

Analysis of Promotional Media Selection Based on Modified Analytical Hierarchy Process to Increase Halal Products Sales Volume

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ABSTRACT

This study identified promotional media that used Analytical Hierarchy Process (AHP) in previous experiments. The data collection process used to carry out this study presented considerable challenges. This was due to the extensive questionnaire data obtained from MSMEs in halal products. Therefore, a binary rating system was employed to simplify the questionnaire, with 1 and 0 assigned to consideration and contempt, respectively. The EPIC model, which contained four distinct dimensions, was used to produce valuable indicators and allowed measurements within each EPIC dimension. The main focus of this study was the development of AHP modifications that are showed in the calculation of pairwise comparison matrices. The data collection process was much easier and faster because the questionnaire was simple and only took less than 2 minutes. The result showed that social media can effectively substitute traditional advertising in the scenarios mentioned. The most popular alternative for promotion for MSMEs is social media (36%), followed by search engines (30%) and products collaboration (13%).

Abstrak: Menemukan media promosi yang menggunakan AHP pada percobaan sebelumnya adalah tujuan yang diinginkan dari penelitian ini, namun pengumpulan data terbukti cukup sulit bagi peneliti. Hal ini karena isu penelitian, UMKM produk halal menuntut volume data kuesioner yang berlebihan. Peneliti juga berusaha menyederhanakan kuesioner dengan menunjuk pertimbangan dan penghinaan masing-masing dengan angka 1 dan 0. Karena model EPIC berisi empat dimensi berbeda, model ini digunakan untuk menghasilkan indikasi. Ini menyiratkan bahwa pengukuran juga dapat dilakukan di setiap dimensi EPIC. Pengembangan modifikasi AHP yang didemonstrasikan dalam perhitungan matriks perbandingan berpasangan menjadi fokus utama penelitian ini. Dalam penelitian ini, pengumpulan data jauh lebih mudah dan cepat. Hal ini disebabkan bentuk kuesioner yang sederhana dan hanya membutuhkan waktu kurang dari 2 menit. Media sosial dapat digunakan sebagai pengganti iklan tradisional dalam skenario yang disebutkan. Alternatif promosi UMKM yang paling banyak diminati adalah media sosial (36%). Mesin pencari dan kolaborasi produk (30% dan 13%) adalah media promosi pengganti berikutnya untuk meningkatkan UMKM dalam produk halal.

Kata kunci: media promosi, modifikasi proses hirarki analitik, UMKM, produk halal

INTRODUCTION

Several factors, such as business conditions, environment, facilities, infrastructure, and technology are responsible for the increasing number of SMEs in Indonesia.¹ The use of technology plays a significant role across various aspects of SME operations, including the procurement of raw materials, production process, marketing, and promotion of products.² Currently, technology is an integral aspect of marketing and products promotion, particularly in the creative industry.³ SMEs tend to leverage multiple digital channels such as print, and social media, television, websites, and the internet⁴, to trigger consumer motivation and drive sales⁵. In order to foster the growth of SMEs, it is essential to embrace and capitalize on technological advancements. This would enable SMEs to tap into vast market opportunities, streamline operations, and achieve greater global competitiveness.

Government Regulation No. 31 of 2019, concerning the Implementation of Law No. 33 of 2014, specifically addresses halal product guarantees in Article 25. According to this regulation, business actors who obtain halal certificates must include halal labels on certified products. This requirement is mandatory for food and beverage products sold within Indonesian territory. The possession of halal certificates holds significant importance for business actors as it plays a pivotal role in entrepreneurship development and empowerment⁶. The success or failure of products marketed in the country is contingent on having halal certificate, making it a fundamental requirement. The significance of halal certification extends beyond the Muslim population in Indonesia. In addition to the majority of the Indonesian population being Muslim, non-

¹ Kusriani, Novira, and Maswadi. 2021. "The Performance Improvement of Sustainable Palm Oil Supply Chain Management after COVID-19: Priority Indicators Using F-AHP." *Uncertain Supply Chain Management* 9(2):227-36. doi: 10.5267/j.uscm.2021.3.010

² Kropivšek, Jože, Petra Groselj, Leon Oblak, and Matej Jošt. 2021. "A Comprehensive Evaluation Model for Wood Companies Websites Based on the AHP/r-Topsis Method." *Forests* 12(6):1-24. doi: 10.3390/f12060706

³ Marisa, Fitri, Sharifah Sakinah, Syed Ahmad, and Zeratul Izzah Mohd. 2020. "Analysis of Relationship CLV with 8 Core Drives Using Clustering K-Means and Octalysis Gamification Framework." *Journal of Theoretical and Applied Information Technology* 98(20):3151-64

⁴ Pérez Vergara, Ileana Gloria, María Camila López Gómez, Igor Lopes Martínez, and Jesús Vargas Hernández. 2021. "Strategies for the Preservation of Service Levels in the Inventory Management During COVID-19: A Case Study in a Company of Biosafety Products." *Global Journal of Flexible Systems Management* 22(June):65-80. doi: 10.1007/s40171-021-00271-z.

⁵ Marisa, Fitri, et al. "Analysis of Relationship..."

⁶ Kusumastuti, Ratih Dyah. 2017. "Awareness of Halal Certification of Micro and Small Enterprises in Jakarta." *International Journal of Economics & Management* 11

Muslim residents and even consumers from other countries also seek and consume halal food and drinks.⁷

Indonesia, as one of the countries with the largest Muslim population in the world, places great importance on halal certification for MSMEs products. Without proper certification, consumers, particularly Muslims, would doubt the authenticity of products, thereby leading to a negative impact on their purchase intention.⁸ Islamic dietary laws require Muslims to consume only halal food and drinks, as stated in Al-Baqarah and Al-Maidah verses 168 and /5:88 of the Qur'an, respectively. Halal certification is relevant for MSMEs to gain the trust and confidence of Muslim consumers and ensure their products meet the required halal standards.

Halal means permissible and unrestricted events in accordance with Islamic principles, with specific provisions prohibiting certain actions. It is important to adhere to Islamic teachings in halal food and beverage products. These products must not contain pig-derived ingredients and should avoid forbidden substances. Additionally, sourcing ingredients must adhere to Islamic procedures for animal slaughter. In order to maintain their halal status, storage and transportation facilities used for these products must remain entirely separate from those handling non-halal goods or pigs. All food and drinks should be completely free from khamr, which refers to intoxicating or alcoholic substances.⁹ In essence, halal food and beverage products are meticulously crafted to align with Islamic guidelines, ensuring these edibles are entirely free from prohibited elements and comply with the principles of permissible consumption as laid out in Islamic teachings.

Law No. 20 of 2008 concerning SMEs was enacted to revolutionize the empowerment of small and medium-sized enterprises. Article 16 (3) specifically outlines the Procedures for SME Development. According to data provided by the Central Statistics Agency of Malang City, the number of SMEs in this area has significantly increased from 156 to 1,113 units in 2018¹⁰. The primary focus for MSMEs is to boost their sales volume and to achieve this, effective products marketing is of utmost importance. The primary focus for MSMEs is to boost their sales volume, and to achieve this, effective products marketing is of utmost importance¹¹. Without proper marketing efforts, the potential of the

⁷ Omar, Emi Normalina, and Harlina Suzana Jaafar. 2011. "Halal Supply Chain in the Food Industry-A Conceptual Model." Pp. 384–89 in *2011 IEEE Symposium on Business, Engineering and Industrial Applications (ISBEIA)*. IEEE.

⁸ Africa, North. 2018. "A Research Framework of the Halal Certification Role in Purchase Intention of Muslim Consumers on the Food Products from Muslim Majority Countries in The Middle East and North Africa." *International Journal* 1(2):15–28

⁹ Muthiah, Aulia. 2018. "Consumer Protection Law."

¹⁰ Hussain, Shahid, Wang Xuotong, Talib Hussain, Asif Hussain Khoja, and Muhammad Zaeem Zia. 2021. "Assessing the Impact of COVID-19 and Safety Parameters on Energy Project Performance with an Analytical Hierarchy Process." *Utilities Policy* 70(March):101210. doi: 10.1016/j.jup.2021.101210

¹¹ Ortiz-Barrios, Miguel, Arlen Elaine Borrego-Areyanes, Iván Darío Gómez-Villar, Fabio De Felice, Antonella Petrillo, Muhammet Gul, and Melih Yucesan. 2021. "A Multiple Criteria

goods produced remains untapped. A successful promotional strategy is one that maximizes sales volume, ultimately leading to sustained profitability¹². In order to achieve their marketing goals, MSMEs can adopt various promotional media, including participating in exhibitions, email campaigns, leveraging social media, maintaining websites, as well as using magazines, newspapers, tv, radio, advertisements, and the internet¹³. By adopting and leveraging these promotional channels strategically, MSMEs can enhance their brand visibility, attract more customers, and experience significant sales growth. This, in turn, would contribute to the long-term success and empowerment of SMEs in Malang City.

SMEs need to adopt a strong marketing strategy to gain a competitive advantage in producing goods and services, as competition requires continuous improvement and the ability to capture and create opportunities¹⁴. Various methods are available for selecting promotion media, including Fuzzy Logic, Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Analytical Hierarchy Process (AHP), and Simple Additive Weighting (SAW). These methods certainly have innumerable advantages and disadvantages. Among these methods, AHP stands out as a popular choice due to its hierarchy structure, attention to validity, and reliable decision-making analysis outputs. AHP is a part of the MCDM model decision-making system, essential for determining the priority weights of several criteria that significantly impact marketing products and sales volume for SMEs^{15,16}. This study aims to identify the most relevant criteria for sales volume of SME products, helping businesses select the best alternatives to facilitate their marketing efforts and ultimately

Decision-Making Approach for Increasing the Preparedness Level of Sales Departments against COVID-19 and Future Pandemics: A Real-World Case." *International Journal of Disaster Risk Reduction* 62(February). doi: 10.1016/j.ijdr.2021.102411

¹² Altay, Burak Can, Abdullah Okumus, and Burcu Adıgüzel Merrangöz. 2021. "An Intelligent Approach for Analyzing the Impacts of the COVID-19 Pandemic on Marketing Mix Elements (7Ps) of the on-Demand Grocery Delivery Service." *Complex & Intelligent Systems* (0123456789). doi: 10.1007/s40747-021-00358-1.

¹³ Khaerul, Manaf, Alam Nurul Cecep, Subaeki Beki, MF Kaffah, Ira Rupaida, and Aedah Binti Abd Rahman. 2020. "Decision Support System for Determining Inventory and Sales of Goods Using Economic Order Quantity Methods and Linear Regression." *Proceedings - 2020 6th International Conference on Wireless and Telematics, ICWT 2020* 6-10. doi: 10.1109/ICWT50448.2020.9243619.

¹⁴ Blagojevic, Bosko, Dimitris Athanassiadis, Raffaele Spinelli, Jyrki Raitila, and John Vos. 2020. "Determining the Relative Importance of Factors Affecting the Success of Innovations in Forest Technology Using AHP." *Journal of Multi-Criteria Decision Analysis* 27(1-2):129-40. doi: 10.1002/mcda.1670.

¹⁵ Sales, Andréa Carla Monteiro, Luciana Gondim De Almeida Guimarães, Alípio Ramos Veiga Neto, Walid Abbas El-Aouar, and Glauber Ruan Pereira. 2020. "Risk Assessment Model in Inventory Management Using the AHP Method." *Gestao e Producao* 27(3):1-20. doi: 10.1590/0104-530x4537-20.

¹⁶ Santosa, Purbayu Budi. 2020. "Business Development Strategy for Young Coffee Entrepreneurs in Batang Regency, Indonesia (SWOT Analysis Approach - Fuzzy Analytical Hierarchy Process)." 5(11):1046-55

increase sales in Indonesia¹⁷. By adopting effective marketing strategies based on insights from AHP method, SMEs can establish a competitive edge in the market, continuously seize opportunities, and achieve sustainable growth in sales volume.

In the present study, a modification of AHP method was proposed by incorporating the EPIC model, an effective promotional media. The EPIC model was selected because it has four distinct dimensions, allowing for developing indicators for constructing AHP matrix. This means that each dimension can also be measured individually, making it a suitable method. However, it is essential to clarify that the primary focus of this study is not on evaluating the effectiveness of media using the EPIC model. The main objective is to establish criteria and alternatives that align with appropriate selection based on indicators of promotional media effectiveness. This consideration significantly influences the pairwise comparison in AHP method, leading to its modification, which is further elaborated on in the next section.

METHODS

AHP method is frequently used to assess various options within a given case. In this study, modifications were made to AHP method in the Pairwise Comparison Matrices section by incorporating the success or failure of the selected media using the EPIC model indicator. Further explanation of these modifications is provided in the next subsection.

AHP Hierarchy Structure

Figure 1 shows hierarchy structure of modified AHP method. At the highest level (level 1), the primary purpose of decision-making is to determine the most suitable promotional media. Moving to Level 2, specific criteria are explained based on survey results of MSMEs actors, encompassing advertising costs, target market, time for promotion, and products identity. Level 3 introduces alternative media options proposed by preliminary studies aligned with predetermined criteria. AHP is a versatile multi-criteria decision-making method that enables the ranking of several criteria or alternatives, allowing for the evaluation of their relative importance¹⁸. The hierarchically structured model accommodates both measurable and unmeasured elements, as well as quantitative and qualitative judgments, including subjective opinions¹⁹. This

¹⁷ Tošović-Stevanović, Aleksandra, Vladimir Ristanović, Dragan Čalović, Goran Lalić, Milena Žuža, and Gorica Cvijanović. 2020. "Small Farm Business Analysis Using the Ahp Model for Efficient Assessment of Distribution Channels." *Sustainability (Switzerland)* 12(24):1–15. doi: 10.3390/su122410479

¹⁸ Sadeghpour, Forough, Mohammad Ghorbani Far, Ali Ramzan Khah, and Masoumeh Amu Akbardokht Amiri. 2019. "Marketing Strategic Planning and Choosing the Right Strategy Using AHP Technique (Case Study: Ghavamin Bank Mazandaran)." *Dutch Journal of Finance and Management* 1(2):1–6. doi: 10.29333/djfm/5821.

¹⁹ Bunyan Unel, Fatma, and Sukran Yalpir. 2019. "Valuations of Building Plots Using the AHP Method." *International Journal of Strategic Property Management* 23(3):197–212. doi: 10.3846/ijspm.2019.7952

method involves a pairwise comparison of objects at the same hierarchy level within the decision-making model, to address limitations found in previous ones (Li and Wang 2019). Furthermore, AHP facilitates the organization of a system and its environment into interacting components, effectively measuring and managing the impact of system errors caused by these components²⁰.

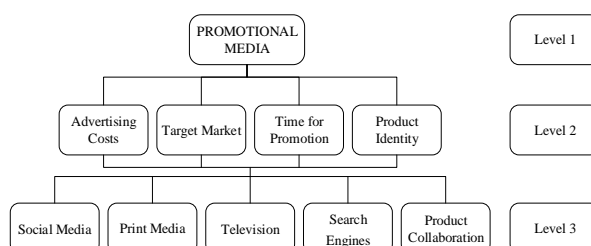


Figure 1. AHP Hierarchy Structure of Promotional Media

AHP offers numerous advantages in the decision-making process²¹. One of which is its ability to provide a graphical representation, making it easily understandable for all stakeholders involved in the decision-making process²². Decomposition is a problem-solving method that effectively breaks down significant and complex issues into minor and more manageable ones. These smaller problems are then organized in hierarchy²³ structure for clarity and easy understanding, as shown in Figure 1. The study design revolves around four essential criteria advertising cost, target market, time for promotion, and products identity. Additionally, the present study explored five distinct alternatives, including social and print media, television, search engines, and products collaboration. These criteria and alternatives are integral to the decision-making process when determining the most suitable promotional media.

Pairwise Comparison Matrices in Modified AHP

In this subsection, a modification of AHP method was proposed in the Pairwise Comparison Matrices section. Furthermore, the flow of this AHP modification is shown in Figure 2. In order to determine the matrix comparison,

²⁰ Gnanavelbabu, A., and P. Arunagiri. 2018. "Ranking of MUDA Using AHP and Fuzzy AHP Algorithm." *Materials Today: Proceedings* 5(5):13406–12. doi: 10.1016/j.matpr.2018.02.334

²¹ Yep, Jeremy YL, Chiung Ching Ho, and Choo Yee Ting. 2018a. "Analytic Hierarchy Process (AHP) for Business Site Selection." *AIP Conference Proceedings* 2016(September). doi: 10.1063/1.5055553

²² Park, Keun Sik, Young Joon Seo, A. Rom Kim, and Min Ho Ha. 2018. "Ship Acquisition of Shipping Companies by Sale & Purchase Activities for Sustainable Growth: Exploratory Fuzzy-AHP Application." *Sustainability (Switzerland)* 10(6). doi: 10.3390/su10061763

²³ Yep, Jeremy YL, Chiung Ching Ho, and Choo Yee Ting. 2018b. "Analytic Hierarchy Process (AHP) for Business Site Selection." *AIP Conference Proceedings* 2016(September). doi: 10.1063/1.5055553.

the indicators derived from the EPIC model were considered, as shown in Table 1.

Modified AHP method significantly influences the determination of the Pairwise Comparison scale, making it less subjective. Before establishing Pairwise Comparison, MSMEs determine the scale of consideration by assigning scores of one and zero to include and exclude or disregard the EPIC indicators, respectively. To illustrate this process, Table 2 shows an example of mapping a matrix of predetermined criteria as well as previous studies,²⁴ incorporating indicators based on the EPIC model²⁵.

Table 2 (level 2) provides the basis for calculating the score (S) used in the Pairwise Comparison. Before computing the S value, the sum of each criterion column is obtained, reflecting the comparison of the assessment results based on the EPIC model indicators. This step is critical in determining the location on the matrix for the Pairwise Comparison. The principle of ratio was used to compare each criterion with the number of indicators. The Pairwise Comparison score is then calculated using the following formula

$$S = \frac{\sum c_1}{i} \times \frac{\sum c_2}{i} \quad (1)$$

where

c_1 is the first criterion to be compared,

c_2 is the second criterion to be compared,

i is the number of indicators.

Table 1. Indicator based on EPIC model

Dimensions	Indicators
Empathy	Whether or not the information conveyed is based on thought (E1) Likes conveyed based on feelings (E2)
Persuasion	Interest in something (P1) Easy to trust (P2)
Impact	Different view (I1) Knowledge increases (I2)
Communications	Understanding of

²⁴ Subiyantoro, Edi, Ahmad Rofiqul Muslikh, Mardiana Andarwati, Galandaru Swalaganata, and Fandi Yulian Pamuji. 2022. "Analysis of Selection of MSME Promotional Media to Increase Sales Volume Using the Analytical Hierarchy Process (AHP) Method." *Journal of Information Technology and Management* 8(1):1-8.

²⁵ Ernestivita, Gesty, and Subagyo Subagyo. 2020. "Media for Promotion of MSME Products Using the EPIC Model." *Effector* 7:1-14. doi: 10.29407/e.v7i1.14336.

written words (C1)
Understanding of the
displayed
image/video (C2)

Table 2. Example of results from criteria mapping with EPIC model indicators

Epic Indicators	C1	C2	C3	C4
E1	0	0	1	1
E2	0	1	0	0
P1	1	0	1	1
P2	0	1	0	1
I1	1	0	1	1
I2	0	1	0	1
C1	0	1	0	1
C2	0	0	0	0

The same formula is also applied to fill in the Pairwise Comparison score at level 3, which corresponds to the criteria section. After calculating each comparison using Formula 1, the next step involves changing the score results with modified AHP importance scale, as shown in Table 3. Process of modifying the score simply entails dividing 1 by 9 because the maximum calculated result of the S ratio is 1.

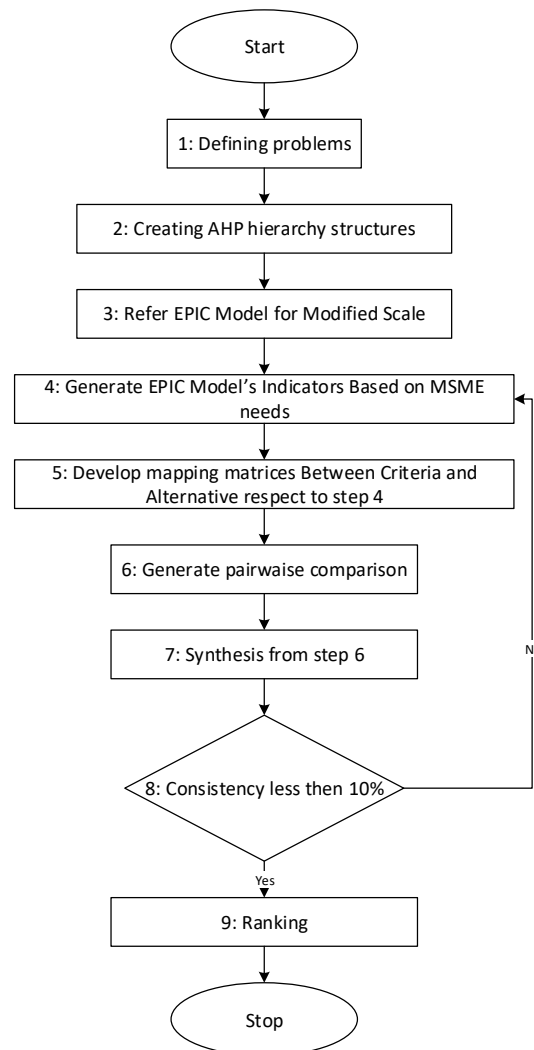


Figure 2. Modified AHP Structure

The proposed modification of AHP is very important as it simplifies decision-making for MSMEs. By reducing the number of criteria and alternatives to consider, MSMEs can easily evaluate their options. This streamlined method allows for the direct conversion of scores into relative importance during pairwise comparisons, following modified AHP method. The main advantage of this modification is its ability to address the issue of indecision that MSMEs often encounter when dealing with a large number of scales, as observed in previous studies using nine scales. By making process more straightforward, MSMEs can make well-informed decisions without feeling overwhelmed by the complexity of the traditional AHP method.

Synthesis Priority

At this stage, the proposed modification does not differ significantly from the general AHP methodology. The primary objective is to determine the priority of each criterion element, representing its weight in contributing to the decision-making process. This is realized through pairwise comparisons between two elements, ensuring comprehensive coverage of all relevant factors.

Experts and stakeholders play a critical role in providing input, either through direct discussions or indirect means such as questionnaires²⁶. In order to obtain the local priority of each element, an eigenvector is derived from the comparison matrix. These considerations are then synthesized through pairwise comparisons to establish an overall or global priority. The step-by-step process involves summing up the values of each column in the matrix, followed by dividing each outcome by the corresponding column total to create a normalized matrix. By adding up the values for each matrix and dividing it by the number of elements, the average is calculated²⁷. In essence, the current stage of modified AHP closely aligns with its general procedures.

Table 3. Modified AHP Pairwise Comparison

scores (<i>S</i>)	Scales	Relatively Important
$\leq 0,11$	1	The two elements are equally important
$0,12 \leq S \leq 0,22$	2	The value between two adjacent consideration values
$0,23 \leq S \leq 0,33$	3	One element is slightly more important than the other
$0,34 \leq S \leq 0,44$	4	The value between two adjacent consideration values
$0,45 \leq S \leq 0,55$	5	One element is more important than the other
$0,56 \leq S \leq 0,66$	6	The value between two adjacent consideration values
$0,67 \leq S \leq 0,77$	7	One element is definitely more important than the other
$0,78 \leq S < 0,88$	8	The value between two adjacent consideration values
$\geq 0,89$	9	One element is absolutely more important than the adjacent ones

²⁶ Marisa, Fitri, Sharifah Sakinah, Syed Ahmad, Zeratul Izzah, Mohd Yusoh, Titien Agustina, Anastasia L. Maukar, Endah Tri, Esti Handayani, and Slamet Risnanto. 2021b. "The Rank of Silaturrahmi-Assimilated Collaboration Parameter Based on Core Drive Using Octalysis Gamification Framework and Fuzzy AHP." *TEM Journal* 10(4):1971-82. doi: 10.18421/TEM104

²⁷ Kim, Young Ki, Tae Ung Kim, Seong Taek Park, and Jae Rim Jung. 2016. "Establishing the Importance Weight of Appropriability Mechanism by Using AHP: The Case of the China's Electronic Industry." *Cluster Computing* 19(3):1635-46. doi: 10.1007/s10586-016-0608-3.

Consistency

In the context of decision-making, it is essential to assess the level of consistency. This is because the present study aims to avoid making decisions based on low consistency²⁸. In order to achieve this, the Consistency Index (CI) and Consistency Ratio (CR) are calculated using the following formula:

$$CI = \frac{(\lambda_{max} - n)}{(n-1)} \quad (2)$$

where:

n = number of elements

The first step is to calculate the maximum eigenvalue of the comparison matrix to determine the consistency value of the results. This computation provides benchmarks for the local priority vectors of all criteria within the matrix²⁹.

$$CR = \frac{CI}{RI} \quad (3)$$

where:

CR = Consistency Ratio

CI = Consistency Index

RI = Random Consistency Index

The Random Index (RI) is a matrix consistency index derived from n randomly generated pairs. Table 2 shows the calculated values obtained from these random indices.

Table 4. Index Consistency Random List

Matrix Size	IR Values
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

²⁸ Khodaparasti, Ramin Bashir, Aboulfazl Aboulfazli, and Reza Isakhajelou. 2015. "Ranking the Most Effective Marketing Mix Elements on the Sales of Javid Darb Company Products: An AHP Technique." *Journal of International Studies* 8(2):164–73. doi: 10.14254/2071-8330.2015/8-2/14

²⁹ Gruner, Richard L., Arnd Vomberg, Christian Homburg, and Bryan A. Lukas. 2019a. "Supporting New Product Launches With Social Media Communication and Online Advertising: Sales Volume and Profit Implications." *Journal of Product Innovation Management* 36(2):172–95. doi: 10.1111/jpim.12475

Matrix Size	IR Values
10	1.49
11	1.51
12	1.48
13	1.56
14	1.57
15	1.59

In the decision-making process, it is important to consider the Inconsistency Ratio (IR). Assuming the IR value is greater than 10%, it indicates the need for judgment correction. In order to validate the accuracy of the calculated results, the Consistency Ratio (CI/RI) should be determined. Supposing the CI/RI is less than or equal to 0.1, the results can be deemed correct³⁰.

RESULTS AND DISCUSSION

Table 2, in the previous subsection, shows that the questionnaire for MSMEs is similar to its format. MSMEs actors are left with the option to select either one or zero to consider or ignore a specific indicator. In this section, the results of levels 2 and 3 calculations pertain to criteria and alternatives, respectively. The results of the sequence tend to appear as appropriate recommendations for increasing sales volume of MSMEs products. A visual representation of the objectives, criteria, and alternatives is shown in Figure 1 of the previous subsection.

The calculation process at level 2 is stated in the criteria section. A priority vector is obtained from AHP criteria shown in Table 2. This priority vector is then used to calculate the S value as in equation 1 to obtain the following matrix

4.00	3.50	4.50	1.46	4.00
6.50	4.00	6.75	2.17	6.50
3.67	2.83	4.00	1.29	3.67
15.00	10.50	16.00	4.00	15.00
4.00	3.50	4.50	1.46	4.00

³⁰ Gruner, Richard L., Arnd Vomberg, Christian Homburg, and Bryan A. Lukas. 2019b. "Supporting New Product Launches With Social Media Communication and Online Advertising: Sales Volume and Profit Implications." *Journal of Product Innovation Management* 36(2):172–95. doi: 10.1111/jpim.12475

0.149260628
0.215341959
0.13077634
0.504621072
0.149260628

The matrix calculation yielded a priority vector at level 2, with a CR value of 7.4%, meaning it is less than 10%. This indicates that the pairwise comparison in AHP modification is consistent, and the calculation adheres to the rules. Therefore, the obtained results are deemed accurate and reliable.

The EPIC model indicator was developed through a combination of interviews with several MSMEs in Jember Regency and insights from the study team. Process of assigning values one and zero is straightforward, as MSMEs actors find it easy to make decisions with a simple yes or no choice. Calculations at Level 3 or AHP modification criteria can be seen in the illustration in Table 5 and the accompanying explanation. Table 5 clearly assesses how one of MSMEs evaluated criteria using the EPIC model indicators. This example provides valuable insights into the decision-making process within the context of the EPIC model.

Table 5. Index Consistency Random List

Epic Indicators	A1	A2	A3	A4	A5
E1	1	0	1	1	1
E2	1	1	0	0	0
P1	0	0	1	1	1
P2	0	0	0	1	1
I1	1	0	1	1	1
I2	0	1	0	0	1
C1	1	1	0	1	1
C2	1	0	1	0	0

The next step in process is to calculate the S score using Equation 1. This is realized by referring to Table 3, which serves as a guide in obtaining the following matrix

5.00	27.00	23.50	15.00	4.55
1.25	5.00	4.33	3.83	1.191667
1.67	6.75	5.00	3.92	1.566667
2.70	13.35	9.05	5.00	2.4
5.58	32.00	27.50	16.33	5

0.328482
0.068315
0.082722
0.142248
0.378232

From the matrix above, the synthesis process and consistency calculation are performed. This process led to the derivation of the priority vector value

Process is repeated for the other alternatives to obtain their respective priority vectors. A CR assessment is also performed in each priority vector calculation to verify the reliability of the pairwise comparison step in AHP modification. The results of these assessments are shown in Table 6.

Table 6. The results of Consistency Random

	C1	C2	C3	C4
A1	0.328482	0.506633	0.408536	0.30911
A2	0.068315	0.073372	0.104674	0.09378
A3	0.082722	0.099603	0.116869	0.11372
A4	0.142247	0.099603	0.184959	0.14245
A5	0.378232	0.22079	0.184959	0.34093
CR	9.6%	8.8%	3.2%	4.5%

The alternative priority order at level 3 in AHP modification was obtained by multiplying the vector matrix of the criteria with the one obtained from the calculations at the beginning of this section. An illustration of the calculation sequence with respect to AHP modification is shown in Figure 3.

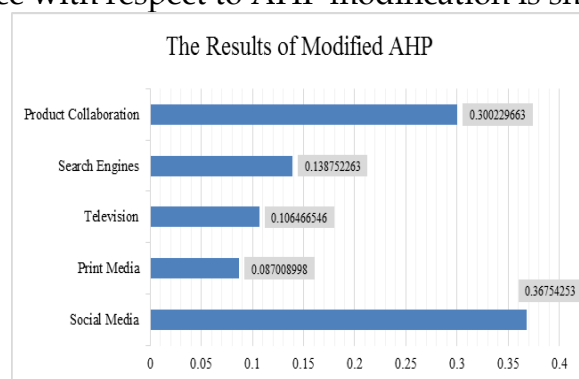


Figure 3. The result of Modified AHP

According to the forms filled out by MSMEs actors regarding which promotional media to use, social media was identified as having considerable influence, followed closely by products collaboration. The questionnaires consistently revealed their preference for social media and products collaboration, which they believed substantially impacted sales volume and

overall profit. On the contrary, other options, such as traditional print media like newspapers, magazines, etc, are deemed financially unfeasible due to their high costs compared to the top two rankings. These results align with the study conducted by Agustina, where print media, particularly newspapers, have never been ranked at the top. In this study, advertising on TV was ranked the highest, but it did not make the top position in the investigation conducted by Agustina.³¹ The variations in ranking could be attributed to differences in the questionnaires target audience and the specific objective of the decision-making process in each study. The preferences and perceptions of MSMEs actors significantly influence their decisions on promotional media usage. The disparities in rankings between studies emphasized the importance of considering the target audience and specific decision-making objectives while formulating effective marketing strategies for businesses.

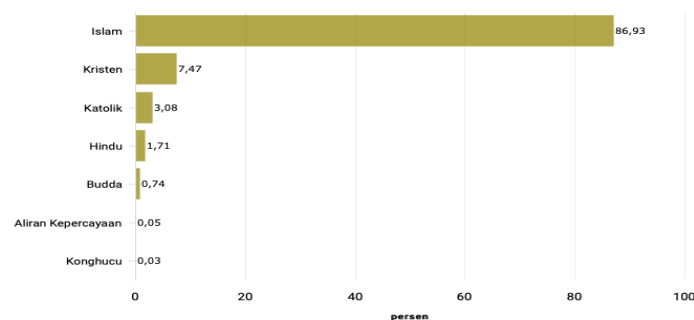


Figure 4. Total Muslim Population in Indonesia

Figure 4 shows data from the Dukcapil of the Ministry of Home Affairs, indicating that as of December 2021, 86.93% of Indonesians, equivalent to 238.09 million people, identify as Muslim. This significant proportion implies that the Muslim population holds the top position in terms of numbers. As a result, businesses offering halal-certified food and beverage products have a remarkable opportunity to tap into this vast consumer market. Catering to the preferences of this large segment of the population can potentially lead to a substantial increase in sales volume³².

AHP modification method presented in this study offers a clear and concise illustration, simplifying process of obtaining complex data in AHP while ensuring accurate results. The effectiveness of this modification is evident in previous studies that used conventional AHP with different data acquisition process yet still achieved similar sequences with slight differences in values. Some of the advantages of this AHP modification method include:

³¹ Agustina, Chandra. 2012. "Selection of Promotional Media Using the Analytic Hierarchy Process (AHP) Method Case Study: BSI Magelang." *Paradigm* 14(1).

³² Khairunnisa, Hana, Deni Lubis, and Qoriatul Hasanah. 2020. "Increase in Turnover of Food and Beverage MSMEs in Bogor City After Halal Certification." *AL-MUZARA'AH* 8(2):109-27.

1. AHP modification simplifies the task of filling pairwise comparisons for MSMEs actors, effectively reducing the likelihood of multiple interpretations or subjectivity on a large scale.
2. From the perspective of the author, the method requires additional calculation process.

On the other hand, this method has some disadvantages, such as:

1. From the perspective of the author, the method includes a few additional steps, but it has minimal impact on processing time.
2. The unavailability of web or mobile-based applications that can speed up process presents an opportunity for readers to consider developing such applications.

CONCLUSIONS AND SUGGESTIONS

This study discussed modified AHP method as an alternative method to obtain a pairwise comparison matrix in AHP step. The development process was based on the EPIC model, which provided additional insights for further analysis of its four dimensions. Both levels 1 and 2 used an indicator matrix derived from the EPIC model. The case examples illustrated that social media emerged as a feasible promotion alternative, with the results closely related to previous studies. However, what set this study apart was the significantly easier and faster data collection process. The simplicity of the questionnaire, as shown in Figures 2 and 5, allowed respondents to complete it in less than 2 minutes. In preliminary studies, due to the numerous considerations in AHP scale, the retrieval process per unit was up to 10 minutes per questionnaire. The potential development of web- or mobile-based applications opened up possibilities for a wider range of respondents.

Author's Contribution

Mardiana Andarwati: Contribute to formulating study ideas, collecting data, processing data, and interpreting data.

Galandaru Swalaganata: Contributing to writing systematics, study methods, analyzing interpretation results, the language proofread

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Declaration of Competing Interest

We declare that we have no conflict of interest

REFERENCES

- Africa, North. 2018. "A Research Framework of the Halal Certification Role in Purchase Intention of Muslim Consumers on the Food Products from Muslim Majority Countries in The Middle East and North Africa." *International Journal* 1(2):15-28.

- Agustina, Chandra. 2012. "Selection of Promotional Media Using the Analytic Hierarchy Process (AHP) Method Case Study: BSI Magelang." *Paradigm* 14(1).
- Altay, Burak Can, Abdullah Okumuş, and Burcu Adıgüzel Merrangöz. 2021. "An Intelligent Approach for Analyzing the Impacts of the COVID-19 Pandemic on Marketing Mix Elements (7Ps) of the on-Demand Grocery Delivery Service." *Complex & Intelligent Systems* (0123456789). doi: 10.1007/s40747-021-00358-1.
- Blagojevic, Bosko, Dimitris Athanassiadis, Raffaele Spinelli, Jyrki Raitila, and John Vos. 2020. "Determining the Relative Importance of Factors Affecting the Success of Innovations in Forest Technology Using AHP." *Journal of Multi-Criteria Decision Analysis* 27(1-2):129-40. doi: 10.1002/mcda.1670.
- Bunyan Unel, Fatma, and Sukran Yalpir. 2019. "Valuations of Building Plots Using the AHP Method." *International Journal of Strategic Property Management* 23(3):197-212. doi: 10.3846/ijspm.2019.7952.
- Ernestivita, Gesty, and Subagyo Subagyo. 2020. "Media for Promotion of MSME Products Using the EPIC Model." *Effector* 7:1-14. doi: 10.29407/e.v7i1.14336.
- Gnanavelbabu, A., and P. Arunagiri. 2018. "Ranking of MUDA Using AHP and Fuzzy AHP Algorithm." *Materials Today: Proceedings* 5(5):13406-12. doi: 10.1016/j.matpr.2018.02.334.
- Gruner, Richard L., Arnd Vomberg, Christian Homburg, and Bryan A. Lukas. 2019a. "Supporting New Product Launches With Social Media Communication and Online Advertising: Sales Volume and Profit Implications." *Journal of Product Innovation Management* 36(2):172-95. doi: 10.1111/jpim.12475.
- Gruner, Richard L., Arnd Vomberg, Christian Homburg, and Bryan A. Lukas. 2019b. "Supporting New Product Launches With Social Media Communication and Online Advertising: Sales Volume and Profit Implications." *Journal of Product Innovation Management* 36(2):172-95. doi: 10.1111/jpim.12475.
- Hussain, Shahid, Wang Xuetong, Talib Hussain, Asif Hussain Khoja, and Muhammad Zaeem Zia. 2021. "Assessing the Impact of COVID-19 and Safety Parameters on Energy Project Performance with an Analytical Hierarchy Process." *Utilities Policy* 70(March):101210. doi: 10.1016/j.jup.2021.101210.
- Khaerul, Manaf, Alam Nurul Cecep, Subaeki Beki, MF Kaffah, Ira Rupaida, and Aedah Binti Abd Rahman. 2020. "Decision Support System for Determining Inventory and Sales of Goods Using Economic Order Quantity Methods and Linear Regression." *Proceedings - 2020 6th International Conference on Wireless and Telematics, ICWT 2020* 6-10. doi: 10.1109/ICWT50448.2020.9243619.

- Khairunnisa, Hana, Deni Lubis, and Qoriatul Hasanah. 2020. "Increase in Turnover of Food and Beverage MSMEs in Bogor City After Halal Certification." *AL-MUZARA'AH* 8(2):109-27.
- Khodaparasti, Ramin Bashir, Aboulfazl Aboulfazli, and Reza Isakhajelou. 2015. "Ranking the Most Effective Marketing Mix Elements on the Sales of Javid Darb Company Products: An AHP Technique." *Journal of International Studies* 8(2):164-73. doi: 10.14254/2071-8330.2015/8-2/14.
- Kim, Young Ki, Tae Ung Kim, Seong Taek Park, and Jae Rim Jung. 2016. "Establishing the Importance Weight of Appropriability Mechanism by Using AHP: The Case of the China's Electronic Industry." *Cluster Computing* 19(3):1635-46. doi: 10.1007/s10586-016-0608-3.
- Kropivšek, Jože, Petra Groselj, Leon Oblak, and Matej Jošt. 2021. "A Comprehensive Evaluation Model for Wood Companies Websites Based on the AHP/r-Topsis Method." *Forests* 12(6):1-24. doi: 10.3390/f12060706.
- Kusrini, Novira, and Maswadi. 2021. "The Performance Improvement of Sustainable Palm Oil Supply Chain Management after COVID-19: Priority Indicators Using F-AHP." *Uncertain Supply Chain Management* 9(2):227-36. doi: 10.5267/j.uscm.2021.3.010.
- Kusumastuti, Ratih Dyah. 2017. "Awareness of Halal Certification of Micro and Small Enterprises in Jakarta." *International Journal of Economics & Management* 11.
- Li, Xin, and YongWang. 2019. "Evaluation of the Operation System of the Sales Logistics Distribution Center in Steel Enterprises Based on AHP." 309(Ismss):44-48. doi: 10.2991/ismss-19.2019.9.
- Marisa, Fitri, Sharifah Sakinah, Syed Ahmad, Zeratul Izzah, Mohd Yusoh, Titien Agustina, Anastasia L. Maukar, Endah Tri, Esti Handayani, and Slamet Risnanto. 2021a. "The Rank of Silaturrahmi-Assimilated Collaboration Parameter Based on Core Drive Using Octalysis Gamification Framework and Fuzzy AHP." *TEM Journal* 10(4):1971-82. doi: 10.18421/TEM104.
- Marisa, Fitri, Sharifah Sakinah, Syed Ahmad, Zeratul Izzah, Mohd Yusoh, Titien Agustina, Anastasia L. Maukar, Endah Tri, Esti Handayani, and Slamet Risnanto. 2021b. "The Rank of Silaturrahmi-Assimilated Collaboration Parameter Based on Core Drive Using Octalysis Gamification Framework and Fuzzy AHP." *TEM Journal* 10(4):1971-82. doi: 10.18421/TEM104.
- Marisa, Fitri, Sharifah Sakinah, Syed Ahmad, and Zeratul Izzah Mohd. 2020. "Analysis of Relationship CLV with 8 Core Drives Using Clustering K-Means and Octalysis Gamification Framework." *Journal of Theoretical and Applied Information Technology* 98(20):3151-64.
- Marisa, Fitri, Sharifah Sakinah, Syed Ahmad, Zeratul Izzah Mohd, DODIK JATMIKA, TITIEN AGUSTINA, WIWIN PURNOMOWATI, and ERRI

- WAHYU PUSPITARINI. 2021. "Customer Motivation Analysis on Retail Business with Octalysis Gamification Framework." *Journal of Theoretical and Applied Information Technology* 99(13):3264-79.
- Marisa, Fitri, Sharifah Sakinah Syed Ahmad, Zeratul Izzah Mohd Yusoh, Anastasia L. Maukar, Ronald David Marcus, and Anang Aris Widodo. 2020. "Evaluation of Student Core Drives on E-Learning during the Covid-19 with Octalysis Gamification Framework." *International Journal of Advanced Computer Science and Applications* 11(11):104-16. doi: 10.14569/IJACSA.2020.0111114.
- Muthiah, Aulia. 2018. "Consumer Protection Law."
- Omar, Emi Normalina, and Harlina Suzana Jaafar. 2011. "Halal Supply Chain in the Food Industry-A Conceptual Model." Pp. 384-89 in *2011 IEEE Symposium on Business, Engineering and Industrial Applications (ISBEIA)* . IEEE.
- Ortiz-Barrios, Miguel, Arlen Alain Borrego-Areyanes, Iván Darío Gómez-Villar, Fabio De Felice, Antonella Petrillo, Muhammet Gul, and Melih Yucesan. 2021. "A Multiple Criteria Decision-Making Approach for Increasing the Preparedness Level of Sales Departments against COVID-19 and Future Pandemics: A Real-World Case." *International Journal of Disaster Risk Reduction* 62(February). doi: 10.1016/j.ijdrr.2021.102411.
- Park, Keun Sik, Young Joon Seo, A. Rom Kim, and Min Ho Ha. 2018. "Ship Acquisition of Shipping Companies by Sale & Purchase Activities for Sustainable Growth: Exploratory Fuzzy-AHP Application." *Sustainability (Switzerland)* 10(6). doi: 10.3390/su10061763.
- Pérez Vergara, Ileana Gloria, María Camila López Gómez, Igor Lopes Martínez, and Jesús Vargas Hernández. 2021. "Strategies for the Preservation of Service Levels in the Inventory Management During COVID-19: A Case Study in a Company of Biosafety Products." *Global Journal of Flexible Systems Management* 22(June):65-80. doi: 10.1007/s40171-021-00271-z.
- Sadeghpour, Forough, Mohammad Ghorbani Far, Ali Ramzan Khah, and Masoumeh Amu Akbardokht Amiri. 2019. "Marketing Strategic Planning and Choosing the Right Strategy Using AHP Technique (Case Study: Ghavamin Bank Mazandaran)." *Dutch Journal of Finance and Management* 1(2):1-6. doi: 10.29333/djfm/5821.
- Sales, Andréa Carla Monteiro, Luciana Gondim De Almeida Guimarães, Alípio Ramos Veiga Neto, Walid Abbas El-Aouar, and Glauber Ruan Pereira. 2020. "Risk Assessment Model in Inventory Management Using the AHP Method." *Gestao e Producao* 27(3):1-20. doi: 10.1590/0104-530x4537-20.
- Santosa, Purbayu Budi. 2020. "Business Development Strategy for Young Coffee Entrepreneurs in Batang Regency, Indonesia (SWOT Analysis Approach - Fuzzy Analytical Hierarchy Process)." 5(11):1046-55.

- Subiyantoro, Edi, Ahmad Rofiqul Muslikh, Mardiana Andarwati, Galandaru Swalaganata, and Fandi Yulian Pamuji. 2022. "Analysis of Selection of MSME Promotional Media to Increase Sales Volume Using the Analytical Hierarchy Process (AHP) Method." *Journal of Information Technology and Management* 8(1):1-8.
- Tošović-Stevanović, Aleksandra, Vladimir Ristanović, Dragan Čalović, Goran Lalić, Milena Žuža, and Gorica Cvijanović. 2020. "Small Farm Business Analysis Using the Ahp Model for Efficient Assessment of Distribution Channels." *Sustainability (Switzerland)* 12(24):1-15. doi: 10.3390/su122410479.
- Yep, Jeremy YL, Chiung Ching Ho, and Choo Yee Ting. 2018a. "Analytic Hierarchy Process (AHP) for Business Site Selection." *AIP Conference Proceedings* 2016(September). doi: 10.1063/1.5055553.
- Yep, Jeremy YL, Chiung Ching Ho, and Choo Yee Ting. 2018b. "Analytic Hierarchy Process (AHP) for Business Site Selection." *AIP Conference Proceedings* 2016(September). doi: 10.1063/1.5055553.
- Yunos, Rahimah Mohamed, CFC Mahmod, and Nor Hafizah Abdul Mansor. 2014. "Compliance to Halal Certification-Its Impact on Business Financial Performance." Pp. 499-503 in *Recent Trends in Social and Behavior Sciences-Proceedings of the 2nd International Congress on Interdisciplinary Behavior and Social Sciences 2013, ICIBSoS 2013*