

Analysis of Promotional Media Selection Based on Modified Analytical Hierarchy Process (AHP) to Increase Halal Product Sales Volume

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Article history:

Received December 2, 2022

Revised February 19, 2023

Accepted March 1, 2023

Available online on April 1, 2023

Keywords:

promotional media, modified analytical hierarchical process, MSMEs, halal products

Paper type: Research paper

Please cite this article [Turabian of style 8th edition]: Subiyantoro, Edi, Ahmad Rofiqul Muslikh, Mardiana Andarwati, and Galandaru Swalaganata. "Analysis of Promotional Media Selection Based on Modified Analytical Hierarchy Process (AHP) to Increase Halal Product Sales Volume". *IQTISHODUNA: Jurnal Ekonomi Islam* vol. 12, no. 1 (April 1, 2023). Accessed April 1, 2023.

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ABSTRACT

Finding the promotional media that used AHP in earlier experiments was the intended goal of this study, however data gathering proved to be quite difficult for researchers. This is because the research issue, MSMEs in the halal product, demands an excessive volume of questionnaire data. The researcher also made an effort to simplify the questionnaire by designating consideration and contempt with the numbers 1 and 0, respectively. Since the EPIC model contains four distinct dimensions, it is utilized to produce indications. This implies that measurements can also be taken in each of the EPIC dimensions. The development of AHP modifications that are demonstrated in the calculation of pairwise comparison matrices is the main focus of this study. In this study, data collection is much easier and faster. It caused by the form of the questionnaire was simple and only takes less than 2 minutes. Social media can be used as a substitute for traditional advertising in the scenarios mentioned. The most popular alternative for promotion for MSMEs is social media (36%). Search engines and product collaboration (30% and 13%) are the following substitute promotional media to increase MSMEs in the halal product.

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

The increase in the number of SMEs in Indonesia must be supported by several factors so that these businesses can develop. These factors range from business conditions, environment, facilities, and infrastructure, to technology.¹ In terms of technology utilization, SMEs can use it in various fields, including the procurement of raw materials, production processes to the marketing stage, and promotion of the products produced.² Currently, technology has been widely used in terms of marketing and product promotion.³ SMEs, especially creative industry business actors, can market through various media such as print media, social media, television, websites, and the

internet⁴, to increase the motivation to buy consumers⁵.

Government Regulation No. 31 of 2019 concerning the Implementation of Law No. 33 of 2014, Article 25 concerning halal product guarantees explains that business actors who obtain halal certificates are required to include halal labels on products that have received halal certificates. Business actors must have awareness of the ownership of halal certificates for food and beverage products sold by business actors is mandatory and are at the forefront of entrepreneurship development and empowerment because the success or failure of products marketed in the Indonesian territory is one of the requirements⁶. is a halal certificate. In addition to the majority of the Indonesian population being Muslim, it is not even only Muslim residents who only consume halal food and drinks,

¹ 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

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

but non-Muslim residents can also consume from other countries.⁷

Indonesia is one of the countries with the largest Muslim population in the world so if there is no certification for MSME products, the product will be doubtful and affect the intention to buy the product because the food (Africa 2018) or drink consumed by Muslims must be halal, following the Qur'an Al-Baqarah verse 168 and the word of Allah SWT (Qs. Al-Maidah/5:88) which requires Muslims to consume everything lawful.

Halal means things that are allowed and can be done freely or not bound, but certain provisions prohibit it. One of them is halal food and beverage products that are following Islamic teachings, namely that they do not contain pork or ingredients derived from pigs, do not contain ingredients that are forbidden, ingredients come from animals that are slaughtered according to Islamic procedures, storage and transportation areas are never used for pigs or pigs. non-halal goods, all food and drinks do not contain khamr.⁸

Based on Law no. 20 of 2008 concerning SMEs, is to make all guidelines towards changing the paradigm of SME empowerment. Article 16 (3) concerning Procedures for SME Development. According to

data from the Central Statistics Agency of Malang City, the quantity of SMEs in Malang City has increased from 156 units to 1,113 units in 2018⁹. The priority of MSMEs is to increase the volume of sales produced so that how to market products is the main goal because, without marketing, the goods produced will be of no use¹⁰. A promotional strategy is said to be successful if it can maximize sales volume, which will provide long-term profits¹¹. Promotional media can be done by participating in exhibitions, email, social media, websites, magazines, newspapers, tv, radio, advertisements, and the internet¹².

⁹ 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

¹⁰ Ortiz-Barrios, Miguel, Arlen Alaine 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

¹¹ 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.

¹² Khaerul, Manaf, Alam Nurul Cecep, Subaeki Beki, MF Kaffah, Ira Rupaida, and

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

Based on the phenomenon, a marketing strategy is needed to win a competitive advantage for SMEs in producing goods and services, considering that competition requires SMEs to continuously improve their ability to capture and create opportunities¹³. There are many methods for determining promotion media selection decisions. Among the popular ones are the Fuzzy Logics method, Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Analytical Hierarchy Process (AHP), and Simple Additive Weighting (SAW). These methods certainly have various advantages and disadvantages. The method that is often used is AHP. The AHP method is quite popular because it is one of the first methods introduced in decision support systems. AHP is one part of the MCDM model decision-making system that is reliable in determining the priority weights of several criteria that people want to know their priority. With this ability, AHP can map the priority criteria in marketing

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.

¹³ 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.

products¹⁴. The advantages of the AHP method are its hierarchical structure, attention to validity to the limit of tolerance, and the durability of decision-making analysis outputs¹⁵. This study shows which criteria are essential in the sales volume of SMEs. This study aims to determine the importance of criteria in creating elements of the sales volume of SME products and assist them in choosing and using which alternative best suits their needs to facilitate marketing, which will impact on increasing sales of MSME products in Indonesia¹⁶.

In this study, we propose a modification of the AHP by utilizing the effectiveness model of promotional media, namely the EPIC model. The EPIC model was chosen to develop indicators in developing the AHP matrix because EPIC has 4 different dimensions. This means that measurements in each of the

¹⁴ 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.

¹⁵ 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

¹⁶ 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

EPIC dimensions can also be measured. The focus of this research is not on the effectiveness of the media using the EPIC model, but the focus of this research is on the existence of criteria and alternatives that can be made according to the appropriate selection based on indicators of the effectiveness of a promotional media. This of course has an impact on the pairwise comparison of AHP so that it raises the AHP modification which is more clearly described in the next section.

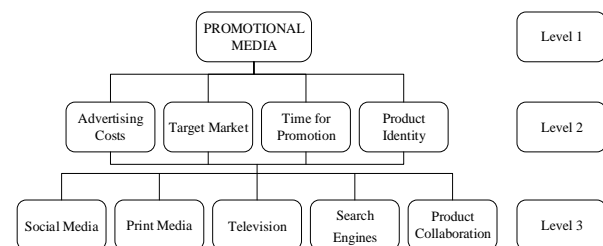
METHODS

The AHP method has often been used as a method to determine several options from a case. In this study, the AHP has been modified in the Pairwise Comparison Matrices section by considering the success or failure of the selected media using the EPIC model indicator. Further explanation is explained in the next subsection.

Analytical Hierarchical Process (AHP) Hierarchy Structure

Figure 1 shows the hierarchical structure of the AHP modification. The highest level or level 1 shows the purpose of decision-making, namely the determination of promotional media. Level 2 explains the criteria based on survey results to MSME actors which include advertising costs, target market, time for promotion, and product identity. Level 3 is an alternative proposed by researchers to decide what media to use based on predetermined criteria. AHP is a multi-criteria decision-making approach that allows several criteria or alternatives to be ranked

and their relative importance to be evaluated¹⁷. The hierarchically structured model can include measurable and unmeasured elements. It also includes quantitative and qualitative judgments and subjective opinions¹⁸. This method is a pairwise comparison of objects at the same hierarchical level in the decision-making model, with AHP trying to cover all the previous model's shortcomings (Li and Wang 2019). AHP also allows the structure of a system and environment into interacting components and then unites them by measuring and managing the impact of component system errors¹⁹.



¹⁷ 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.

¹⁸ 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

¹⁹ 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

Figure 1. AHP Hierarchy Structure of Promotional Media

AHP has many advantages in explaining the decision-making process²⁰. One of them is that it can be described graphically to easily understand by all parties involved in decision-making²¹.

Decomposition is a problem definition used to break down significant problems and simplify problems into more minor problems, which are then explained in a hierarchy²². Defining the problem by breaking down the whole problem into elements and depicted in the form of a hierarchy is shown in Figure 1. This research design involves four criteria: advertising cost, target market, time for promotion, and product identity. At the same time, the alternatives involved are five items, including social media, Print Media, Television, Search Engines, and Product Collaboration.

²⁰ 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

²¹ 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

²² 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.

Pairwise Comparison Matrices in Modified AHP

In this subsection, a modification of the AHP is proposed in the Pairwise Comparison Matrices section. The flow of the AHP modification can be seen in Figure 2. While the determination of the matrix comparison uses the consideration of indicators based on the EPIC model as can be seen in Table 1.

The modified AHP method proposed in this article also has an impact on determining the Pairwise Comparison scale which is not necessarily subjective to the researcher. But before determining Pairwise Comparison, MSMEs determine the scale of consideration with a score of 1 to consider the EPIC indicator and a score of 0 to ignore or not consider the EPIC indicator. Table 2 shows an example of mapping a matrix of predetermined criteria as well as previous studies²³ with indicators based on the EPIC model²⁴.

Based on Table 2 or level 2, the score (S) is calculated to determine the Pairwise Comparison score. Before calculating the S value, do the sum in the criteria column to obtain the sum or comparison of the assessment

²³ 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.

²⁴ 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.

results based on the EPIC model indicators. This is to determine the location on the matrix to determine Pairwise Comparison. The author uses the principle of ratio in the comparison of each criterion with the number of indicators. Determination of the calculation of the Pairwise Comparison score can be seen in 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 what is 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 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 or in the criteria section. After the calculation process for each comparison uses formula 1, the next step is to change the score results with the modified AHP importance scale as shown in Table 3. The process of modifying the score is quite simple dividing 1 by 9. This was done because the maximum calculation result of the S ratio was 1.

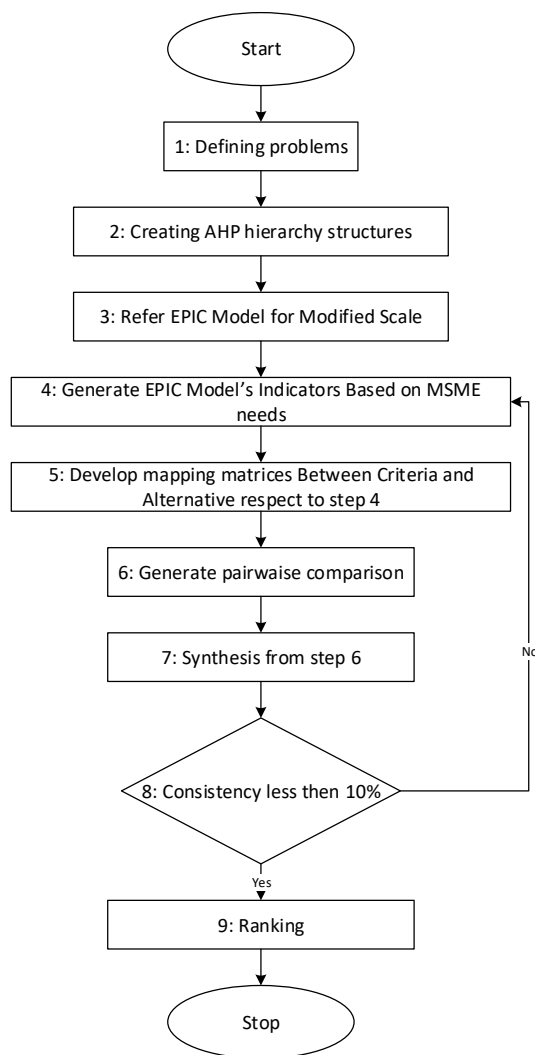


Figure 2. Modified AHP Structure

This modification is important and makes it easier for MSMEs to consider and not consider criteria and alternatives. So that in the process of converting scores into relative importance in pairwise comparisons, researchers can directly process according to the proposed AHP modification. This also reduces MSMEs' indecision in assessing if given a choice of 9 scales as in previous research.

Synthesis Priority

At this stage, there is no difference with AHP in general. Determining

the element's priority of the criterion can be seen as the weight of the contribution of these elements to the purpose of decision-making. AHP performs element priority analysis with a pairwise comparison method between two elements to cover all existing elements. This priority is determined based on the views of experts and interested parties on decision-making, either directly through discussions or indirectly by questionnaires²⁵. From the comparison matrix, an eigenvector is made to get local priority. From the comparison matrix, an eigenvector is made to get local priority. These considerations are used for pairwise comparisons to be synthesized to obtain an overall or global priority. The process is to add up the values of each column in the matrix, divide each value from the column by the corresponding column total to get the normalized matrix, add up the values for each matrix, and divide by the number of elements to get the average value²⁶.

²⁵ 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

²⁶ 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.

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 absolutely important than the other
$0,12 \leq S < 0,88$	8	The value between two adjacent consideration values
$\geq 0,89$	9	One element is absolutely more important than adjacent elements

Consistency

In decision-making, knowing how good consistency is important because the research does not want decisions based on low consistency²⁷. The following calculates the Consistency Index (CI) and Consistency Ratio (CR) with the 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. The maximum eigenvalues of the comparison matrix represent the local priority vector benchmarks for all criteria²⁸.

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

where:

CR= Consistency Ratio

CI= Consistency Index

RI= Random Consistency Index

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

²⁸ 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

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

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
10	1.49
11	1.51
12	1.48
13	1.56
14	1.57
15	1.59

If the IR value is more than 10%, the judgment must be corrected. However, if the consistency ratio (CI/RI) is less or equal to 0.1, the calculation results can be declared correct²⁹.

RESULTS AND DISCUSSION

As in Table 2 in the previous subsection, the questionnaire for MSMEs is not much different from the table. So that MSME actors only

²⁹ 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

choose 1 to consider the indicator or 0 to not consider or ignore the indicators that have been made. In this section, we will describe the results of level 2 calculations, namely criteria, and level 3, namely alternatives. So that the results of the sequence will then appear as appropriate recommendations for increasing the sales volume of MSME products. Objectives, criteria, and alternatives can be seen in Figure 1 in the previous subsection. The calculation at level 2 is in the criteria section so that a priority vector is obtained from the AHP criteria given as in Table 2, to calculate the S value as in equation 1 to obtain a matrix like the following

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

From the matrix calculation above, the priority vector is obtained at level 2 with a CR value of 7.4%, which means it is lower than 10%, so it can be concluded that the pairwise comparison in the AHP modification has no problems and the calculation is correct according to the rules.

0.149260628
0.215341959
0.13077634
0.504621072
0.149260628

The development of the EPIC model indicator was obtained from the results of interviews with several MSMEs in Jember Regency and the research team. The determination of

filling 1 and 0 is also the same because MSME actors do not find it difficult to determine, such as giving a yes or no choice. Calculations at Level 3 or the AHP modification criteria can be seen in the illustration in Table 5 and the following explanation. Table 5 provides a clear assessment of the example of one of the MSMEs there on how to assess criteria with the EPIC model indicators.

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 is to calculate the S score using equation 1. Then refer to Table 3 and obtain a matrix like the following

5.0	27.0	23.5	15.0	
0	0	0	0	4.55
1.2				1.19166
5	5.00	4.33	3.83	7
1.6				1.56666
7	6.75	5.00	3.92	7
2.7	13.3			
0	5	9.05	5.00	2.4
5.5	32.0	27.5	16.3	
8	0	0	3	5

From the matrix above, the synthesis process and consistency calculation

are carried out. The obtained priority vector value

0.328482
0.068315
0.082722
0.142248
0.378232

The same is done for the other alternatives so that the priority vectors of all alternatives are obtained. In each priority vector calculation, a CR calculation is also carried out to ensure that there are no problems in the pairwise comparison step of the AHP modification as shown in Table 6.

Table 6. The results of Consistency Random

	C1	C2	C3	C4
A1	0.32848	0.50663	0.40853	0.3091
2		3	6	1
A2	0.06831	0.07337	0.10467	0.0937
5		2	4	8
A3	0.08272	0.09960	0.11686	0.1137
2		3	9	2
A4	0.14224	0.09960	0.18495	0.1424
7		3	9	5
A5	0.37823	0.22079	0.18495	0.3409
2			9	3
C	9.6%	8.8%	3.2%	4.5%
R				

Alternative priority order or at level 3 AHP modification is done by multiplying the priority vector matrix of the criteria with the criteria priority vector obtained from the calculations at the beginning of this section. An illustration of the calculation sequence with AHP modification can be seen in Figure 3.

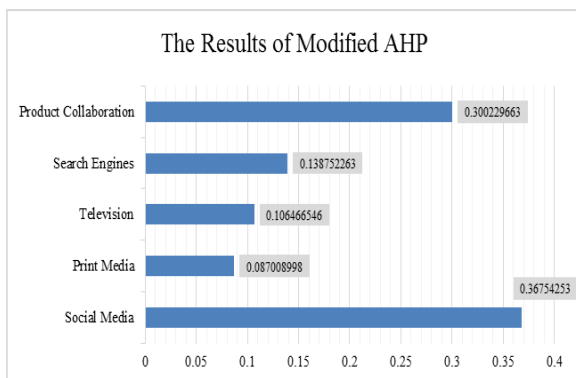


Figure 3. The result of Modified AHP

Social media has a considerable influence, followed by product collaboration from the form filled out by MSME actors in making decisions about which promotional media to use. From the results of interviews, in general, MSME actors who are the targets of filling out questionnaires tend to choose social media and product collaborations a lot. According to them, other options do not have a big impact in terms of sales volume which has an impact on the amount of profit earned. On the contrary, such as the unaffordable financing of print media such as newspapers, magazines, and the like in terms of financing, is quite expensive than the top 2 rankings. Such as research conducted by Agustina where print media such as newspapers have not been ranked at the top. In this study, the highest ranking was advertising on TV, but in this study advertising on TV did not get the top rank.³⁰ This is because the target of distributing the questionnaires is different and the

³⁰ Agustina, Chandra. 2012. "Selection of Promotional Media Using the Analytic Hierarchy Process (AHP) Method Case Study: BSI Magelang." *Paradigm* 14(1).

purpose of the decision-making is also different.

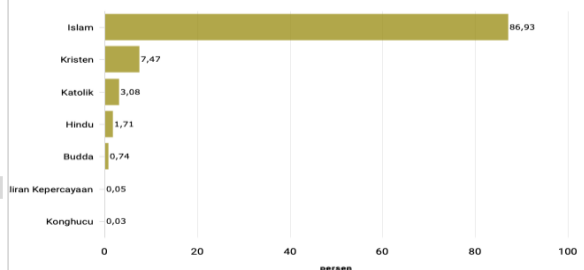


Figure 4. Total Muslim Population in Indonesia

Figure 4 presents data from the Dukcapil of the Ministry of Home Affairs, it is recorded that the number of Indonesians who are Muslim until December 2021 is 86.93%, or 238.09 million people. This means that the Muslim population is ranked first and the potential and opportunity to get consumers to buy halal-certified food and beverage business products can affect the increase in sales volume³¹.

This AHP modification method provides a concise illustration to the reader so that in the process of obtaining quite complex data in AHP it can be simplified and accurate results are obtained as well. This can be proven by the results of previous studies using ordinary AHP with different data acquisition processes but producing the same sequence with values that are not much different.

³¹ 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.

Some of the advantages of this AHP modification method include:

1. Facilitate the filling of pairwise comparisons by MSME actors so that it does not cause multiple interpretations or subjectivity for MSME actors on a large scale.
2. From the researcher's point of view, the additional calculation process.

While the disadvantages of this method are:

1. From the researcher's point of view, there are a few additional steps but not so much impact in terms of processing time.
2. The unavailability of web or mobile-based applications to accelerate it raises choices for readers to develop it.

AHP as a new alternative to obtain a pairwise comparison matrix in the AHP step. In its development, the developed matrix utilizes the EPIC model which basically can be used as additional consideration for further analysis with its 4 dimensions. In this study, both level 1 and level 2 also used an indicator matrix based on the epic model. In the case examples given, social media can be an alternative for promotion. It also gives results that are not much different from previous studies. But in this study, data collection is much easier and faster. It caused by the form of the questionnaire was simple and only takes less than 2 minutes like Figures 2 and 5. Whereas in previous research due to many considerations in the AHP scale, the process of retrieval per unit of data can be up to 10 minutes per questionnaire. Furthermore, web- or mobile-based applications can be developed to reach a wider range of respondents.

CONCLUSIONS AND SUGGESTIONS

This study has discussed the method of developing modified

Author's Contribution

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

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

Acknowledgements

The researcher would like to thank those who have helped complete this article, especially when collecting data and reviewing the contents of the article.

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 Xueting, 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, Aboufazel Aboufazel, 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 Alaine 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 Mahmud, 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*.