high	5
Fast	Tall	4
Pretty Fast	Middle	3
Not Fast	Low	2
Very Not Fast	Very Low	1

Calculation Analysis

1. Determine the suitability rating of each alternative for each criterion.

Table 8. Suitability Rating of Each Alternative

A	C1	C2	C3	C4	C5
A1	0.923611111	1.108333333	0.841772152	0.869281046	0.89261745
A2	1	1.303921569	1.023076923	1.007575758	1.015267176
A3	0.923611111	1.055555556	1	0.936619718	0.943262411

2. Normalization of Decision Matrix

Normalization of the decision matrix is done by considering the type of criteria. For benefit-type criteria, normalization is done by dividing the alternative value of a criterion by the highest value of the criterion. Meanwhile, for cost-type criteria, the normalization value is obtained by dividing the lowest value of a criterion by the alternative value of the criterion. The results of the decision matrix normalization can be seen in Table 9.

Table 9. Decision Matrix Normalization

A	C1	C2	C3	C4	C5
A1	4.235294118	3.529411765	4.647058824	4.5	4.382352941

A2	3.911764706	3	3.823529412	3.882352941	3.852941176
A3	4.235294118	3.705882353	3.911764706	4.176470588	4.147058824

The next step is to calculate the preference value for each alternative. This preference value is obtained by adding up all the criteria values of the alternatives concerned.

V1 = (0.923611111 × 0.15) + (1.108333333 × 0.2) + (0.841772152 × 0.2) + (0.869281046 × 0.25) + (0.89261745 × 0.2)

= 0.138541667 + 0.221666667 + 0.16835443 + 0.217320261 + 0.17852349 = 0.924407

V2 = (1 × 0.15) + (1.303921569 × 0.2) + (1.023076923 × 0.2) + (1.007575758 × 0.25) + (1.015267176 × 0.2)

= 0.15 + 0.260784314 + 0.204615385 + 0.251893939 + 0.203053435 = 1.070347073

V3 = (1 × 0.15) + (1.303921569 × 0.2) + (1.023076923 × 0.2) + (1.007575758 × 0.25) + (1.015267176 × 0.2)

= 0.15 + 0.260784314 + 0.204615385 + 0.251893939 + 0.203053435 = 1.070347073

Table 10. Shows the results of the calculation of the preference value for each alternative.

Alternative	Total Value
A1	0.924407
A2	1.070347
A3	0.97246

3. Alternative Value Ordering

The alternative sorting results of the preference value results are shown in the table below.

Table 11. Alternative Value Sorting Results

Ranking	Alternative	Total Value
1	A2	1.070347
2	A3	0.97246
3	A1	0.924407

Discussions

This study aims to evaluate three popular music streaming applications, namely Spotify, Apple Music, and YouTube Music, using the Simple Additive Weighting (SAW) method. The alternatives evaluated include the three apps, while the assessment criteria include audio quality (C1), subscription price (C2), ease of use (C3), song selection and

catalog (C4), and app response time (C5). The weight for each criterion is determined based on the importance of each criterion, where criteria with high weights, such as audio quality and ease of use (weighted 5), become aspects that are highly prioritized by users. After the criteria and weights were determined, the next stage was data collection through a questionnaire filled out by 142 respondents. Respondents provided ratings for each alternative based on the five criteria, resulting in the initial data summarized in Table 8. An important step in the SAW method is data normalization to ensure objective comparison between alternatives. Normalization is done by dividing the value of each alternative on the benefit criterion by the maximum value on that criterion. Meanwhile, for the cost criterion, the minimum value is divided by the alternative value, resulting in uniform data and enabling fair evaluation.

After the normalization process, the preference value is calculated by summing the results of the multiplication between the normalization value and the weight of each criterion. The results of the preference value calculation are shown in Table 10, where Apple Music (A2) obtained the highest score of 1.070347, ahead of YouTube Music (A3) with a score of 0.97246, and Spotify (A1) with a score of 0.924407. These results show that Apple Music is the best alternative based on the criteria used. The ranking of alternatives by preference score is further shown in Table 10, which indicates that Apple Music excels in almost all key criteria, especially ease of use and song catalog selection. Spotify, despite its strengths in ease of use and catalog variety, comes last as its score on the subscription price criterion is relatively lower than other alternatives.

The data normalization process in the SAW method also presents a challenge, as it requires high accuracy to avoid calculation errors that could affect the final results. In addition, comparing the results of this study with similar studies from the past becomes difficult if different approaches or criteria are used, making it difficult to evaluate the consistency of the results. The results of this study show that the SAW method can be effectively applied to provide objective and systematic recommendations based on multi-criteria. In the context of this research, the results show that Apple Music is the best choice for users who prioritize ease of use, variety of song catalogs, and competitive subscription prices. This research makes a significant contribution to users who need data-driven guidance to choose the best music streaming service.

4. Conclusion

Based on the research results, the Simple Additive Weighting (SAW) method is proven effective in evaluating and determining the best music streaming application among Spotify, YouTube Music, and Apple Music. Apple Music received the highest score in ease of use, song catalog variety, subscription price, audio quality, and application response time. The implications of this study indicate that the SAW method can be used to support multi-criteria-based decision making in various contexts, especially in choosing digital services. This study provides useful insights for users and music streaming service providers. For further research, it is recommended that additional criteria such as device

compatibility, data security, and social features are also analyzed to provide more comprehensive results. The addition of other alternative music streaming services can also provide wider coverage.

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