

ANALYSIS OF WEBSITE AND EXCEL-BASED PROMOTIONAL MEDIA DETERMINATION

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ABSTRACT

The development of information technology now has a positive impact on increasing the use of social media which can facilitate all the activities of SMEs in Indonesia to carry out the stages of marketing and promoting the products produced. SME business actors can use information technology in various fields including procurement of raw materials, and production processes to create a marketplace. Currently, the use of technology has been widely used in terms of marketing and product promotion. 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 the related SME actors. Based on the results of the overall average weight of the Website-based and Excel-based AHP SMEs Application, it can be concluded that for calculating the AHP method using the Website-based AHP SMEs Application using a laptop, mobile phone and tablet device accessed on a web browser, it will be easier to use, effective and accurate for the ranking and reporting results obtained instead of using Excel, the prioritized alternative from the Website and Excel-based AHP SMEs Application is social media to expand the market, increase promotions with various social media applications to increase product sales of SMEs actors in Indonesia.

Keywords: AHP, Media Promotion, SMEs, Website, Excel

1. INTRODUCTION

The development of information technology today has a positive impact on increasing the use of social media which can facilitate all the activities of SMEs in Indonesia to carry out the stages of marketing and promoting the products produced (Marisa et al., 2022). SME business actors can use information technology in various fields including the procurement of raw materials, and production processes to create a marketplace (Subiyantoro et al., 2022). Currently, the use of technology has been widely used in terms of product marketing and promotion (Ekawati, 2021). SMEs in Indonesia can market and communicate with customers through various media such as social media, websites, and the internet (Jatmika & Andarwati, 2021).

Based on Law no. 20 of 2008 concerning SMEs, namely making all guidelines towards changing the paradigm of SME empowerment (Subiyantoro et al., 2021). According to data from the Central Statistics Agency of Malang City, the quantity of SMEs in Malang City has increased by 156 units and has increased to 1113 units in 2018 (Kurniawati & Ahmad, 2021). The priority of SME actors is to increase the sales volume produced by their products by marketing the product (Amrullah et al., 2021). This is the main goal for SME actors because without marketing the goods produced there will be no use (Noviyanti, 2019). A promotional strategy is considered successful if it can maximize sales volume which will provide long-term benefits to the business being run (Nurdiyanto & Meilia, 2016).

So, to do business, SMEs need an effective marketing strategy to win a competitive advantage over other SMEs in producing goods and services because the threat of competitors requires SMEs to always be vigilant and must be able to seize opportunities and create opportunities that exist (Wardana & Andarwati, 2021). So it is necessary to select the most effective marketing strategy for SMEs actors using the Analytical Hierarchy Process (AHP) method which is one part of the decision-making system on how to choose the right promotional media for SMEs product promotion (Agesta Nurmaida et al., 2019).

Therefore, this study shows which criteria are important in determining promotional media for SME actors. This study aims to analyze the comparison of determining promotional media for SME actors using the Website and Excel-based AHP method in making decisions and using which alternative best suits their needs, to facilitate marketing which will have an impact on increasing SMEs product sales (Marisa et al., 2020).

2. DISCUSSION

2.1. Analytical Hierarchy Process (AHP)

AHP is a functional hierarchy to solve problems involving variables, criteria, and alternatives, some of which are qualitative (Sumirah et al., 2018). AHP is used to rank using criteria, weights, and alternatives that have been determined by SME actors (Larasati & Marisa, 2019). Has the advantage of making a decision-making system process that can be described graphically so that it is easily understood by the parties involved in making the decision (Putri & Mahendra, 2019). The basis for using the AHP method must refer to a measurable hierarchical rating scale shown in Table 1 below.

Table 1: Hierarchical Rating Scale

Intensity Interest	Explanation
1	Both elements have the same effect
3	The category is being compared with other interests
5	More categories than other interests
7	Strong category compared to other interests
9	The interests of one extreme are stronger than the other interests

2.2. Consistency

In using the AHP method, SME actors must know how well the consistency of the important things in the Consistency Index (CI) (Pradipta & Diana, 2017). The following is to calculate the Consistency Index (CI) with the formula below.

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

Where:

n = many elements used

The maximum eigenvalues of the pairwise comparison matrix represent the local priority vector benchmarks for all criteria determined by SME actors (Nurdiyanto & Meilia, 2016). The following calculates the Consistency ratio (CR) with the formula below.

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

Where:

CR = Consistency Ratio

CI = Consistency Index

RI = Random Consistency Index

2.3. Data Analysis

In this comparative analysis research on the determination of promotional media using the Website and Excel-based AHP method, criteria and choices are used according to what has been formulated in the background of the problem above. (Agesta Nurmaida et al., 2019). The data collection used is data obtained from the results of questionnaires distributed to respondents of SME actors (Azhar et al., 2018). The criteria and alternatives used can be seen in Table 2 below.

Table 2: Criteria and Alternatives

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

2.4. Hierarchical Structure

The decision hierarchy uses several supporting elements following the Objective elements, Criteria elements, and Alternative elements that have been made in this study that have been designed. The following decision hierarchy can be seen according to Figure 1 below.

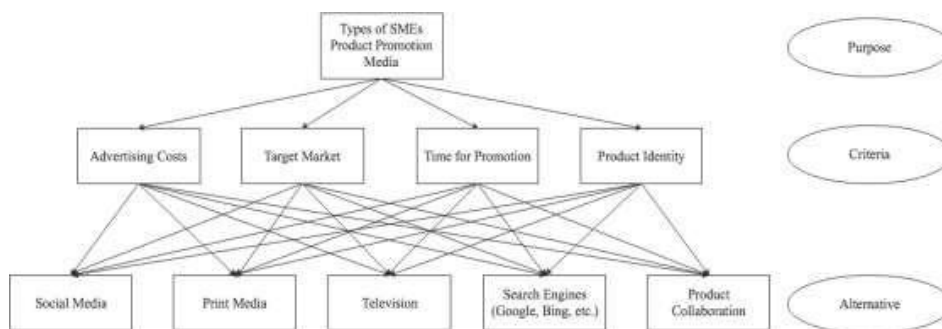


Figure 1: Decision Hierarchy

2.5. AHP SMES Website Application

The SME AHP application is a website-based application created with the PHP programming language and Frontend using HTML and CSS then the database uses the MySQL database. The AHP SMEs application can be accessed using laptop, tablet, and mobile devices via a browser application on their respective devices. The following is a form for the Website-based AHP SMEs Application section:

2.6. Homepage

The following is the display of the SME AHP Application to see the graph of the alternative used, see the AHP preference value, see the AHP criteria and see the Alternative Media according to Figure 2 below.

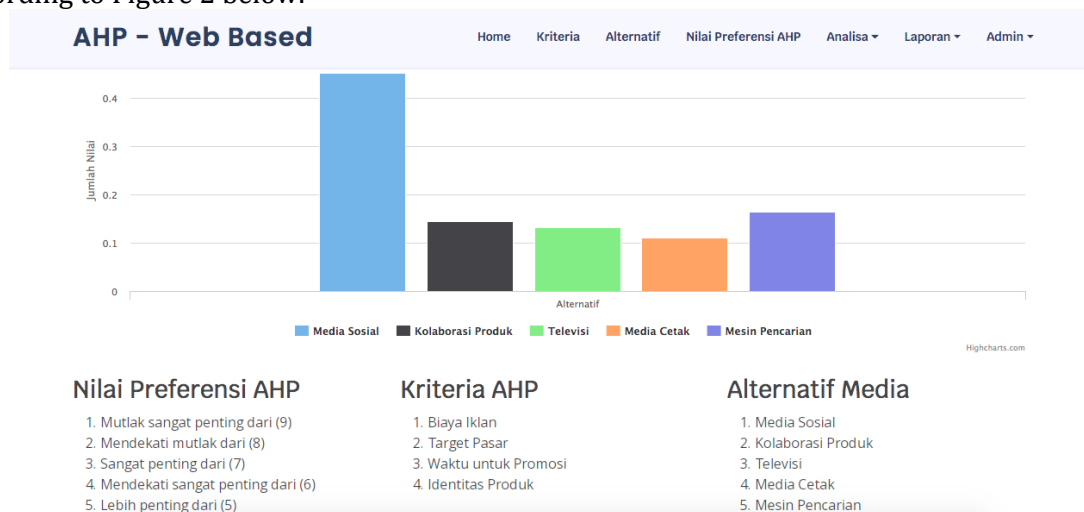


Figure 2: Home Page View

2.7. Criteria Data

The following is the display of the Criteria Data for inputting the name of the criteria determined by SME actors according to Figure 3 below.

AHP - Web Based

Home Kriteria Alternatif Nilai Preferensi AHP Analisa Laporan Admin

Data Kriteria

Hapus Centang Tambah Data

Show 10 entries Search:

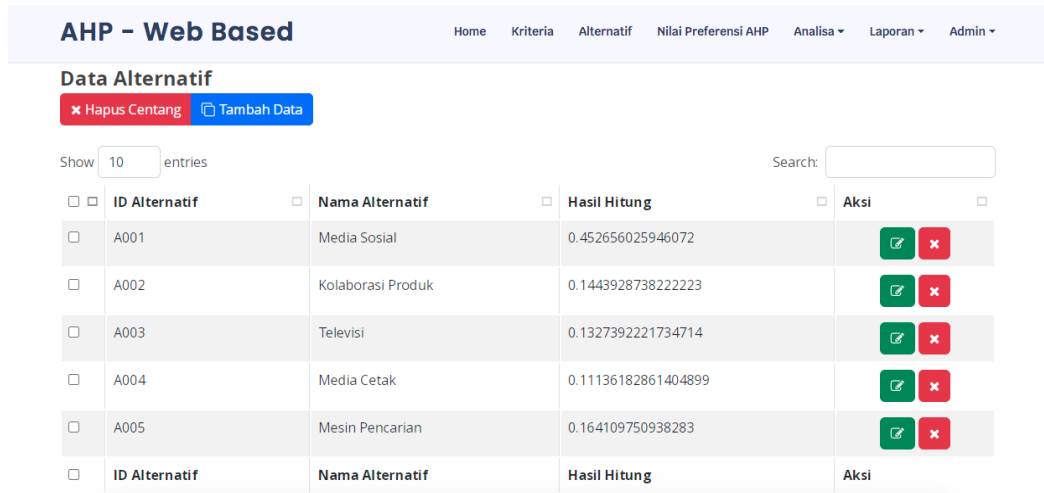
ID Kriteria	Nama Kriteria	Bobot Kriteria	Aksi
C1	Biaya Iklan	0.620232558139535	<input type="checkbox"/> <input type="checkbox"/>
C2	Target Pasar	0.17356589147286827	<input type="checkbox"/> <input type="checkbox"/>
C3	Waktu untuk Promosi	0.14891472868217048	<input type="checkbox"/> <input type="checkbox"/>
C4	Identitas Produk	0.05728682170542625	<input type="checkbox"/> <input type="checkbox"/>
ID Kriteria	Nama Kriteria	Bobot Kriteria	Aksi

Showing 1 to 4 of 4 entries Previous Next

Figure 3: Criteria Data Display

2.8. Alternative Data

The following is the Alternative Data display for inputting alternative names determined by SME actors according to Figure 6 below.



AHP - Web Based Home Kriteria Alternatif Nilai Preferensi AHP Analisa ▾ Laporan ▾ Admin ▾

Data Alternatif
 ✖ Hapus Centang ➕ Tambah Data

Show entries Search:











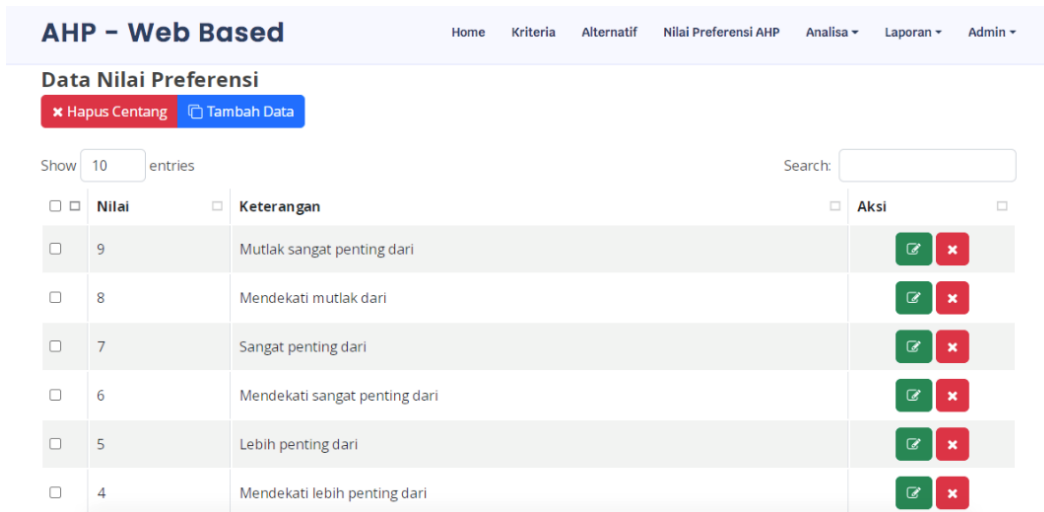
<input type="checkbox"/>	ID Alternatif	<input type="checkbox"/>	Nama Alternatif	<input type="checkbox"/>	Hasil Hitung	<input type="checkbox"/>	Aksi	<input type="checkbox"/>
<input type="checkbox"/>	A001		Media Sosial		0.452656025946072		 	
<input type="checkbox"/>	A002		Kolaborasi Produk		0.1443928738222223		 	
<input type="checkbox"/>	A003		Televisi		0.1327392221734714		 	
<input type="checkbox"/>	A004		Media Cetak		0.11136182861404899		 	
<input type="checkbox"/>	A005		Mesin Pencarian		0.164109750938283		 	
<input type="checkbox"/>	ID Alternatif		Nama Alternatif		Hasil Hitung		Aksi	<input type="checkbox"/>

Figure 4: Alternative Data View

2.9. Preference Value Data

The following is a display of Preference Value Data to input the preference value of the AHP method determined by SME actors according to Figure 5 below.



AHP - Web Based Home Kriteria Alternatif Nilai Preferensi AHP Analisa ▾ Laporan ▾ Admin ▾

Data Nilai Preferensi
 ✖ Hapus Centang ➕ Tambah Data

Show entries Search:













<input type="checkbox"/>	Nilai	<input type="checkbox"/>	Keterangan	<input type="checkbox"/>	Aksi	<input type="checkbox"/>
<input type="checkbox"/>	9		Mutlak sangat penting dari		 	
<input type="checkbox"/>	8		Mendekati mutlak dari		 	
<input type="checkbox"/>	7		Sangat penting dari		 	
<input type="checkbox"/>	6		Mendekati sangat penting dari		 	
<input type="checkbox"/>	5		Lebih penting dari		 	
<input type="checkbox"/>	4		Mendekati lebih penting dari		 	

Figure 5: Preference Value Data Display

2.10. Criteria Analysis

The following is the appearance of the Criteria Analysis for inputting the criteria values determined by SME actors according to Figure 6 below.

AHP - Web Based [Home](#) [Kriteria](#) [Alternatif](#) [Nilai Preferensi AHP](#) [Analisa](#) [Laporan](#) [Admin](#)

[Beranda](#) / [Analisa Kriteria](#) / [Tabel Analisa Kriteria](#)

Analisa Kriteria

Kriteria Pertama	Pernilaian*	Kriteria Kedua
Biaya Iklan	9 - Mutlak sangat penting dari	Target Pasar
Biaya Iklan	9 - Mutlak sangat penting dari	Waktu untuk Promosi
Biaya Iklan	9 - Mutlak sangat penting dari	Identitas Produk
Target Pasar	9 - Mutlak sangat penting dari	Waktu untuk Promosi
Target Pasar	9 - Mutlak sangat penting dari	Identitas Produk
Waktu untuk Promosi	9 - Mutlak sangat penting dari	Identitas Produk

*Rubah nilai sesuai dengan keinginan atau hasil survey

[Selanjutnya](#)

Criteria Comparison Figure 6: Criteria Analysis Display

The following is a comparison of criteria displayed to check the comparison of criteria that have been inputted or determined by SME actors according to Figure 7 below.

Figure 7: Criteria Comparison View

AHP - Web Based [Home](#) [Kriteria](#) [Alternatif](#) [Nilai Preferensi AHP](#) [Analisa](#) [Laporan](#) [Admin](#)

Perbandingan Kriteria

[Ulangi Penghitungan Kriteria](#)

Antar Kriteria	Biaya Iklan	Target Pasar	Waktu untuk Promosi	Identitas Produk
Biaya Iklan	1	9.0000	9.0000	9.0000
Target Pasar	0.1111	1	9.0000	9.0000
Waktu untuk Promosi	0.1111	0.1111	1	9.0000
Identitas Produk	0.1111	0.1111	0.1111	1
Jumlah	1.3333	10.2222	19.1111	28.0000

Perbandingan	Biaya Iklan	Target Pasar	Waktu untuk Promosi	Identitas Produk	Jumlah	Prioritas
Biaya Iklan	0.7500	0.8804	0.4709	0.3214	2.4228	0.6057
Target Pasar	0.0833	0.0978	0.4709	0.3214	0.9735	0.2434
Waktu untuk Promosi	0.0833	0.0109	0.0523	0.3214	0.4680	0.1170

2.11. Alternative Analysis

The following is an alternative analysis display for inputting alternative values determined by SME actors according to Figure 8 below.

AHP - Web Based Home Kriteria Alternatif Nilai Preferensi AHP Analisa ▾ Laporan ▾ Admin ▾

Analisa Alternatif

Pilih Kriteria*

Kriteria Pertama	Pernilaian**	Kriteria Kedua
Media Sosial	9 - Mutlak sangat penting dari	Kolaborasi Produk
Media Sosial	9 - Mutlak sangat penting dari	Televisi
Media Sosial	9 - Mutlak sangat penting dari	Media Cetak
Media Sosial	9 - Mutlak sangat penting dari	Mesin Pencarian
Kolaborasi Produk	9 - Mutlak sangat penting dari	Televisi
Kolaborasi Produk	9 - Mutlak sangat penting dari	Media Cetak
Kolaborasi Produk	9 - Mutlak sangat penting dari	Mesin Pencarian
Televisi	9 - Mutlak sangat penting dari	Media Cetak
Televisi	9 - Mutlak sangat penting dari	Mesin Pencarian
Media Cetak	9 - Mutlak sangat penting dari	Mesin Pencarian

Figure 8: Alternative Analysis View

2.12. Alternatives According to Criteria

The following is an Alternative by Criteria display to check the comparison of alternatives that have been inputted or determined by SME actors according to Figure 9 below.

AHP - Web Based Home Kriteria Alternatif Nilai Preferensi AHP Analisa ▾ Laporan ▾ Admin ▾

Alternatif Menurut Kriteria

Hapus Semua Data

Biaya Iklan	Media Sosial	Kolaborasi Produk	Televisi	Media Cetak	Mesin Pencarian
Media Sosial	1	9.0000	9.0000	9.0000	9.0000
Kolaborasi Produk	0.1111	1	9.0000	9.0000	9.0000
Televisi	0.1111	0.1111	1	9.0000	9.0000
Media Cetak	0.1111	0.1111	0.1111	1	9.0000
Mesin Pencarian	0.1111	0.1111	0.1111	0.1111	1
Jumlah	1.4444	10.3333	19.2222	28.1111	37.0000

Perbandingan	Media Sosial	Kolaborasi Produk	Televisi	Media Cetak	Mesin Pencarian	Prioritas
Media Sosial	0.6923	0.8710	0.4682	0.3202	0.2432	0.4525
Kolaborasi Produk	0.0769	0.0968	0.4682	0.3202	0.2432	0.1505

Figure 9: Alternative Views By Criteria

2.13. Data Weight

The following is the display of the Weight Data to check the weight values that have been inputted, the criteria values, and alternative values determined by SME actors according to Figure 10 below.

Data Bobot

Alternatif	Kriteria			
	Biaya Iklan	Target Pasar	Waktu untuk Promosi	Identitas Produk
	0.6057	0.2434	0.1170	0.0339
Media Sosial	0.4525	0.4525	0.4525	0.3978
Kolaborasi Produk	0.1505	0.1505	0.1505	0.1585
Televisi	0.1287	0.1287	0.1287	0.1047
Media Cetak	0.1135	0.1135	0.1135	0.1827
Mesin Pencarian	0.1547	0.1547	0.1547	0.2482

Figure 10: Weight Data Display

2.14. Final Result

The following is the display of the Final Results to check the final result value from the average results of the criteria and alternative values determined by SME actors according to Figure 11 below.

Hasil Akhir

Alternatif	Kriteria				Hasil Akhir
	Biaya Iklan	Target Pasar	Waktu untuk Promosi	Identitas Produk	
Media Sosial	0.2741	0.1101	0.0529	0.0135	0.4506
Kolaborasi Produk	0.0912	0.0366	0.0176	0.0054	0.1508
Televisi	0.0780	0.0313	0.0151	0.0036	0.1279
Media Cetak	0.0688	0.0276	0.0133	0.0062	0.1159
Mesin Pencarian	0.0937	0.0377	0.0181	0.0084	0.1579

Figure 11: Final Result Display

2.15. Ranking Results

The following is the final result display to check the final result value from the average criteria and alternative values determined by SME actors according to Figure 12 below.

AHP - Web Based					
Home	Kriteria	Alternatif	Nilai Preferensi AHP	Analisa ▾	Laporan ▾
mesin Pencarian	0.0957	0.0377	0.0181	0.0084	0.1579

Hasil Perankingan

ID	Nama	Hasil Akhir	Ranking
A001	Media Sosial	0.4506	1
A005	Mesin Pencarian	0.1579	2
A002	Kolaborasi Produk	0.1508	3
A003	Televisi	0.1279	4
A004	Media Cetak	0.1159	5

Figure 12: Ranking Results Display

2.16.. AHP Data Processing in Excel

After doing calculations manually from the results of processing questionnaire data from SMEs actors then it is used as a comparison matrix, below are the results of data management using Excel as follows:

Table 3: Criteria Data

	Advertising Cost	Target Market	Time For Promotion	Product Identity
Advertising Cost	1,00	0,20	2,00	0,33
Target Market	5,00	1,00	2,00	1,00
Time For Promotion	0,50	0,50	1,00	0,33
Product Identity	3,00	1,00	3,00	1,00
Total	9,50	2,70	8,00	2,67

Table 3 shows the criteria data for each of the respective criteria determined by SME actors.

Table 4: Criteria Data Weight

	Advertising Cost	Target Market	Time For Promotion	Product Identity	Weight
Advertising Cost	0,11	0,07	0,25	0,13	0,138584
Target Market	0,53	0,37	0,25	0,38	0,380422
Time For Promotion	0,05	0,19	0,13	0,13	0,121954
Product Identity	0,32	0,37	0,38	0,38	0,359040

Table 4 shows the results of the weighting of the criteria data from the calculation of each criterion, which will later be added up to the total for each of the criteria determined by the SME actors.

Table 5: Advertising Cost Alternative Data

Advertising Cost	Social Media	Print Media	Television	Search Engine	Product Collaboration	Weight
Social Media	0,28	0,23	0,35	0,26	0,29	0,282670

Print Media	0,09	0,08	0,02	0,13	0,07	0,079483
Television	0,06	0,23	0,07	0,09	0,06	0,100414
Search Engine	0,28	0,15	0,21	0,26	0,29	0,239378
Product Collaboration	0,28	0,31	0,35	0,26	0,29	0,298055

Table 5 shows the results of alternative data on advertising costs. From this calculation, each alternative advertising cost is then divided by the total of each alternative advertising cost. Later, it will be averaged on the alternative weights of advertising costs determined by SME actors.

Table 6: Target Market Alternative Data

Target Market	Social Media	Print Media	Television	Search Engine	Product Collaboration	Weight
Social Media	0,24	0,25	0,27	0,57	0,15	0,297811
Print Media	0,08	0,08	0,05	0,07	0,10	0,076370
Television	0,12	0,25	0,14	0,07	0,15	0,146048
Search Engine	0,06	0,17	0,27	0,14	0,30	0,188695
Product Collaboration	0,49	0,25	0,27	0,14	0,30	0,291076

Table 6 shows the results of alternative target market data from the calculation of each alternative target market. Then, it is divided by the total of each alternative target market respectively. Later, it will be averaged on the alternative weights of the target market determined by SME actors.

Table 7: Alternative Data Time For Promotion

Time For Promotion	Social Media	Print Media	Television	Search Engine	Product Collaboration	Weight
Social Media	0,20	0,33	0,29	0,09	0,25	0,231991
Print Media	0,10	0,17	0,14	0,18	0,25	0,168268
Television	0,10	0,17	0,14	0,18	0,13	0,143268
Search Engine	0,40	0,17	0,14	0,18	0,13	0,203268
Product Collaboration	0,20	0,17	0,29	0,36	0,25	0,253203

Table 7 shows the results of the alternative time data for promotion from the calculation of each alternative time for each promotion. Then, it is divided by the total of each alternative time for each promotion. Later, it will be averaged at the alternative weights of time for promotions determined by SME actors.

Table 8: Product Identity Alternative Data

Time For Promotion	Social Media	Print Media	Television	Search Engine	Product Collaboration	Weight
Social Media	0,24	0,31	0,33	0,57	0,28	0,346643
Print Media	0,06	0,08	0,08	0,05	0,03	0,060717
Television	0,12	0,15	0,17	0,10	0,28	0,162812
Search Engine	0,08	0,31	0,33	0,19	0,28	0,237799
Product Collaboration	0,49	0,15	0,08	0,10	0,14	0,192029

Table 8 shows the results of alternative product identity data from the calculation of each alternative product identity. Then, it is divided by the total of each alternative identity of each product. Later, it will be averaged on the alternative weights of product identities determined by SME actors.

Table 9: Average Amount

	Advertising Cost	Target Market	Time For Promotion	Product Identity	Average	Rating
Social Media	0,282669989	0,297810761	0,231991342	0,346642848	0,276444875	1
Print Media	0,079483413	0,076369821	0,168268398	0,060716541	0,109485505	5
Television	0,100413596	0,146048237	0,143268398	0,162812393	0,141139426	4
Search Engine	0,239378397	0,188695114	0,203268398	0,237799311	0,205542832	3
Product Collaboration	0,298054605	0,291076067	0,253203463	0,192028907	0,267387363	2

Table 9 shows the results of the overall average number of AHP results on the type of promotion media for SME products, the first order is social media. Then the second order is product collaboration, the third is search engines, the fourth is the television and the last is print media in data processing using the AHP method in Excel.

4. CONCLUSION

Based on the results of the analysis of the AHP method in this study, it can be concluded that alternative social media is a priority criterion in increasing the sales volume of SMEs actors who use the Website-Based AHP SMEs Application by getting an average weight value of 0.4506, alternative search engines with an average weight value - 0.1579, product collaboration alternatives with an average weight value of 0.1508, television alternatives with an average weight value of 0.1279, and the last priority is print media alternatives with an average weight value of 0.1159. For the SMEs AHP Application using Excel, social media alternatives are prioritized criteria by getting an average weight of 0.276444875, product collaboration alternatives with an average weight value of 0.267387363, alternative search engines with an average weight value of 0.205542832, alternative television with an average weight value of 0.141139426, and the last priorities are alternative print media with an average weight value of 0.109485505. Based on the results of the overall average weight of the Website-based and Excel-based AHP SMEs Application, it can be concluded that for calculating the AHP method using the Website-based AHP SMEs Application using a laptop, mobile phone and tablet device accessed on a web browser, it will be easier to use, effective and accurate for the ranking and reporting results obtained instead of using Excel, the prioritized alternative from the Website and Excel-based AHP SMEs Application is social media to expand the market, increase promotions with various social media applications to increase product sales of SMEs actors in Indonesia.

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