

Selection of TikTok Content Based on User Engagement Criteria Using the Analytic Hierarchy Process

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Abstract - Indonesia has 106.9 million active TikTok users aged 18 and above. TikTok is designed for engagement in many ways, as it actively encourages two-way communication and eye-catching content. Uploaded content must have its uniqueness variable. In increasing the engagement of a TikTok account, criteria are chosen based on the COBRA concept (consuming, contributing, and creating) and alternatives based on social media content trends in Indonesia (tutorial, educational, a day in my life, behind the scene dan tips and trick). This research was conducted by implementing the Analytic Hierarchy Process (AHP) method to select the content that must be prioritized to get engagement from the wider community. From the data processing results obtained, tutorial content is the best content in increasing engagement results, especially TikTok. Content that has the lowest engagement is behind the scene content. Further research can be carried out through a group decision support system with various related experts. It can also be combined with the BORDA, TOPSIS, and Profile Matching methods to optimize ranking results.

Keywords: TikTok, engagement, AHP, COBRA concept.

I. INTRODUCTION

According to [1], social media is a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, allowing the creation and exchange of User Generated Content. Social media is precious because it not only fulfills the needs and interests of users but also encourages the audience to be interactive. Social media engagement theory has been discovered previously by [2], followed by [3], who researched to expand the model that focuses on social interaction between users supported by social media platforms provided by an organization.

Social media users have increased by 12.35% from the previous year. In 2022, social media users in

Indonesia will reach 191 million. The type of social media that is widely used and has the first rank, namely WhatsApp, followed by Instagram, Facebook, TikTok, and Telegram [4]. Based on the advertising audience reach numbers published in TikTok self-service tools in July 2022, the latest data show data Indonesia has 106.9 million active tiktok users aged 18 and above [5].

Launched in 2016, TikTok is one of the most popular mobile short-form video apps, with more than 400 million active users worldwide. On it, users create and share short, inventive videos and bizarre memes [6]. TikTok is designed for engagement in many ways, as it actively encourages two-way communication and eye-catching content. Uploaded content must have its uniqueness variable because it will not spread widely and negate the value of TikTok's design and engagement potential [7]. The success of TikTok is due to three equally important components: the platform, the creators, and the fans. The platform provides technical support and traffic for the creators and provides content recommendations to fans; the creators, who produce videos for the platform, interact with fans by forwarding, commenting, liking, sharing, and following; and the fans launch challenges or supports to the creators by distributing content and engaging in community distribution on the platform [8].

TikTok has a music library containing various music tracks and technical possibilities for using sound accompaniment. The differences between TikTok application as a social network can be summarized as follows: user-friendly interface, built-in video editor with advanced functionality, the ability to add links to the website, YouTube, and Instagram in the profile header, availability of hashtags for video search and promotion, intelligent recommendation system allows you to become popular, regardless of the subscribers' number [9]. This research also explains that TikTok has a variety of exciting content that many users have

produced, such as duets and reactions [10], songs and dances, parodies/gags/pranks, reviews, social videos, tips and instructions, thematic selections, backstages, answers to questions, challenges. TikTok also has the ability for users to create and promote content and uses powerful artificial intelligence algorithms to manage the content recommendation system in various aspects [9] and [11]. In line with this research, taking content as an alternative to TikTok has also been adapted to trends in Indonesia. Seventeen trends in TikTok content have been found during the literature review process. This research only uses 5 TikTok content that appears the most and is used by various sources. Alternatives in this research are tutorial content, educational content, a day in my life content, behind-the-scenes content, and tips and tricks content.

User engagement on social media is part of the user experience, psychological state, and behavior [3]. Therefore, user involvement is divided into two psychological components: 1) individual involvement and 2) personal meaning. The individual engagement has been found to increase passion and motivation to participate on social media accounts. Meanwhile, personal meaning is defined as the extent to which users feel the fulfillment of their needs and interests.

The use of criteria looks at the concept of COBRA [12]. COBRAs were categorized into three dimensions corresponding to a gradual involvement with brand-related content on social media: consuming, contributing, and creating. The consuming COBRA type represents a minimum level of online brand-related activeness. It denotes participating without actively contributing to or creating content. People who consume watch the brand-related videos that companies or other people make view the product ratings and reviews others post, and the dialogues between members of online brand forums. The contributing COBRA type is the middle level of online brand-related activeness. It denotes both user-to-content and user-to-user interactions about brands. People who contribute to brand-related content converse on a brand's fan page on a social networking site, contribute to brand forums and comment on blogs, pictures, videos, and any other brand-related content that others have created. The creating COBRA type represents the ultimate level of online brand-related activeness. It denotes actively producing and publishing the brand-related content others consume and contribute to. People that create and write brand-related weblogs post product reviews, build and upload branded videos, music, and pictures, or write articles on brands [12].

This study investigates the roles of gratifications-sought, narcissism, and personality traits in TikTok

engagement behaviors (i.e., contribution, enhancement, and creation) in China [8]. In conceptualizing marketing-related social media content usage, [12] introduced a three-factor framework, namely consuming, contributing, and creating, to measure consumers' engagement activities. Reference [13]-[15] generally agree that these three dimensions constitute consumer behavioral engagement with social media content.

Based on [16], the use of the AHP fuzzy method can determine the highest ranking in displaying news feeds on social media. This research uses status reports, photos, videos, interactions, app actions, and reactions from people, blogs, and networks on social media that individuals follow to determine which newsfeed post will first appear on social media homepages. The highest-ranking post is commented number, and the lowest is a picture embedded.

Reference [17] also reviews the determination of social media selection criteria to increase student participation in government. This study also tries to develop a hierarchy to evaluate social media preferences and prioritize social media that are currently popular to support e-participation. This study uses 11 social media selection criteria to increase participation and the eight most suitable alternative solutions. The combination of fuzzy AHP and TOPSIS is applied in this research. Fuzzy AHP is used to determine social media weights to increase government participation, and TOPSIS is used to determine social media preferences. The results of this study indicate that LINE is an alternative social media solution with the highest priority, while Wiki has the lowest priority.

Based on the explanation described above, this study aims to provide content recommendations that must be prioritized to improve the performance of a TikTok social media account using the Analytic Hierarchy Process (AHP) method.

II. METHOD

The research method in Fig. 1 is carried out with five main stages to provide a solution for selecting TikTok content based on User Engagement Criteria. These steps are described as follows:

The first stage begins with problem identification, namely observing a TikTok social media account related to the content that will be released. It was found that around 17 TikTok content can increase an account's engagement [18]- [19]. This research uses the top five most used content such as a tutorial, educational, a day in my life, behind the scenes, and tips and tricks. A literature review was conducted in the second stage regarding the factors used to increase user engagement.

This research uses the COBRA concept (consuming, contributing, and creating). The third stage, data collection, was carried out by interviewing Decision Makers, namely experts in the user experience of social media, after setting the COBRA concept as the criteria and TikTok content as an alternative. The fourth stage was data processing using the AHP method. Where are the steps in the AHP method shown in Fig. 2. The fifth stage is selecting the best TikTok content to increase user engagement based on the results of AHP data processing. This research is included in quantitative research. The object of research is the social media TikTok, with research time ranging from August to December 2022.

Based on Fig. 2, it is explained in detail the steps in implementing the AHP method for this research. The steps are defined as follows:

1. Identify the criteria in this study using the user engagement dimension based on the COBRA concept (Consuming, Contributing, and Creating), and identify alternatives that will be compared between the type of content and user engagement. Arranging these criteria in a matrix of pairs as in (1).

$$a_{ij} = \frac{w_i}{w_j}, i, j = 1, 2, 3, \dots, n \quad (1)$$

2. Determine priority comparison between criteria
3. Calculating priority criteria using a pairwise comparison matrix to then normalize. Normalize each column by dividing each column by dividing each value in i column and j row by the total value of each column.
4. Determine WSF (Weight Single Factor) with the (2).

$$a_{ij} = \frac{a_{ij}}{\sum a_{ij}} \quad (2)$$

5. The next stage is the consistency test such as determining the weight of the criteria, Weight Single Factor, calculating value Consistency Factor, λ_{max} , Consistency Index dan Consistency Ratio as in (3).

$$a_{ij} = \sum_{i=1}^n a_{ij} \times w_i \quad (3)$$

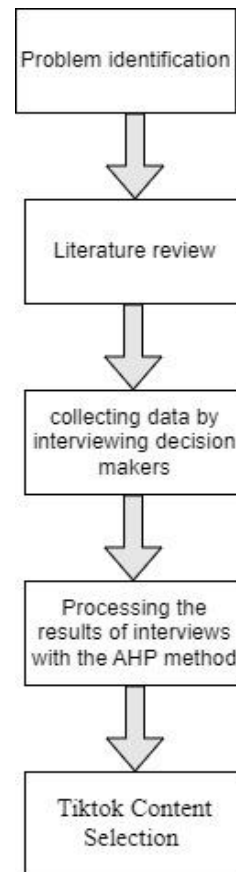


Fig. 1 The research stages

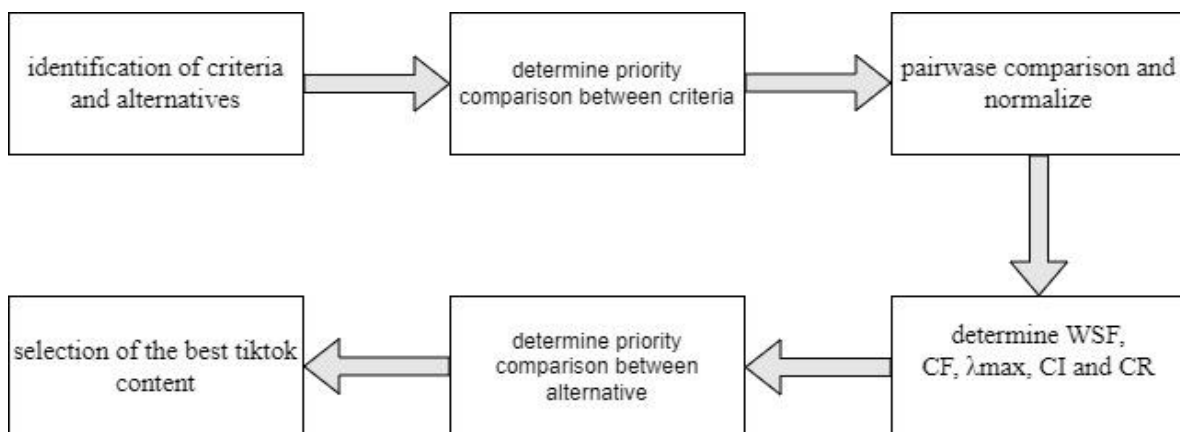


Fig. 2 AHP stages

Determine the value of CF (Consistency Factor) with the (4).

$$CF = \frac{WSF}{Bobot} \quad (4)$$

Calculating λ_{max} or average CF value with the (5).

$$\lambda_{max} = \frac{\sum CF}{n} \quad (5)$$

Calculate CI (Consistency Index) using (6).

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (6)$$

Measuring the entire consistency of the assessment using the consistency ratio (CR) with the (7).

$$CR = \frac{CI}{RI} \quad (7)$$

6. The process is continued by determining priority comparisons between alternatives and then calculating priority criteria using a comparison matrix and then normalizing.
7. Ranking is done after calculating the weight of the alternatives on each criterion, which is then

carried out in a pairwise comparison matrix between the alternative weight matrices and the criteria weight matrix.

III. RESULT AND DISCUSSION

A. Determining Criteria and Alternatives

Determining the criteria for user engagement on TikTok is based on the COBRA concept, namely consuming, contributing, and creating, then testing is carried out on alternatives based on TikTok content as follows: tutorials, education, a day in my life, behind the scene, and tips and tricks. The initial hierarchy of TikTok content selection is shown in Fig. 3.

B. Carrying out Pairwise Comparisons of Criteria

Pairwise comparisons are filled in by related DM. Pairwise comparisons consist of pairwise comparisons based on objectives, namely the selection of tiktok content based on consuming (C1), contributing (C2), and creating (C3) criteria. In pairwise comparisons, the number 1 is placed diagonally to indicate that the comparison between the same criteria has a value of 1.

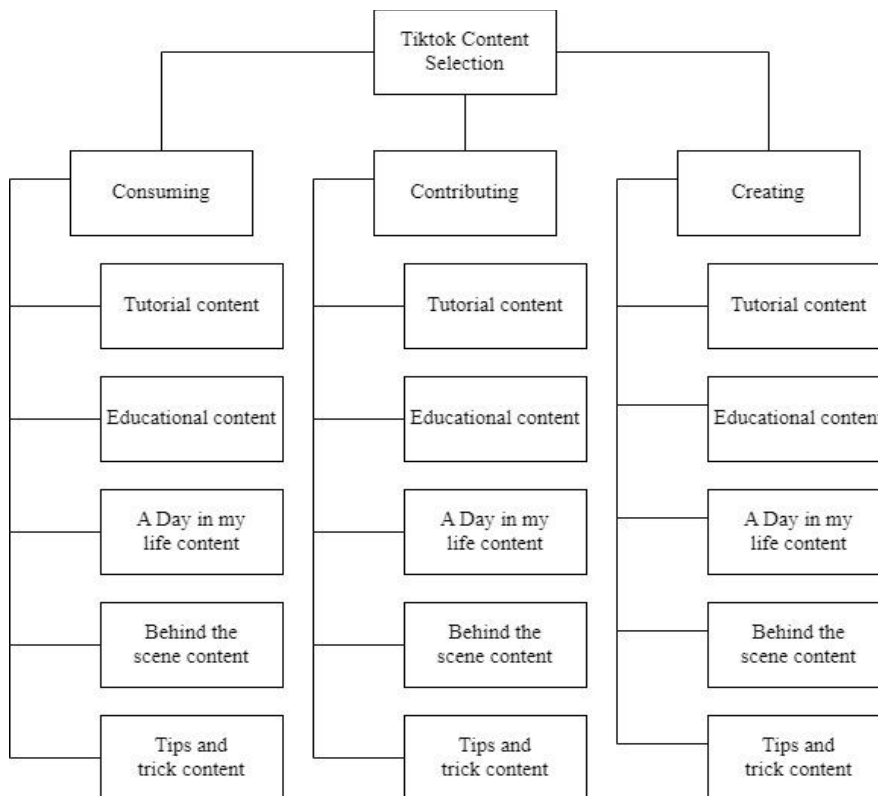


Fig. 3 The initial hierarchy of TikTok content selection

Then fill in the upper diagonal value 1 with the comparison that has been obtained. Here are the results:

- C1 compared to C2 0,667
- C2 compared to C3 0,286
- C2 compared to C3 0,333

To get the value of the lower part of the diagonal value 1, it is done by dividing it by the value of the pairwise comparison results obtained. The following is a pairwise comparison between criteria based on objectives, as seen in Table I.

After pairwise comparisons based on the criteria, normalization is carried out on the comparison data by dividing each data in the column by the amount of data in each column, then totaling it to get a value of 1. The normalization matrix can be seen in Table II.

C. Determine the Eigenvector

The next step after normalizing the pairwise comparisons is calculating the Eigenvector values. This value is obtained by adding up each data in each row and then calculating the average. The results are shown in Table III.

D. Determine Weight Single Factor (WSF)

After determining the Eigenvector value, the next step is to determine the WSF value by calculating the matrix between the pairwise comparison matrices and the Eigenvector matrix., The following is the calculation result :

$$\begin{pmatrix} 1,000 & 0,667 & 0,286 \\ 1,500 & 1,000 & 0,333 \\ 3,500 & 3,000 & 1,000 \end{pmatrix} \times \begin{pmatrix} 0,162 \\ 0,223 \\ 0,615 \end{pmatrix} = \begin{pmatrix} 0,487 \\ 0,671 \\ 1,852 \end{pmatrix}$$

TABLE I
PAIRWISE COMPARISONS BETWEEN CRITERIA

| Criteria | Comparison Matrix | | |
|----------|-------------------|-------|-------|
| | C1 | C2 | C3 |
| C1 | 1.000 | 0.667 | 0.286 |
| C2 | 1.500 | 1.000 | 0.333 |
| C3 | 3.500 | 3.000 | 1.000 |
| Total | 6.000 | 4.667 | 1.619 |

TABLE II
TABLE NORMALIZATION OF THE CRITERIA MATRIX

| | C1 | C2 | C3 |
|-------|-------|-------|-------|
| C1 | 0.167 | 0.143 | 0.176 |
| C2 | 0.250 | 0.214 | 0.206 |
| C3 | 0.583 | 0.643 | 0.618 |
| TOTAL | 1.000 | 1.000 | 1.000 |

TABLE III
TABLE EIGENVECTOR

| No. | EIGENVECTOR |
|-------|-------------|
| C1 | 0.162 |
| C2 | 0.223 |
| C3 | 0.615 |
| TOTAL | 1.000 |

E. Determine Consistency Factor (CF)

The next step is to divide the WSF value by the Eigenvector value. Here's the calculation:

$$\begin{aligned} \text{CF first row} &= \frac{0,487}{0,162} = 3,003 \\ \text{CF second row} &= \frac{0,671}{0,223} = 3,005 \\ \text{CF third row} &= \frac{1,852}{0,615} = 3,013 \end{aligned}$$

F. Determine lambda

The next step determines the value of λ_{max} by calculating the average of the calculated CF values.

$$\lambda_{max} = 3,003 + 3,005 + 3,013 : 3 = 3.007$$

G. Determine Consistency Index (CI)

The next step is to determine CI based on the following formula:

$$CI = \frac{\lambda_{max}-n}{n-1} = \frac{3,007-3}{3-1} = 0,004$$

H. Determine Consistency Ratio (CR)

The last step in the consistency test is to determine the consistency of the ratio with the following formula:

$$CR = \frac{CI}{RI} = \frac{0,004}{0,52} = 0,007$$

A certain level of consistency is needed in prioritizing to get the best value. Nilai $CR \leq 0$ is the consistency value. If not, revision is required. For the results of the CR calculation above, it can be concluded that the CR value is $0.007 \leq 0.01$, or it can be said that the value is consistent. The following consistency test data can be seen in Table IV.

TABLE IV
TABLE CONSISTENCY TEST CALCULATION

| Criteria | Eigenvector | WSF | CF | λ_{max} | CI | CR |
|----------|-------------|-------|-------|-----------------|-------|-------|
| C1 | 0,162 | 0,487 | 3,003 | | | |
| C2 | 0,223 | 0,671 | 3,005 | 3,007 | 0,004 | 0,007 |
| C3 | 0,615 | 1,852 | 3,013 | | | |

I. Calculation of Alternative Paired Matrix

After pairwise comparisons based on the objective of the criteria, the next process is to carry out pairwise comparisons starting from the first criterion, namely the consuming criterion (C1) to the alternatives. A pairwise comparison of consuming criteria can be seen in Table V.

After pairwise comparisons based on the criteria, the comparison data is normalized to get a value of 1. The normalization matrix can be seen in Table VI. After carrying out pairwise comparisons based on the consuming criteria (C1), then do it in the same way to get the results of the pairwise comparisons and normalization of the contributing (C2) and creating (C3) criteria.

J. Determine Eigenvector Alternatif

The next step after normalizing the alternative matrix is finding each alternative's Eigenvector value. Calculations are made starting from alternatives based on criteria C1, C2, and C3. The Eigenvector value is obtained by adding up each data in each row and then calculating the average. Here are the results shown in Table VII.

Based on Table VII, it can be seen that in criterion C1 (Consuming), Tips and Trick content has the smallest value, namely 0.082, and the most significant value is educational content with a value of 0.384 indicating the highest level of content importance in the consuming criteria is educational content. The contributing criterion (C2) has the most significant value of 0.339 with a day in my life content, and the smallest value is 0.098 with behind the scene content, indicating that the highest level of importance in the contributing criteria is a day in my life content. Finally, the creating criterion (C3) has the most significant value of 0.363 with tutorial content, and the smallest value is 0.088 with a day in my life content, indicating that the highest level of importance in the creation criterion is tutorial content.

TABLE V
TABLE PAIRED COMPARISON OF ALTERNATIVES WITH CONSUMING CRITERIA (C1)

| C1 | A1 | A2 | A3 | A4 | A5 |
|-------|-------|-------|-------|--------|--------|
| A1 | 1.000 | 0.667 | 2.500 | 3.250 | 3.500 |
| A2 | 1.500 | 1.000 | 3.000 | 3.750 | 4.000 |
| A3 | 0.400 | 0.333 | 1.000 | 1.750 | 2.000 |
| A4 | 0.308 | 0.267 | 0.571 | 1.000 | 1.250 |
| A5 | 0.286 | 0.250 | 0.500 | 0.800 | 1.000 |
| Total | 3.493 | 2.517 | 7.571 | 10.550 | 11.750 |

TABLE VI
TABLE CRITERION NORMALIZATION WITH CONSUMING CRITERIA (C1)

| C1 | A1 | A2 | A3 | A4 | A5 |
|-------|-------|-------|-------|-------|-------|
| A1 | 0.286 | 0.265 | 0.330 | 0.308 | 0.298 |
| A2 | 0.429 | 0.397 | 0.396 | 0.355 | 0.340 |
| A3 | 0.115 | 0.132 | 0.132 | 0.166 | 0.170 |
| A4 | 0.088 | 0.106 | 0.075 | 0.095 | 0.106 |
| A5 | 0.082 | 0.099 | 0.066 | 0.076 | 0.085 |
| Total | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |

TABEL VII
RESULTS OF ALTERNATIVE WEIGHTING BASED ON CRITERIA

| Weight/ Eigenvector | C1 | C2 | C3 |
|---------------------|-------|-------|-------|
| A1 | 0.297 | 0.182 | 0.363 |
| A2 | 0.384 | 0.250 | 0.275 |
| A3 | 0.143 | 0.339 | 0.088 |
| A4 | 0.094 | 0.098 | 0.117 |
| A5 | 0.082 | 0.132 | 0.158 |

K. Alternative Ranking

The final step after the alternative Eigenvector process is carried out, the next step is the ranking process or determining the priority weight value by calculating the matrix between the results of the criterion Eigenvector and the results of the alternative Eigenvector. The following is the result of the calculation shown in Table VIII.

Based on alternative ranking calculations, it can be seen that the highest score is tutorial content with a value of 0.312, the second is educational content with a value of 0.287, the third is a day in my life content with a value of 0.153, the fourth is tips and tricks content with a value of 0.109 and the last is content behind the scene with a value of 0.139. Based on this ranking, it can be concluded that the highest score is owned by tutorial content, and the lowest score is owned by behind the scene content. The results obtained from the alternative ranking calculations above are that behind the scene content does not have a high level of engagement based on the COBRA concept (consuming, contribution and creation).

TABLE VIII
ALTERNATIVE RANKING RESULTS

| Alternative | Score |
|-------------|-------|
| A1 | 0.312 |
| A2 | 0.287 |
| A3 | 0.153 |
| A4 | 0.109 |
| A5 | 0.139 |

IV. CONCLUSION

This research discusses the type of content on social media, TikTok, with excellent engagement. This study uses criteria based on the COBRA concept (consuming, contributing, and creation). Based on the results of calculations using the AHP method, tutorial content is the best content in increasing engagement results, especially TikTok. Further research can be conducted using a group decision support system with various experts. It can also be combined with the BORDA, TOPSIS, and Profile Matching methods in optimizing ranking results.

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