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Abstract

The Indonesian government is currently concentrating its efforts on ensuring a halal product. A case study conducted in an Indonesian province shows an imbalance in the number of halal-certified and the number of SMEs that provide products for the customer. An in-depth analysis of the variables must be conducted to strengthen the halal certification body. This research aims to conduct the institutional strengthening of the halal certification body in Indonesia. Three sectors have the authority to inspect business units in Indonesia to obtain halal certification involving government, private, and collaboration. The study

collected data from 6 resource persons who are specialists in their professions, such as academics, halal auditors, government, and private entities, through semi-structured interviews and focus group discussions. The analytical hierarchy process (AHP) method was used to determine strategy in decision making by considering four main criteria determining factors for strengthening the halal certification body, which consisted of barriers, drivers, organization, and competitiveness. The results of this study indicated that there were 32 sub-criteria which are the factors for institutional strengthening of the halal certification body. The government sector was chosen as a top priority in the strategy for strengthening the halal certification body. Future study is suggested to improve the performance of the Halal certification body by exploring various stakeholders and entity in the system.

Keywords (separated by '-')	Halal certification - Institutional strengthening strategy - AHP - Government - Private - Collaboration

Institutional Strengthening Strategy on Halal Certification Body

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Abstract. The Indonesian government is currently concentrating its efforts on ensuring a halal product. A case study conducted in an Indonesian province shows an imbalance in the number of halal-certified and the number of SMEs that provide products for the customer. An in-depth analysis of the variables must be conducted to strengthen the halal certification body. This research aims to conduct the institutional strengthening of the halal certification body in Indonesia. Three sectors have the authority to inspect business units in Indonesia to obtain halal certification involving government, private, and collaboration. The study collected data from 6 resource persons who are specialists in their professions, such as academics, halal auditors, government, and private entities, through semi-structured interviews and focus group discussions. The analytical hierarchy process (AHP) method was used to determine strategy in decision making by considering four main criteria determining factors for strengthening the halal certification body, which consisted of barriers, drivers, organization, and competitiveness. The results of this study indicated that there were 32 sub-criteria which are the factors for institutional strengthening of the halal certification body. The government sector was chosen as a top priority in the strategy for strengthening the halal certification body. Future study is suggested to improve the performance of the Halal certification body by exploring various stakeholders and entity in the system.

Keywords: Halal certification · Institutional strengthening strategy · AHP · Government · Private · Collaboration

1 Introduction

This case study was conducted in Riau Province, which has a population of 6,394,087 million people with a Muslim majority of 87% [1]. This increases the demand for halal items, particularly among Muslims. Small and Medium Enterprises (SMEs) are critical foundations of the national economy that may boost economic growth and absorb labor. SMEs are also the types of enterprises or business organizations that connect with people regularly at different levels. The government announced on their website in November

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2020 that there are at least 15,126 SME actors. It is not proportional to the large number of items that have been certified, as indicated in Fig. 1. There are 385 business actors that have carried out halal certification in 2020. On the other hand, this results in an imbalance between the number of business actors and the number of products that have carried out halal certification in Riau by 2.55%.

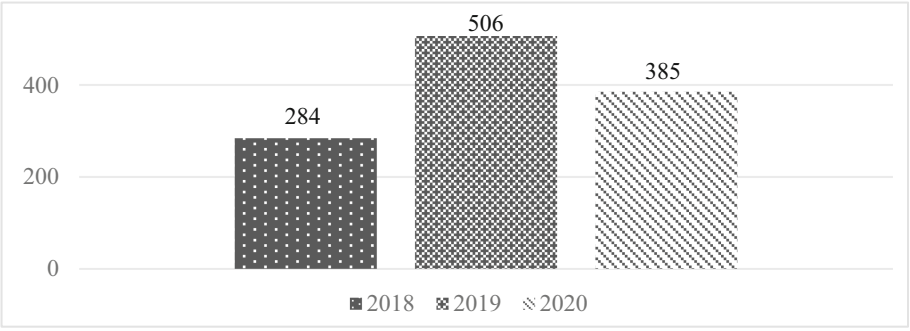

Fig. 1. Number of Halal products in Riau in 2018–2020

Halal assurance of a product is currently an issue that cannot be ignored. Given the large number of products circulating in the community, supervision and assistance related to cleanliness, halalness, and the feasibility of SME products in the food sector needs to be implemented. A study confirms that business actors must produce products that meet consumer needs and meet the standards set by the government [2]. The government has also made efforts to increase the number of certifications with various achievement parameters. The aim is to maintain the quality of imported products entering the Indonesian market and to keep local products competitive with imported products. In this case, halal certification can be done by government organizations, the private sector, or in partnership with universities. These three agencies have the power to control the current halal certification body in Indonesia. The halal certification body serves as a platform for encouraging community business units to achieve halal product certification [3]. The policy of halal certification is governed by Law No. 33 of 2014 on Halal Product Guarantee (UUJPH). A halal certificate is required for all products that enter, circulate or trade in Indonesia. According to UUJPH, the Halal Product Guarantee Agency (BPJPH) issues the formal halal certificate, which is required mandatory. The process of issuing halal certification in Indonesia is depicted in Fig. 2 [4]. There are several stakeholders involved in the process, including applicants or business actors, the government, halal supervisors or internal halal auditors, and Halal Assurance Institutions (LJH) in the form of BPJPH and MUI, Halal Inspection Agency (LPH) in the form of LPPOM and other related institutions.

The flow of the certification process above shows that a core problem can be drawn in this study. The halal certification body needs a strategy to increase the number of SMEs obtaining halal certification. A qualitative study on institutional strengthening elements for halal certification bodies is needed to address these issues. It aims to identify variables that affect SMEs undertaking halal certification and develop the optimal

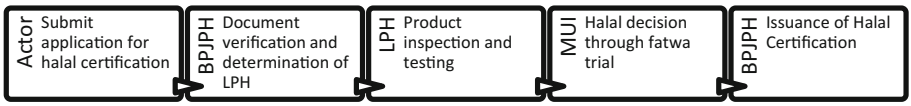

Fig. 2. Procedure for Halal certification in Indonesia

choice strategy for current issues. A study stated that the Analytical Hierarchy Process (AHP) methodology requires a decision-making method (Multiple Attribute Decision Making) to establish the strategy for a complicated problem. Multi-Objective Decision Making (MODM) and Multi-Attribute Decision Making (MADM) are the two types of MCDM. The Analytical Hierarchy Process (AHP) has been widely utilized to address problems in numerous industries such as education, industry, and engineering [5]. It is regarded as the most effective and widely used MCDM approach in various studies. AHP can be used in a variety of situations, including ranking order, prioritizing, resource allocation, and decision-making. AHP aids decision-makers by providing a numerical basis for quantifying the weight of the evaluated criteria. Each element's criterion weight is established by its relative value concerning other hierarchical elements. As a result, AHP can help decision-makers discover and prioritize important issues [6]. Decision-makers frequently employ AHP to examine the link between linguistic data [7]. Compiling a hierarchical structure, performing pairwise comparisons, computing partial weights, testing consistency, and doing synthesis are the primary processes in applying the AHP technique to solve problems [8]. As a result, this study is planned to provide policymakers with recommendations for developing methods to improve halal product certification in Indonesia.

2 Methodology

2.1 Selection of Indicators

The selection of criteria was carried out based on a review of literature studies that had been carried out by previous researchers, as stated by [9] stated in her research. She explained that there were at least 21 indicators or sub criteria with two variables or main criteria that influenced SMEs in carrying out halal certification. It is also equipped with additions from other literature studies to meet the barrier, driver, organizational, and competitiveness variables. A barrier variable is a sort of variable that causes or makes it difficult for business actors to do the halal certification. In this study, the drivers are in the form of drivers or elements that can help business actors succeed in halal certification. Organizational factors are those that are directly influenced by the company's internal management, whereas competitiveness is the polar opposite of organizational variables, arising as a result of conditions beyond the company's control. Thus, this case study found that four primary criteria and 32 sub-criteria were used to establish the optimal strategy for halal certification institutions to increase the number of halal certifications. Table 1 describes the dimensions of the criteria that are considered significant and are used as factors for strengthening the halal certification institution in increasing the number of halal certifications.

Table 1. Indicators in institutional strengthening in Halal certification body

Variable (MC)	Item (SC)	Code	Reference
Barriers (B)	Difficult licensing bureaucracy (MD distribution permit, IUMK, IUI, P-IRT)	B1	[9]
	Limited financial resources	B2	[9]
	Stages of the certification procedure that are unclear	B3	[9]
	Information is scarce regarding JPH	B4	[9]
	The raw materials for business players' products are assumed to be halal	B5	[9]
	Certification has a short validity term (2 years)	B6	[9]
	The time it takes for a halal certificate to be issued	B7	[9, 10]
	Institutional coaching and services are lacking	B8	[9, 10]
	Business actors have a low level of education	B9	[9]
	Government enforcement and affirmation are lacking	B10	[9, 10]
	Unavailability of raw materials according to SOP in certification	B11	[9]
Drivers (D)	Consumer awareness of the importance of safe and hygienic products	D1	[9]
	The increasing in the company's image and branding	D2	[9]
	Actors in the business world are aware of the regulations and Islamic law	D3	[9]
	The Halal logo adds value to the goods	D4	[9]
	Increased customer confidence and income	D5	[9]
	Halal certification is mandatory under UUJPH	D6	[9]
	Based on the UUJPH Islamic business model, halal certification is required (Halalan Thayyiban)	D7	[9]
	Halal certification as a commercial commodity	D8	[9]
	Program for halal certification	D9	[9]
	It is permissible to market things without fear of being prosecuted	D10	[9, 11]
Organizational (O)	Lack of knowledge regarding halal items among business actors	O1	[11]
	Top managerial commitment is lacking	O2	[11, 12]
	The unpreparedness of production facilities for a halal production system	O3	[12, 13]

(*continued*)

Table 1. (*continued*)

Variable (MC)	Item (SC)	Code	Reference
	Operations management capability in adopting halal services	O4	[13]
	Traceability documents are available and up to date	O5	[14]
Competitiveness (E)	Limited availability of halal-certified raw material suppliers	E1	[11]
	The shift in the lifestyle of the Indonesian people following the west	E2	[11]
	Government support to provide halal logistics services	E3	[12]
	Competitive pressure as a threat of losing the advantage	E4	[13]
	Market demand for halal products	E5	[13, 15]

2.2 Stages of Analysis

The method adopted in this study was the AHP method which is useful for decision-makers to solve complex problems by considering a supporting hierarchy model. In solving a problem using the AHP method, several steps starting from the preparation of a hierarchical structure to synthesizing the results [8].

Hierarchical Structure. The construction of the hierarchical structure is a crucial phase in the AHP method's processing; this hierarchy consists of numerous layers that typically start from a high level and work their way down, as shown in Fig. 3. In general, the AHP paradigm begins with level 1 as the primary goal, then moves on to level 2 as the primary criteria, level 3 as a sub criteria, and level 4 as alternate options.

Pairwise Comparison. Following the creation of a hierarchical structure, a pairwise comparison was performed between the indications discovered. At each matrix or level, comparisons were conducted, and nine scales were utilized in the process, as indicated in Table 2. This scale was used to quantify the relative relevance of indicators. It is crucial to consider which preference is more important than other items at the same hierarchical level or level when choosing between two indicators [8].

The calculation of the geometric mean was used in this case to determine the average group assessment of all respondents.

$$\begin{bmatrix} b_{11} & b_{12} & \dots & b_{1n} \\ b_{21} & b_{22} & \dots & b_{2n} \\ \vdots & \vdots & \dots & \vdots \\ b_{n1} & b_{n2} & \dots & b_{nn} \end{bmatrix} \tag{1}$$

$$GM = \sqrt[n]{X1 \times X2 \times \dots Xn} \tag{2}$$

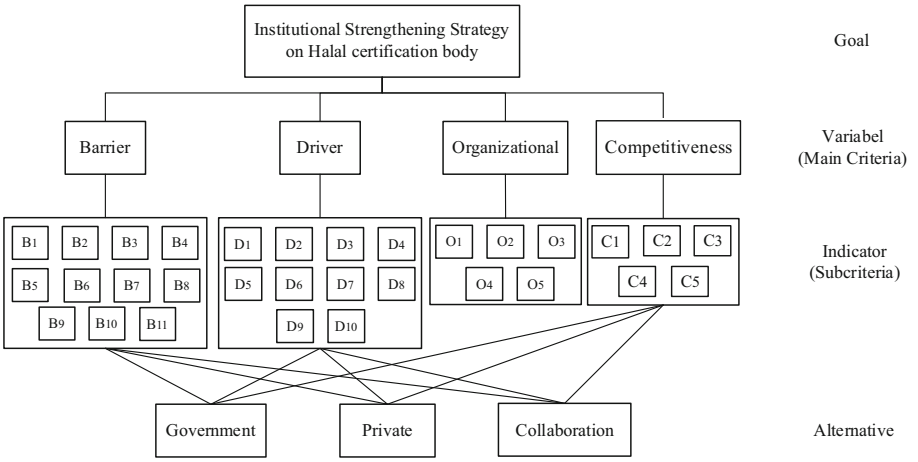

Fig. 3. The hierarchical structure of institutional strengthening at the Halal certification body

Table 2. Interest intensity scale

Importance intensity	Definition
1	Equally important
3	A little bit more important
5	More important
7	Highly important
9	Absolutely more important
2, 4, 6, 8	If doubt between two side by side values
Opposite	If element *i* has one digit above when compared to element *j,* then *j* has the opposite when compared to element *i*

The formula above is a geometric mean calculation, where "n" is the number of respondents while "X1" is the assessment of the 1st respondent in cell "*b11*" for each respondent's assessment, and "Xn" is the assessment of the nth respondent.

Partial Weight Calculation. Many methods for estimating the partial weights of comparison matrices have been devised by experts. The eigenvector and logarithm approaches, on the other hand, are appropriate methods for calculating partial weights. The founder of AHP developed the eigenvector approach which is derived from matrix theory in his research. The weight calculation is determined using this approach after normalizing the matrix by multiplying the values in each row by the number of columns in the matrix. The matrix "b" in Eq. (1) can be represented as, where "n" is the number

of rows.

$$\text{Partial weight} = \begin{bmatrix} (b_{11} + b_{12} + ... + b_{1n})/n \\ (b_{21} + b_{22} + ... + b_{2n})/n \\ (b_{n1} + b_{n2} + ... + b_{nn})/n \end{bmatrix} \tag{3}$$

Consistency Testing. Testing the consistency ratio on a matrix is very important to do. It is useful to find out whether the data being tested is more than 0.1 (CR $\leq$ 0.1). If it exceeds the limit, then the comparison between elements is inconsistent, and comparisons between elements must be re-done. The intensity of each level is calculated in the same way to calculate the priority and consistency of the ratio. In calculating the consistency ratio of a matrix, there are several elements to consider, namely consistency index (CI) and random index (RI). Equation (4)–(6) is a step in finding the consistency index value of a matrix.

$$Vector\ consistency = geometric\ mean \times partial\ weight \tag{4}$$

$$Eigen\ value\ (\lambda\ max) = \frac{\sum_{i=0}^{n} consistency\ vektor}{n} \tag{5}$$

$$CI = \frac{\lambda max - n}{n} \tag{6}$$

The CR was calculated by dividing the CI and RI values after obtaining the consistency index value of a matrix. The Random Index (RI) value utilized in this investigation is shown in Table 3.

Table 3. Random index [8]

n	1	2	3	4	5	6	7	8	9	10	11
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51

Synthesis of Results. The partial weights of the main criteria matrix and the sub-criteria matrix are multiplied at this stage. The alternative priorities were synthesized using the value of the vector consistency and partial weights. The synthesis process begins at the bottom of a hierarchy and progresses to the top. Then, the total weight is added using the formula stated in Eq. (7).

$$Total\ overall\ weight = \sum weight\ of\ alternative\ criteria \tag{7}$$

It is crucial to note that the total sum of the possible weights must be 1.00. The weight value of an alternative determines its priority in developing the halal certification body. The bigger the weight value of an alternative, the more likely it is to become a priority in strengthening the halal certification body.

3 Results and Discussion

Focus group discussions and brainstorming with the LPH (Halal Inspection Agency) are the alternate technique chosen based on the findings of early observations. Halal Inspection Agency from The government, the private sector, and collaboration are three competing strategies that can be employed to solve existing problems. This alternative technique was chosen because all three options have the potential to become a halal certification body capable of regulating the Indonesian halal certification process. On the government side, the LPH is LPPOM. The private sector is defined as an entity or company that can audit SMEs and has been certified by the government as a halal guarantee institution in the second alternative plan. The last alternative is collaboration in the form of universities that can invite private parties or the government to conduct training for universities so that they can become LPHs capable of auditing SMEs. The three alternative options described previously have been summarized in Table 4 and will be evaluated for selection.

Table 4. Summary of alternative options.

Description	Government	Private	Collaboration
Experience	33 yr	2 yr	5 yr
Validity	4 yr	4 yr	4 yr
Model	A	B	C
Certified by	SNI ISO/IEC 17065:2012	ISO 17020	BNSP
Technology	Real time PCR, GC-FID, GC-MS	PCR-DNA, FTIR, UPLC	HPLC,ICP-MS
Publisher	BPJPH	BPJPH	BPJPH

Based on the AHP steps for the case studies discussed in the previous Sect. 2 and the basic model developed in this study, the results of the pairwise comparisons of the main criteria, subcriteria, and pairwise comparisons of the alternatives are presented and the results that have been synthesized are also presented.

3.1 Pairwise Comparison of Main Criteria (MC)

Barrier, driver, organizational, and competitiveness are all part of the MC matrix. The consistency ratio is verified when group assessments from respondents are included in the comparison matrix. If the consistency ratio (CR) is equal to or less than 0.10, the respondent's judgment can be accepted. The CR value for the six respondents' assessments was found to be less than 0.10, indicating that all of the respondents' assessments were consistent, and there was no need to perform pairwise comparisons again. Table 5 shows the pairwise comparison matrix where the geometric mean and matrix normalization calculations have been carried out, where the result of the CR calculation for this matrix is 0.012. The CR matrix is less than 0.10 or 10%, the matrix is considered consistent, and the calculation can be continued.

Table 5. Main criteria matrix normalization.

Main criteria	B	D	O	E	Partial weight	Consistency ratio
B	0.275	0.230	0.324	0.231	0.265	**0.012**
D	0.267	0.224	0.189	0.259	0.235	
E	0.320	0.446	0.377	0.395	0.385	
O	0.138	0.100	0.111	0.116	0.116	
Sum	1.000	1.000	1.000	1.000	1.000	

3.2 Pairwise Comparison of Subcriteria (SC)

After calculating the partial weights and checking the consistency of the ratios on the main criteria, the next step is to perform pairwise comparison calculations for the sub criteria of each indicator on the main criteria. Tables 6, 7, 8 and 9 shows the calculation of the sub criteria matrix that has been normalized and then weighted for all sub criteria.

Table 6. Normalization of the subcriteria barrier matrix

SC	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	Partial weight	CR
B1	0.06	0.03	0.09	0.09	0.05	0.23	0.04	0.05	0.05	0.06	0.07	**0.07**	**0.07**
B2	0.10	0.05	0.10	0.10	0.07	0.04	0.05	0.02	0.09	0.04	0.02	**0.06**	
B3	0.09	0.07	0.13	0.13	0.15	0.07	0.12	0.09	0.18	0.15	0.14	**0.12**	
B4	0.07	0.05	0.10	0.10	0.14	0.06	0.12	0.04	0.12	0.13	0.21	**0.10**	
B5	0.15	0.10	0.10	0.09	0.12	0.12	0.11	0.09	0.11	0.20	0.11	**0.12**	
B6	0.02	0.07	0.10	0.09	0.05	0.05	0.02	0.07	0.07	0.10	0.04	**0.06**	
B7	0.10	0.08	0.07	0.05	0.07	0.14	0.06	0.06	0.04	0.04	0.09	**0.07**	
B8	0.11	0.19	0.11	0.17	0.11	0.06	0.09	0.08	0.04	0.04	0.04	**0.09**	
B9	0.11	0.05	0.06	0.07	0.10	0.07	0.15	0.18	0.09	0.08	0.07	**0.09**	
B10	0.12	0.14	0.09	0.08	0.06	0.06	0.18	0.19	0.12	0.10	0.13	**0.12**	
B11	0.07	0.16	0.06	0.03	0.08	0.11	0.05	0.13	0.10	0.06	0.07	**0.08**	
Sum	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	

According to Tables 6, 7, 8 and 9, the partial weight and consistency ratio calculation results for the complete subcriteria matrix, in which the CR value produced does not exceed 10%, indicating that the pairwise comparison evaluation conducted by all respondents is consistent.

3.3 Pairwise Comparison of Alternatives and Synthesis of Results

Table 4 shows that three alternatives were chosen to enhance the halal certification body in this research case study. These three alternatives each feature laboratories with

Table 7. Normalization of the subcriteria matrix driver

SC	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Partial weight	CR
D1	0.14	0.11	0.14	0.09	0.10	0.15	0.12	0.17	0.19	0.21	**0.14**	**0.05**
D2	0.09	0.07	0.06	0.05	0.11	0.05	0.05	0.09	0.07	0.07	**0.07**	
D3	0.08	0.08	0.07	0.05	0.05	0.07	0.05	0.09	0.16	0.09	**0.08**	
D4	0.13	0.14	0.14	0.09	0.07	0.11	0.09	0.09	0.05	0.04	**0.09**	
D5	0.16	0.07	0.18	0.14	0.11	0.10	0.20	0.06	0.07	0.16	**0.12**	
D6	0.10	0.17	0.12	0.09	0.12	0.11	0.13	0.11	0.09	0.06	**0.11**	
D7	0.09	0.11	0.10	0.07	0.04	0.06	0.07	0.06	0.14	0.06	**0.08**	
D8	0.08	0.07	0.08	0.08	0.16	0.09	0.11	0.09	0.05	0.13	**0.09**	
D9	0.07	0.10	0.04	0.16	0.16	0.11	0.05	0.18	0.09	0.09	**0.11**	
D10	0.06	0.09	0.08	0.20	0.07	0.16	0.11	0.06	0.09	0.09	**0.10**	
Sum	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	

Table 8. Normalization of the organizational subcriteria matrix

SC	O1	O2	O3	O4	O5	Partial weight	Consistency ratio
O1	0.24	0.26	0.21	0.24	0.27	**0.24**	**0.03**
O2	0.12	0.13	0.22	0.12	0.10	**0.14**	
O3	0.21	0.11	0.18	0.18	0.26	**0.19**	
O4	0.30	0.32	0.30	0.29	0.24	**0.29**	
O5	0.13	0.19	0.09	0.17	0.14	**0.14**	
Sum	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	

Table 9. Normalization of the subcriteria competitiveness matrix

SC	E1	E2	E3	E4	E5	Partial weight	Consistency ratio
E1	0.18	0.16	0.39	0.19	0.09	**0.20**	**0.09**
E2	0.17	0.15	0.12	0.10	0.20	**0.15**	
E3	0.10	0.27	0.21	0.33	0.35	**0.25**	
E4	0.15	0.27	0.12	0.18	0.18	**0.18**	
E5	0.39	0.15	0.16	0.19	0.19	**0.22**	
Sum	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	

various testing methods. Respondents were explicitly educated about the information and distinctions between these three possibilities while filling out the questionnaire. The

three possibilities are represented by the symbols A, B, and C in this study. Table 10 shows the partial weight computation for each choice. Table 10 was used to do all pairwise comparisons, vector consistency calculations, and matrix normalization, after which the data were synthesized to provide the ranking results for each alternative using Eq. (7) from the preceding section. The total weight of each matrix is shown in Table 10. Based on the three options, agency "A" had the highest priority score of 0.423, indicating that government agencies are the top priority in the halal certification body's institutional strengthening plan, which can be seen in Fig. 4. Furthermore, in the case study in this research, agency "C," namely the university, has a priority score of 0.332, making it the second priority. Meanwhile, the agency "B," namely the private sector, receives a priority score of 0.246, making it the last alternative. The results were then subjected to sensitivity analysis to determine their stability and resilience.

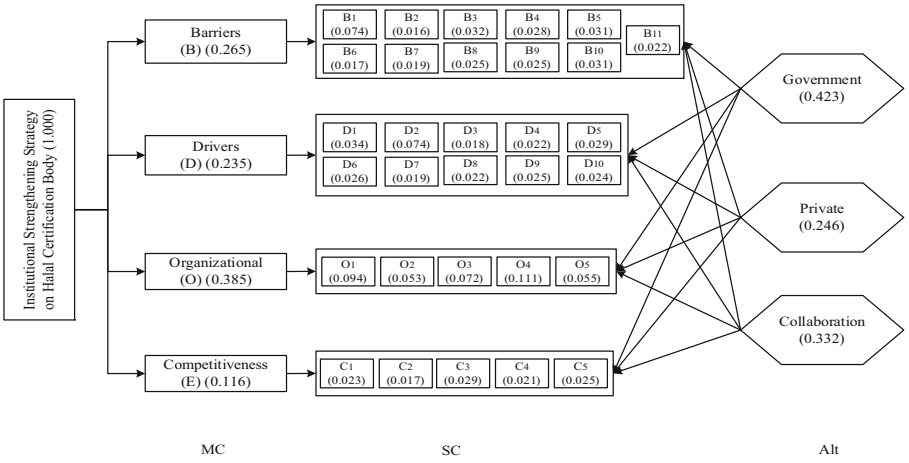

Fig. 4. Alternatives chosen

4 Stability Analysis

The AHP method was used to break down a complex and unstructured situation into multiple components in a hierarchical order, namely by providing a subjective assessment of each variable's relative importance and determining which variable has the highest priority to influence the situation's outcome. Changes in hierarchy and scoring can have a direct impact on the framework's outcomes. As a result, a stability analysis should be used to verify the robustness of an AHP architecture. The rating stability of various projection scenarios was tested. Dynamic sensitivity analysis was utilized to test rating stability by shifting the importance of the objectives. The weight of the criteria is increased or decreased in dynamic sensitivity analysis, resulting in changes in alternative priorities. Five scenarios are investigated and simulated in this research to see how these alterations affect the final ranking of options. This scenario is designed to see if adding weight to a variable has an impact on the case study's final alternative results.

Table 10. The weighting of institutional strengthening matrix for Halal certification body

MC	Partial weight (1)	SC	Partial weight (2)	The total weight (3)	Alternative partial weight			Total overall weight		
					A	B	C	A	B	C
Barrier	0.265	B1	0.074	0.020	0.56	0.20	0.24	0.011	0.004	0.005
		B2	0.061	0.016	0.50	0.22	0.28	0.008	0.004	0.005
		B3	0.120	0.032	0.35	0.36	0.30	0.011	0.011	0.009
		B4	0.104	0.028	0.44	0.24	0.31	0.012	0.007	0.009
		B5	0.118	0.031	0.55	0.21	0.24	0.017	0.007	0.007
		B6	0.063	0.017	0.42	0.37	0.22	0.007	0.006	0.004
		B7	0.073	0.019	0.40	0.20	0.40	0.008	0.004	0.008
		B8	0.093	0.025	0.27	0.30	0.44	0.007	0.007	0.011
		B9	0.094	0.025	0.40	0.33	0.26	0.010	0.008	0.007
		B10	0.115	0.031	0.22	0.25	0.53	0.007	0.008	0.016
		B11	0.084	0.022	0.47	0.20	0.33	0.011	0.004	0.007
Driver	0.235	D1	0.143	0.034	0.51	0.22	0.28	0.017	0.007	0.009
		D2	0.071	0.017	0.44	0.22	0.34	0.007	0.004	0.006
		D3	0.078	0.018	0.25	0.33	0.43	0.005	0.006	0.008
		D4	0.095	0.022	0.33	0.27	0.40	0.007	0.006	0.009
		D5	0.125	0.029	0.48	0.23	0.29	0.014	0.007	0.009
		D6	0.110	0.026	0.45	0.19	0.35	0.012	0.005	0.009
		D7	0.080	0.019	0.45	0.20	0.36	0.008	0.004	0.007
		D8	0.093	0.022	0.50	0.23	0.27	0.011	0.005	0.006
		D9	0.106	0.025	0.35	0.29	0.36	0.009	0.007	0.009
		D10	0.101	0.024	0.30	0.36	0.34	0.007	0.009	0.008
Organizational	0.385	O1	0.243	0.094	0.46	0.24	0.30	0.043	0.023	0.028
		O2	0.138	0.053	0.29	0.26	0.45	0.015	0.014	0.024
		O3	0.188	0.072	0.40	0.23	0.37	0.029	0.017	0.027
		O4	0.288	0.111	0.49	0.19	0.32	0.055	0.021	0.035
		O5	0.143	0.055	0.46	0.24	0.31	0.025	0.013	0.017
Competitiveness	0.116	E1	0.201	0.023	0.43	0.23	0.34	0.010	0.005	0.008

(*continued*)

Table 10. (*continued*)

MC	Partial weight (1)	SC	Partial weight (2)	The total weight (3)	Alternative partial weight			Total overall weight		
					A	B	C	A	B	C
		E2	0.150	0.017	0.40	0.29	0.31	0.007	0.005	0.005
		E3	0.252	0.029	0.39	0.27	0.34	0.011	0.008	0.010
		E4	0.180	0.021	0.50	0.25	0.25	0.010	0.005	0.005
		E5	0.216	0.025	0.46	0.24	0.30	0.012	0.006	0.007
Total	1.00									
Priority level								0.423	0.246	0.332
Alternative ranking								1	3	2

4.1 Scenario 1

In the scenario in the first simulation, the four main criteria are given the same weight with a weight of 25% each, as shown in Fig. 5. From the graph, it can be observed that the final ranking of the alternatives remains or does not change.

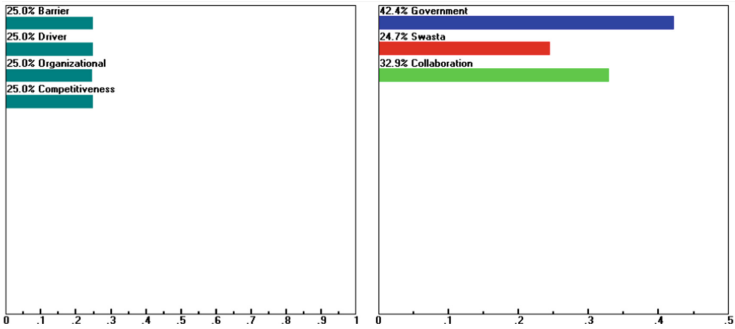

Fig. 5. Dynamic sensitivity graph for AHP framework (all criteria equal weight).

4.2 Scenario 2

In the second scenario, the main barrier criterion is given a weight of 50%, which changes the weight of the other criteria, as shown in Fig. 6. However, the ranking of the first alternative is still the same or consistent with the previous scenario.

4.3 Scenario 3

Even though the important weight for the driver criteria is set to 50% in this third case, as illustrated in Fig. 7, the ranking of alternatives remains stable.

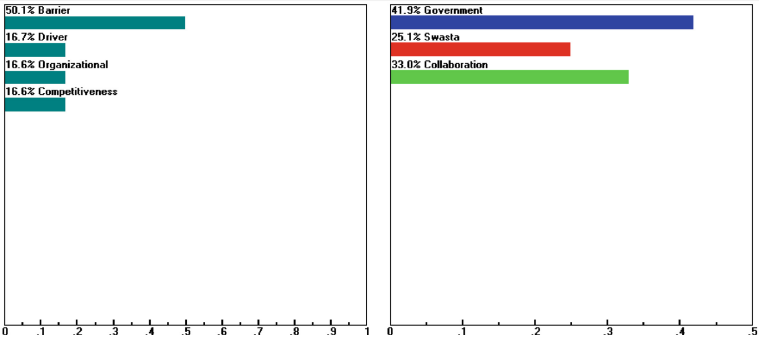

Fig. 6. Dynamic sensitivity graph for AHP framework (with 50% barrier weight).

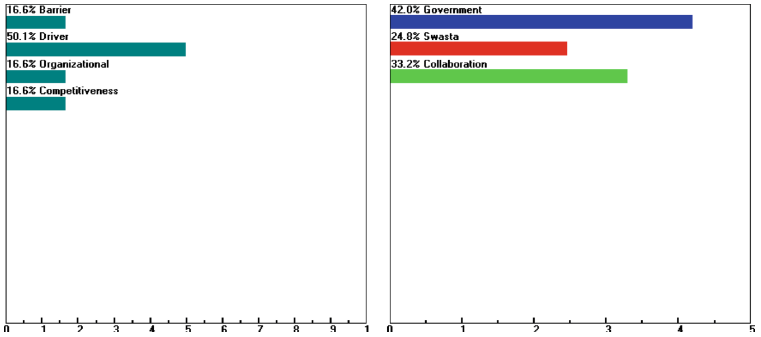

Fig. 7. Dynamic sensitivity graph for AHP framework (with 50% driver weight).

4.4 Scenario 4

In this scenario, 50% importance is given to the main organizational criteria (O). Figure 8 represents a dynamic sensitivity graph, where the graph still shows alternative "A" or government as the first alternative option.

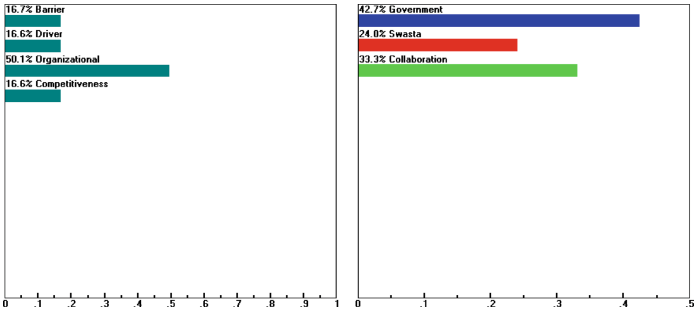

Fig. 8. Dynamic sensitivity graph for AHP framework (with 50% organizational weight).

4.5 Scenario 5

The major criteria competitiveness (E) has been given a weighting level of 50% in this scenario, and Fig. 9 depicts an alternate trend with alternative consistency "A" or government as the main ranking.

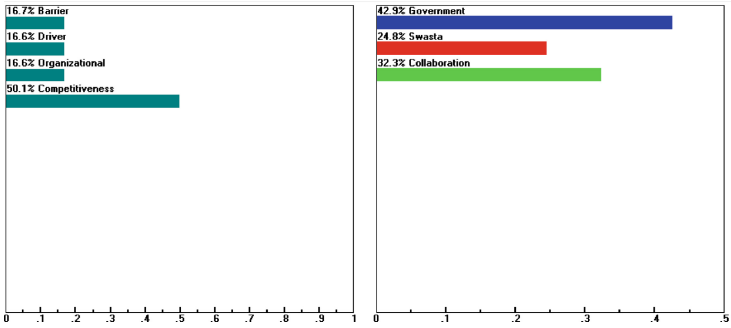

Fig. 9. Dynamic sensitivity graph for AHP framework (with 50% competitiveness weight).

Alternative "A" was chosen as the main priority in the strategy of strengthening the halal certification body with a weighting result of 0.423 or 42.3%. This is because when making pairwise comparisons with the other three variables, most of the respondents chose the interest intensity scale in the range 5–9 by considering the agency's 32-year experience in handling the halal certification process. The dynamic sensitivity graph's results are shown in Tables 5, 6, 7, 8 and 9. The proportion in each alternative can be changed by reducing or increasing the percentage of weighting on variables or major criteria, as shown in the graph of the test results. However, because it does not affect the final ranking outcomes, the AHP framework in this case study is stated to be stable, with a weighting percentage of 38.5% and the biggest weight from the cause indicator of SME for not doing halal certification, namely on the indicator of lack of willingness of the businessman on halal product and percentage weight 24.3% to overcome the problem on the indicator needs to conduct dissemination on the businessman or business unit about the importance of the halal product. Thus, the three sectors that were given the authority to carry out inspections of business units found that the government sector is believed to be able to play its role in increasing the number of halal product certifications in Indonesia.

5 Conclusion

This research aims to determine the strategy of institutional strengthening of halal certification bodies by considering different variables obtained from this study involving barriers, drivers, organization, and competitiveness. Three alternatives were selected in this case study research involving the government, private, and collaboration sectors. The government was selected as the main priority in the strategy of strengthening the halal certification body. Future study is suggested to make performance improvement

to the Halal certification body by exploring various stakeholders and entity within the system.

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Chapter 5

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