Desktop-Based AHP Application Development for SMEs Promotion Media Decision Support System

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ABSTRACT

Promotion media is an important part of product marketing in SMEs. Promotions are carried out to increase product sales volume from the target set by SMEs. SMEs in promoting using social media, print media, television, search engines, and product collaboration. For promotion to be more efficient, it is necessary to know the most effective promotional media. The decision support method that can be used to overcome these problems is the AHP method. The data was obtained from the distribution of questionnaires from related SMEs. The AHP for SMEs application is a desktop-based application with a Windows operating system. This application uses Visual Basic programming language with MySQL database. The AHP SMEs application can be installed on laptop/pc devices with 32-bit or 64-bit Windows operating systems. The AHP SMEs application focuses on solving alternative choices of promotional media based on criteria that have been determined by the user. While the method in solving alternative options using the AHP method. This research shows that the first promotional media is social media, then product collaboration, search engines, television, and the last is print media.

Keywords : SPK, AHP, Media Promotion, SMEs

1. INTRODUCTION

Promotional media is an important part of product marketing in SMEs. This is motivated by the need to improve the competitiveness of the competitive advantage of SMEs by changing the style and way of doing business in a promotion for the development of these products(Ikbal et al., 2021). Improvements to improve promotion management by satisfying information needs for decision making and to keep customers loyal to the products offered at SMEs(Abdurrahman et al., 2021). In this condition, the priority of everyone's needs is the preservation of life, so it is mandatory for SME business people to meet their social needs and determine their goals to increase the level of customer service and product sales(Candraningrat et al., 2021).

First, the number of large industries in each sector of the economy. Each investment unit in the SMEs sector can create more job opportunities than the same investment in large businesses in the SMEs sector. In this study, the problem that occurs in SMEs sales is a decrease in the number of SMEs sales from customers(Darma et al., 2020). Empowerment of SMEs is a strategic step in improving the economic life of the community in the SMEs sector, especially through providing job opportunities and reducing poverty levels(Sudaryono et al., 2020).

Decision-making that involves many criteria is not an easy task even though different decision-makers have their own opinions and views about these criteria, in making decisions in this study using the AHP method(Breckova & Karas, 2020). The advantage of AHP is that it not only allows for effective consideration of qualitative and quantitative criteria in marketing but also helps us to forecast, predict and evaluate sales increases for SMEs actors(Martins et al., 2019). AHP is widely used in research for decision support in various fields, ranging from system selection, management, to the field of human resources. AHP is a simple and accurate method in making decisions for SMEs actors(Iswari et al., 2019).

Therefore, this study shows which criteria are important in increasing the sales volume of SMEs. This research aims to find out the importance of criteria for creating elements of SMEs sales and assist SMEs actors in making decisions in choosing and using which alternative best suits their needs, to facilitate marketing which will have an impact on increasing the sales volume of SMEs products(Ndruru & Riandari, 2019).

2. DISCUSSION

2.1. Decision Support System (DSS)

Decision Support System (DSS) is a system that manages data and solves unstructured problems. In one's intellectual abilities combined with computer skills to help improve the quality of decision making so that the desired goals are achieved(Konstantinos et al., 2019). The process of choosing the best alternative from several alternatives that are used to solve problems by utilizing a particular system(Konstantopoulou et al., 2019).

2.2. Analytical Hierarchy Process (AHP)

AHP is a model for solving complex unstructured situations and the components interact with each other by measuring the impact of system errors on their components(Widianta et al., 2018). The existence of a hierarchy makes it possible to break down complex or unstructured problems into problem sections, and then organize them into a hierarchical form(Ignatius et al., 2018). Several basics must be understood in solving problems using the AHP method, including:

2.2.1.Decomposition

Decomposition is defining a problem that is used to break down a large problem and simplifying the problem into smaller problems which are then described in a hierarchical form(Sugiartawan & Hartati, 2018). The AHP Hierarchy Structure for a system as a whole from decomposition which consists of criteria for assessing existing alternatives and determining these alternatives(Listyaningsih & Utami, 2018). The definition of the problem by breaking down all the problems into the form of the AHP hierarchical structure is shown in Figure 1.

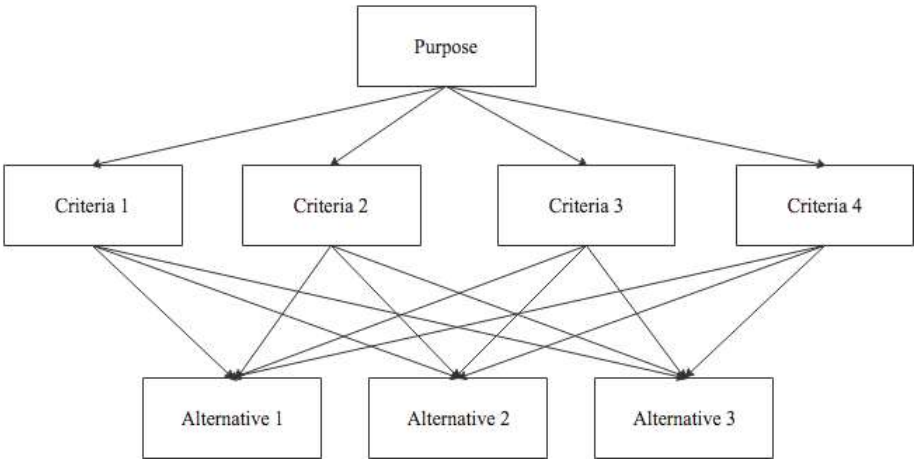

Figure 1: AHP Structure

2.2.2. Comparative Judgement

Comparative judgement based on pairwise comparisons by comparing several paired elements with established criteria to make judgments about the relative importance of more than two elements(Pun et al., 2017). The basis for using the AHP method refers to the AHP procedure shown in Table 1.

Table 1: Rating For Pairwise Comparison

Level of Importance	Description
1	Just as important as the others
3	A little more important than others
5	Quite important compared to others
7	Very important compared to others
9	One element is shown to be absolutely preferable to its partner, at the highest confidence
2, 4, 6, 8	Given when there is doubt about the assessment between two adjacent levels of importance

2.2.3. Consistency

A decision maker can find out how important its consistency is, from this study it does not want a decision based on low consistency. The following calculates CI and CR with the formula:

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

To assess the results of consistency by calculating based on the maximum eigenvalue. From the maximum eigenvalues will represent the local priority vector benchmarks for all criteria.

$$CR = \frac{CI}{RI} \quad (2)$$

RI is the matrix consistency index of n randomly generated pairs. The values calculated from the random indices are presented in Table 2.

Table 2: Random Consistency Index List

Number of Elements	Random Consistency Index
1,2	0.00
3	0.58
4	0.90
5	1.12
6	1.24
7	1.32
8	1.41
9	1.45
10	1.49
11	1.51
12	1.48
13	1.56
14	1.57
15	1.59

2.3. Data Analysis

In this study, criteria and alternative choices were used following those formulated in the background of the problem above. While the data used is data obtained from the results of questionnaires distributed to respondents(Gümüs & Kütahyali, 2017). The criteria and alternatives used are presented in Table 3.

Table 3: Criteria and Alternatives

Criteria	Alternative
Advertising Cost	Social media
	Print media
	Televisi
	Television
	Product Collaboration
Target Market	Social media
	Print media
	Televisi
	Television
	Product Collaboration
Time For Promotion	Social media
	Print media
	Televisi
	Television
	Product Collaboration
Product Identity	Social media
	Print media
	Televisi
	Television
	Product Collaboration

From the criteria and alternatives above, a questionnaire was made to make it easier to obtain the data needed in this study to produce information for SMEs actors in increasing the sales volume of their products.

2.4. Hierarchical Structure

Based on the criteria and alternatives that have been determined, a hierarchical structure is drawn up to facilitate the data processing process. The process of compiling the hierarchy is an important step to prevent errors that have an impact on the inconsistency of research results, for that a hierarchical structure is made that describes the objectives to be achieved in this study(Kropivšek et al., 2021). The hierarchy created based on the criteria and alternatives that have been determined in this study can be seen in Figure 4.

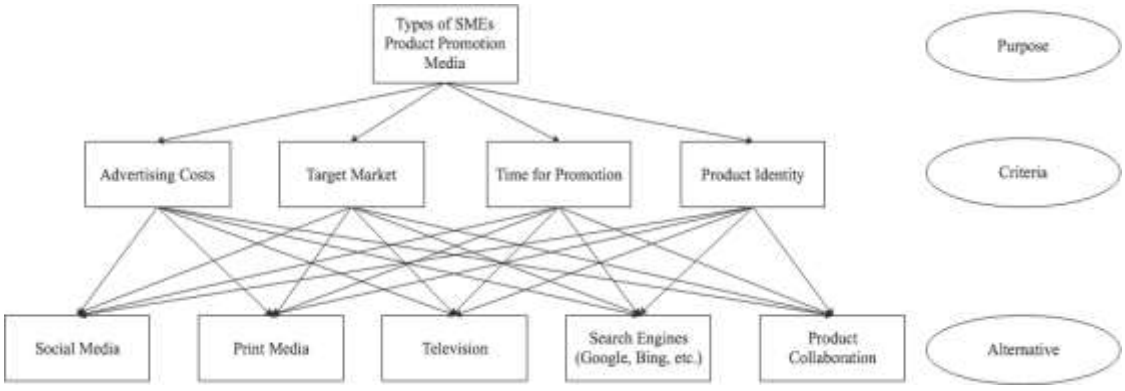

Figure 4: Hierarchical Structure

2.5. AHP SMEs Applications

The AHP SMEs application is a desktop-based application with a Windows operating system. The AHP SMEs application can be installed on a laptop or PC device with a 32-bit or 64-bit Windows operating system. The display of the form for the AHP SMEs Application section is as follows:

2.5.1. Criteria Form

The following is the appearance of the Criteria Form for inputting the criteria determined by SMEs users in Figure 5. The Criteria Form below is as follows:

Figure 5: Criteria Form

2.5.2. Sub-Criteria Form

The following is the appearance of the Sub-Criteria Form to input the sub-criteria determined by SMEs users in Figure 6. The Sub-Criteria Form below is as follows:

Figure 6: Sub-Criteria Form

2.5.3. Alternative Form

The following is the appearance of the Alternative Form for inputting alternatives determined by SMEs users in Figure 7. The Alternative Form below is as follows:

Figure 7: Alternative Form

2.5.4. Alternative Assessment Form

The following is the display of the Alternative Assessment Form for inputting the alternative values determined by SMEs users in Figure 8. The Alternative Assessment Form below is as follows:

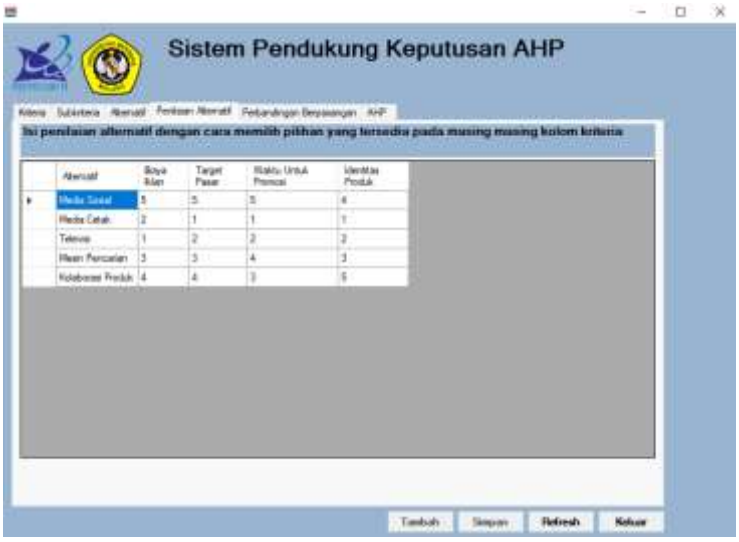

Figure 8: Alternative Assessment Form

2.5.5. Criteria Set Form

The following is the appearance of the Criteria Set Form for inputting the criteria values determined by SMEs users in Figure 9. The Criteria Set Form below is as follows:

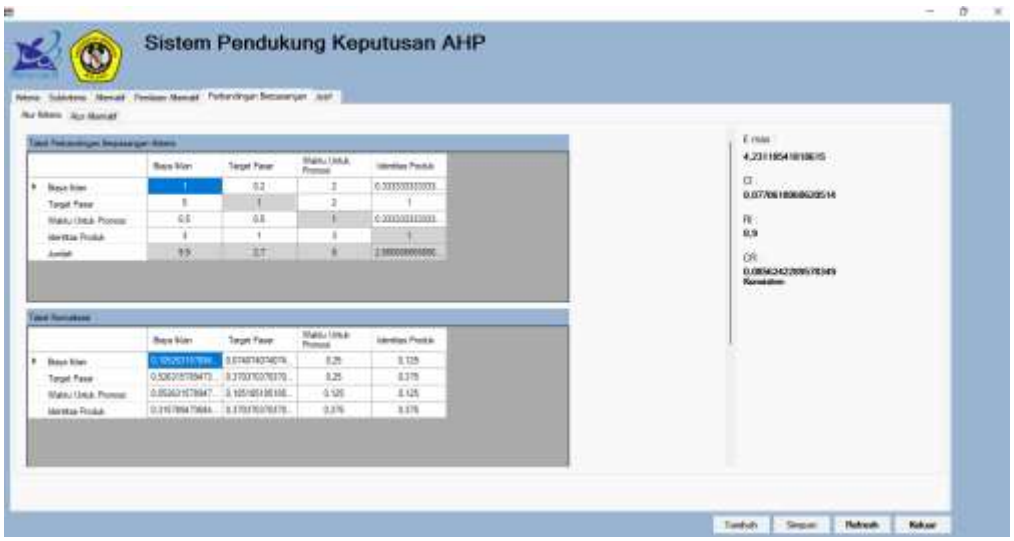

Figure 9: Criteria Set Form

2.5.6. Alternative Arrange Form

The following is the display of the Alternative Arrangement Form for inputting alternative values determined by SMEs users in Figure 10. The Alternative Arrangement Form is as follows:

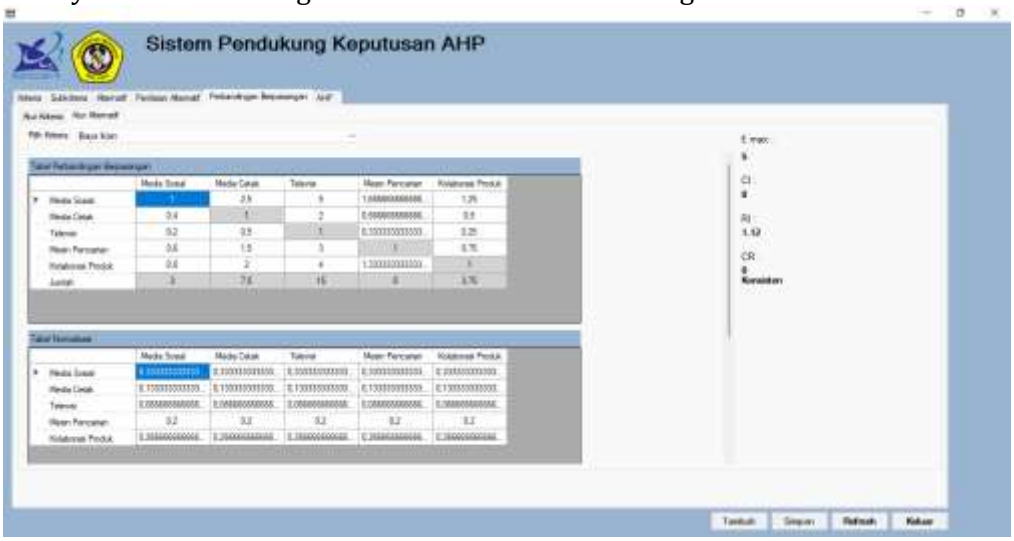

Figure 10: Alternative Arrange Form

2.5.7. AHP Ranking Form

The following is the display of the AHP Ranking Form to check the ranking of which alternatives have the highest average results determined by SMEs users in Figure 11. The AHP Ranking Form is below as follows:

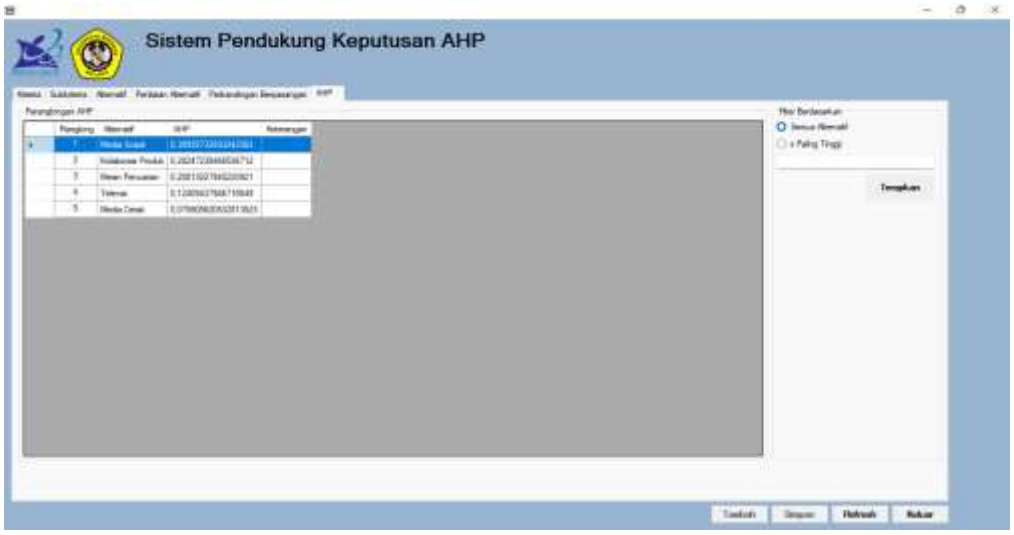

Figure 11: AHP Ranking Form

3. CONCLUSION

This research can be concluded that alternative social media is a priority criterion in increasing the volume of SMEs with an average value of 0.309397, alternative collaboration products with an average value of 0.282472, alternative search engines with an average value of 0.208130, alternative television with an average value of 0.124094, and the last priority is alternative print media with an average value of 0.075905. Based on the results of the overall average score that alternative social media can expand the market with various promotions using social media such as WhatsApp Business, Instagram, Facebook, Youtube and others to increase the sales volume of SME products in Indonesia.

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