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Barriers of Integration Halal Assurance System and Quality Management System

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***Abstract**:*

Muslim consumers need products with halal status and good quality. Halal products are obtained if the company implements the Halal Assurance System (HAS). Good quality products are one of the results of implementing a Quality Management System (QMS). HAS and QMS can be integrated because of the similarities in the basic principles. The integration of the two systems provides benefits for the company, such as increasing performance, reducing documentation, reducing costs which lead to efficiency and effectiveness of the company, increasing consumer confidence, and a good corporate image. This study discusses the integration barriers of HAS and QMS using Interpretive Structural Modelling (ISM) and Fuzzy Analytical Hierarchy Process (FAHP) methods. ISM was used to determine the key barriers, while FAHP prioritized barriers in HAS and QMS integration. Barrier integration of HAS and QMS consisted of resources, technical implementation, attitudes, guidelines, economics, and regulations. Each barrier consisted of sub-barriers which will be discussed further in this paper. Questionnaires and focus group discussions are used for data collection. The ISM result showed that regulations and guidance are the key barriers to integration. FAHP showed that the absence of international halal standards was the main sub-barrier and should be resolved immediately. The Prioritization showed the urgency of barriers and sub-barrier that need to be resolved immediately so the integration of HAS and QMS can be adequately implemented.

***Keywords**: barriers, halal assurance, integrated management, quality management*

1. Introduction

The growth of the global Muslim population by 1.84% a year (Azam and Abdullah, 2020) causes halal products to be in high demand. *Halal* is an Arabic word that means lawful and permissible based on Islamic Syariah Law. It refers to Al Quran and Hadith (Yusuf et al., 2016). A product's halal status can only be achieved through halal certification, using Halal Assurance System (HAS) as the guidance. The application of HAS must be carried out throughout the supply chain, from farm to fork (Ahmad et al., 2018). HAS implementation will guarantee the consumer that the products are produced through a halal process, using halal ingredients and in accordance with the requirements.

Another important thing that the company must guarantee is quality. Good quality can be achieved only if the company implements Quality Management System (QMS). QMS is a set of procedures and policies to control an organization's processes. It ensures that the company's

products or services are stable in quality (Akhmetova et al., 2019). QMS that often use in Indonesia are Good Manufacturing Practices (GMP), Hazard Analysis Critical Control Point (HACCP), ISO 2200, ISO 9001, Food Safety Management System (FSMS), Approved Quality Assurance (AQA) (Rahman et al., 2017), British Retail Consortium (BRC), and International Featured Standard (IFS) food standards (Bernardo et al., 2015).

Integrated Management System (IMS) combines several interconnected management systems in one complete framework (Gianni et al., 2017). The benefits of management system integration are increased efficiency, reduced audit cost and time (Elizabeth et al., 2021), increased employee motivation, and increased company image and consumer trust (Satolo et al., 2013). Many types of research integrate Quality Management Systems; Environmental Management Systems (EMS); Occupational, Health, and Safety Management Systems (OHSMS), but the number of researches discuss the integration of HAS and other system management are still lacking. Several companies already implement the integration of HAS and QMS, but they still do the integration on their own and face some problems during the integration process.

Halal and quality are intertwined. Halal Assurance System is developed based on the basic principle of Total Quality Management (TQM) (Ceranić and Božinović, 2009); meanwhile, TQM is part of QMS. These two management share the same basic principle so that it can be integrated (Puspaningtyas and Sucipto, 2021). Integration of HAS and QMS could give some advantages to the industry, but there are some barriers to implementation. These barriers arise from internal and external. This study aims to analyze the key barriers and prioritize the sub-barriers of HAS and QMS integration. The study's outcome will be helpful for industries with a plan to integrate HAS and QMS into their company.

2. Method

The data were collected through focus group discussions and questionnaires. The variables were decided through a literature review and group discussion, as shown in **Table 1.** Focus group discussions involved lecturers and experts from industries. There were two types of questionnaires. The key barriers of HAS and QMS integration were collected through the VAXO questionnaire, and the data would be calculated using Interpretive Structural Modelling (ISM). ISM is a method that uses an expert's opinion and knowledge to construct a complicated system into a structural model (Mathiyazhagan et al., 2013). There was some research about barriers using ISM. Rauch et al. (2015) analyzed factors that inhibit the implementation of total productive maintenance in industries using ISM. Soni et al., (2020) utilized ISM to analyze the drivers and barriers on sustainable supply chain management in industries. ISM was utilized by Majumdar and Sinha (2019) to analyze the barriers of green supply chain management of textile industries in Southeast Asia. Based on some research mentioned above, ISM was suitable for analyzing the key barrier in this study.

The second questionnaire utilized pairwise comparison and would be calculated using Fuzzy Analytical Hierarchy Process (Fuzzy AHP). AHP is a method that uses hierarchy to structure decision-making. This method uses pairwise comparison based on an expert's opinion (Umadevi, et al (2012). Fuzzy triangular numbers were used in pairwise comparison to overcome the imprecision of subjective criteria assessment. The integration of Fuzzy and AHP allowed decision-makers to judge the assessment within a reasonable interval and minimize the subjectivity of AHP itself (Afolayan et al., 2020). FAHP is suitable for problems that need to be ranked or prioritized. Many studies utilized FAHP to prioritize barriers. Sirisawat et al. (2018) prioritized logistics barriers for exporting eggs.

Table 1. Barriers and sub-barriers of HAS and QMS integration

Barriers	Sub-barriers	Sources
Resources (B1)	Lack of budget integration (B11) Lack of employee's knowledge about halal and safety (B12) Lack of employee's motivation (B13) Lack of internal auditor (B14)	Demirci et al. (2016), Domingues et al (2016), Asif (2008), Rajković et al (2008), Ikram et al (2020), Widiastuti et al (2020)
Technical Implementation (B2)	Different management system requirement (B21) Lack of communication and teamwork (B22) Inadequate integrated audit method (B23) Lack of administration and management support (B24)	
Attitudes (B3)	Lack of employee awareness about the importance of integration (B31) Short term-oriented employee perception (B32)	
Guidance (B4)	Lack of consultants and external auditors who understand integration (B41) Lack of guidance and concept of assurance system integration (B42) Lack of certification bodies that understand the concept of quality assurance system integration (B43)	
Economic (B5)	Lack of value of quality assurance system integration in the market (B51) Differences in stakeholder demands (B52)	
Regulations (B6)	There is no international halal standard yet (B61) Constantly changing regulations and guidelines (B62)	

FAHP was used by prioritize barriers when implementing integrated lean six sigma in organizations. Musaad et al., (2020) utilized FAHP combined with FTOPSIS to analyze barriers and strategies to adopt Green Innovation on the SMEs scale. Based on that, FAHP was used to prioritize HAS and QMS integration barriers and sub-barrier in this study.

The ISM would analyze the key barriers of the HAS dan QMS integration, but it did not give the weight to them, so the weight of each barrier and sub-barrier would be calculated using FAHP. The framework of this study is shown in **Fig.1.**

The study began with a literature review. Some journals, proceedings, books, and articles from Elsevier, Hindawi, Emeralds, and other publications were used to decide the variables. Then the questionnaires for two methods were developed, and a focus group discussion was held. The ISM method was used through five steps and utilized EXsimpro software. The first step was developing Self-structured interpretive modeling (SSIM) of the barriers. The relationship between variables *(i,j)* will be analyzed using VAXO, as mentioned below:

V: variable *i* will help to the variable *j* (one direction)
A: variable *j* will help to the happening of *i* (one direction)
X: variable *i* and *j* are affecting each other
O: variable *i* and *j* are unrelated each other

The next step was analyzing the reachability matrix (RM) using binary (0,1) (Soni et al., 2020). In this study, RM and final matrix was the output of analysis using EXsimpro. Level partitions were based on reachability, antecedent, and intersection sets. The reachability set consisted of the criteria itself and other criteria which help to achieve. The antecedent set consists of the element and other elements that help achieve it. The intersection set is a set that is derived for all criteria. It is given a level if the criteria have the same intersection and reachability set. It can be more than one criterion at the same level (Beikkhakhian et al., 2015). The fourth step was ISM construction, and the last was MICMAC analysis. ISM method showed the key barrier of HAS and QMS integration.

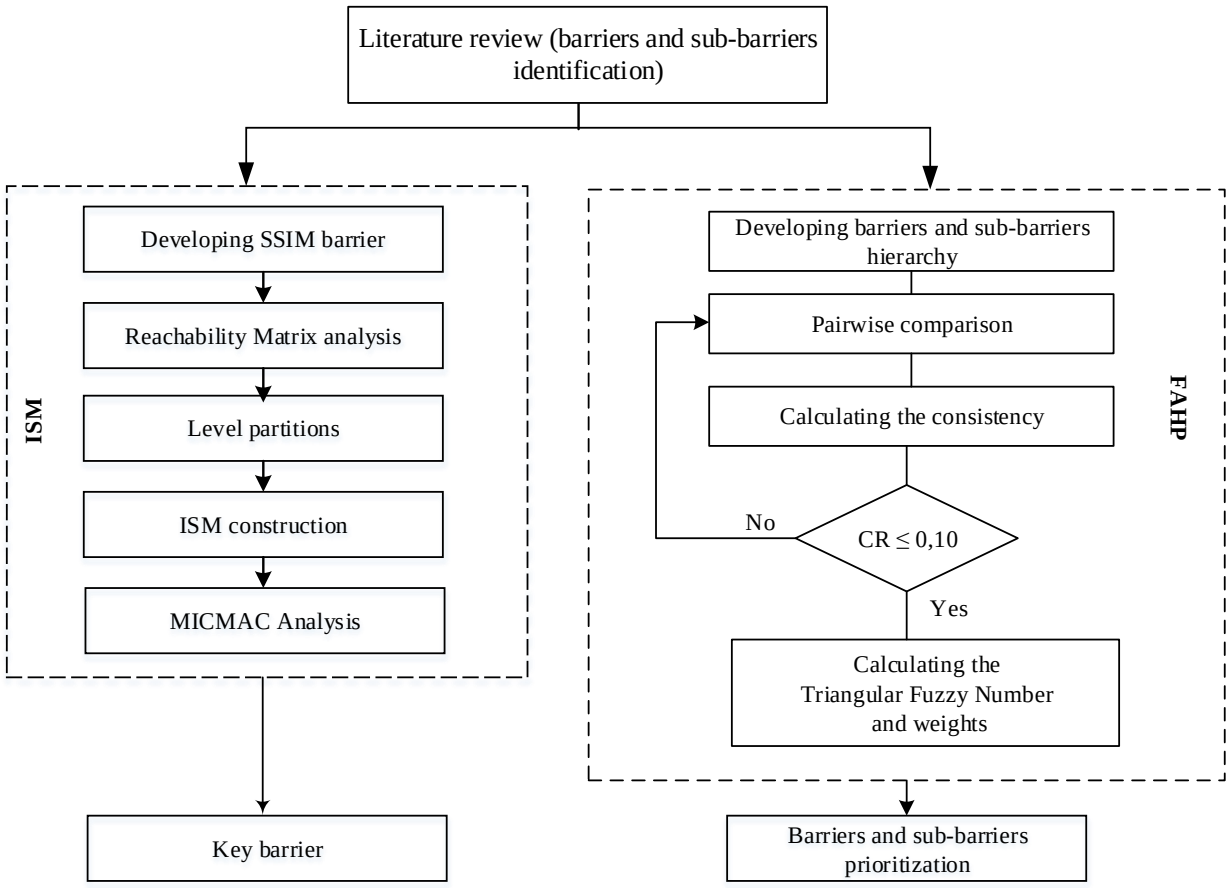

Fig 1. Framework of the study

For the fuzzy AHP method, the barriers and sub-barriers hierarchy were developed. Secondly, the pairwise comparison based on the expert's opinion was developed. Then the consistency of the expert's answer would be calculated using the Consistency ratio (CR). If the CR ≤ 0.10, the weight will be calculated using Triangular Fuzzy Number (TFN). The FAHP result showed the barriers and sub-barriers prioritization.

3. Result and Discussion

3.1 ISM result

The SSIM using VAXO can be seen in **Table 2**. Then the SSIM was converted to Reachability matrix using binary number as shown in **Table 3.**

Table 2. SSIM of HAS and QMS integration barriers

Criteria	B1	B2	B3	B4	B5	B6
B1		V	V	A	O	O
B2			A	A	A	A
B3				A	O	A
B4					O	A
B5						O
B6						

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Table 3. Reachability matrix of HAS and QMS integration barrier

Criteria	B1	B2	B3	B4	B5	B6
B1	1	1	1	0	0	0
B2	0	1	0	0	0	0
B3	0	1	1	0	0	0
B4	1	1	1	1	0	0
B5	0	1	0	0	1	0
B6	0	1	1	1	0	1

Table 4. Final Matrix of HAS and QMS integration barrier

Criteria	B1	B2	B3	B4	B5	B6	Driving Power
B1	1	1	1	0	0	0	3
B2	0	1	0	0	0	0	1
B3	0	1	1	0	0	0	2
B4	1	1	1	1	0	0	4
B5	0	1	0	0	1	0	2
B6	1	1	1	1	0	1	5
Dependencies	3	6	4	2	1	1	

Based on the result of the final matrix, the level of barriers was established. The level partition was done using four iterations, and the final level partition is shown in **Fig. 2.** It shows the level of HAS and QMS integration barriers. The lowest level was regulation in level 5, then guidance in level 4. The direction of the arrow showed the impact of each criteria. For example, the arrow from regulation points to guidance, which means the regulation barrier affects the guidance barrier. The arrow points from guidance to resource, which means the guidance barrier affects the resources barrier. It also shows the regulation barrier affecting resources indirectly.

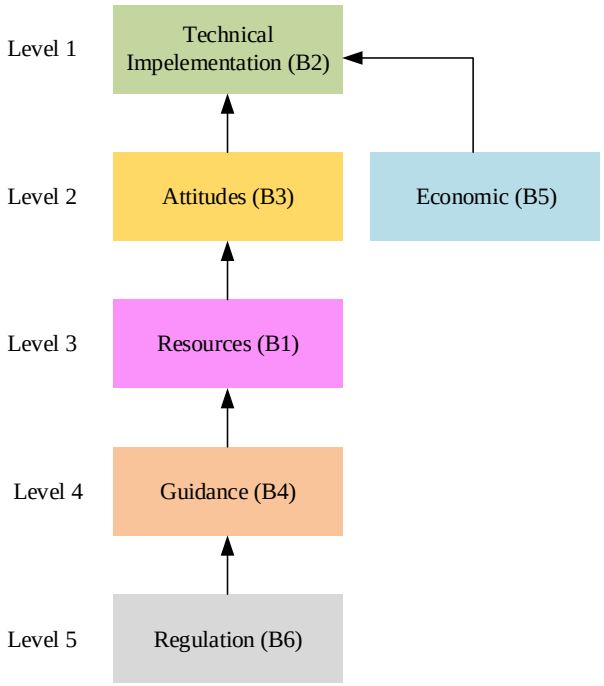

Fig 2. ISM level of HAS and QMS Integration Barriers

Based on **Fig. 3**, there are three groups to which the barriers exist. Barriers economic (B5) is included in autonomous. It shows that B5 has a low driving power and low dependencies. Barrier Attitudes (B3) and Technical implementation (B2) are included dependent groups. They have high dependencies and low driving power. Barrier regulation (B6) and guidance (B4) are in the independent group. They have strong driving power and low dependencies. Mathiyazhagan et al (2013) categorized variables in linkage and independent are the key/ main variable. In this study, regulation and guidance are the key barriers to HAS and QMS integration. It means they affect the other barriers and should be overcome first.

3.2 Fuzzy AHP result

The second method, Fuzzy AHP, was used to rank the main barrier and sub-barrier. AHP was used to calculate the weight of each barrier and sub-barrier using geometric mean (Musaad O et al., 2020). Literature review and group discussion were utilized to determine the barrier and sub-barrier. There were six main barriers, i.e., Resources, Technical implementation, Attitudes, Guidance, Economic, and Regulation. Firstly, the weight of six barriers was calculated, and secondly, the weight of 17 sub-barriers was then calculated. The hierarchical structure of HAS and QMS integration can be seen in **Fig 4.**

3.2.1. The rank of main barriers

The rank of main barriers shows the weight of regulation (B6) is 0.2956 and ranked first. The second rank is guidance (B4) with a weight of 0.2625, followed by Attitudes (B3) with a weight of 0.2332, Resources (B1) (0.1632), Technical implementation (B2) (0.0447), and the last rank is Economic (B5) with the weight of 0.0017.

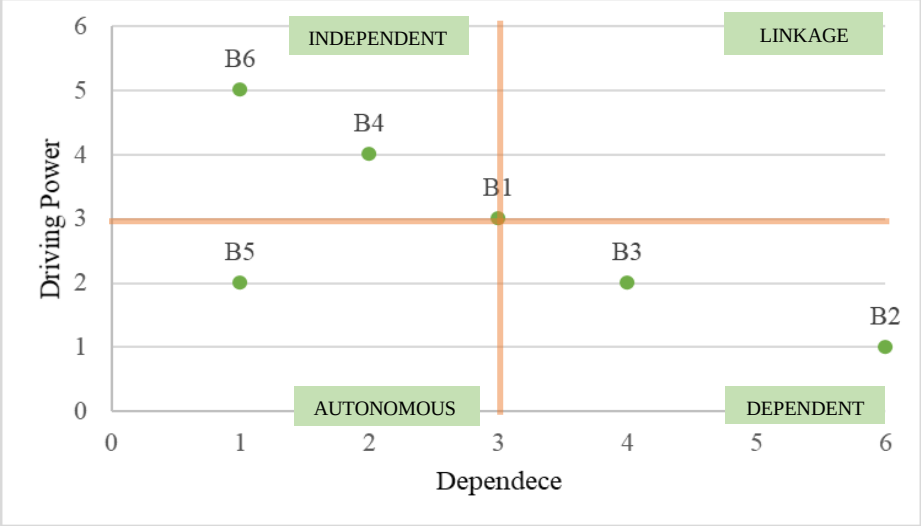

Fig 3. MICMAC Analysis

Table 5. Rank of Main Barrier

Barrier	Weight	Rank
Regulation (B6)	0.2956	1
Guidance (B4)	0.2625	2
Attitudes (B3)	0.2322	3
Resources (B1)	0.1632	4
Technical implementation (B2)	0.0447	5
Economic (B5)	0.0017	6

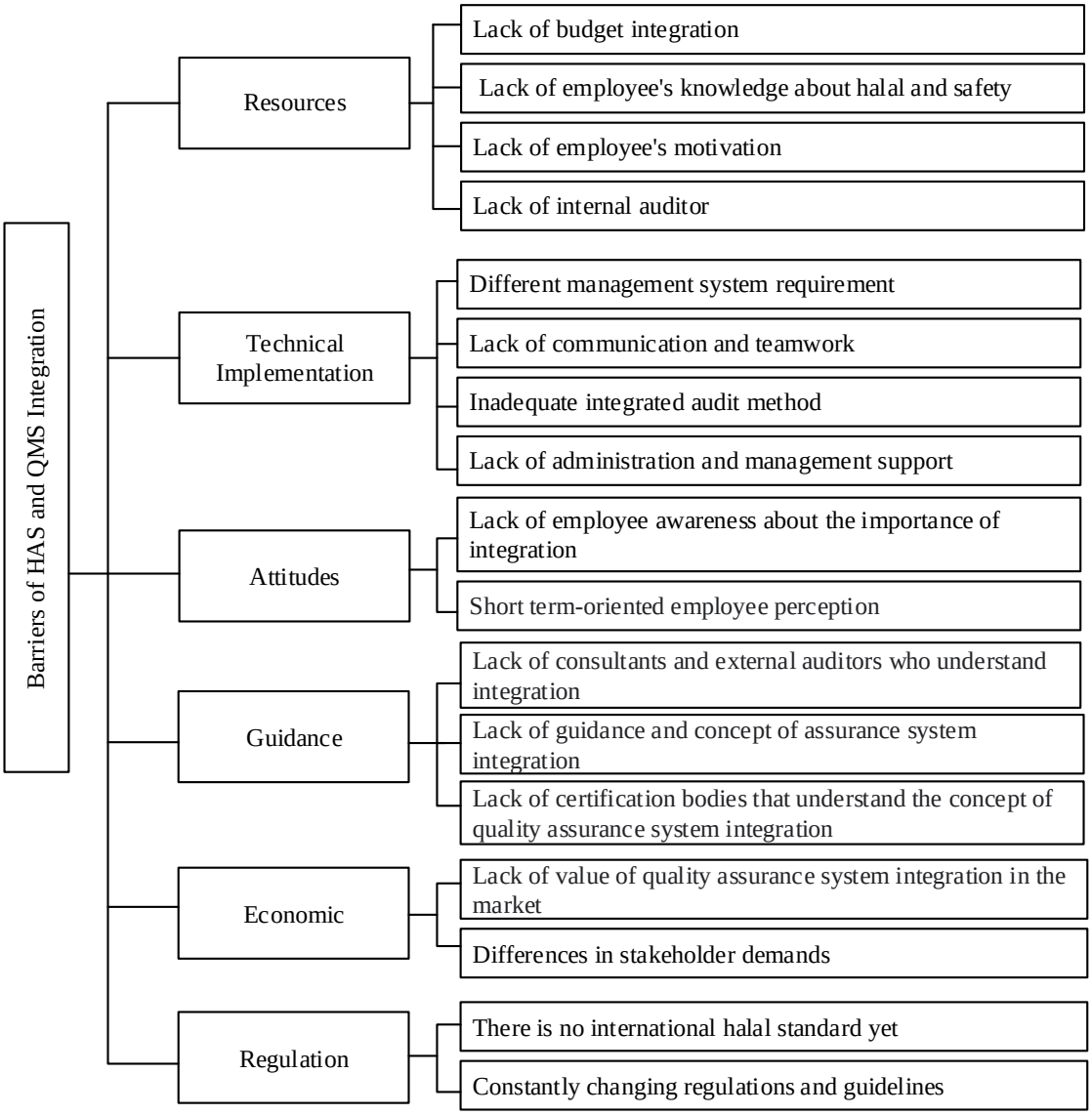

Fig 4. Hierarchical structure of HAS and QMS integration barriers and sub-barriers

In this study, regulation (B6) is the barrier that should be overcome before the other barriers because it affects the other barriers. Regulation depends on the region/country in which the company is placed. The differences in the regulation can affect the integration because the company must fulfill every different regulation and continuously adjust if there are any regulation changes. The second rank is guidance (B4). The lack of guidance for HAS and QMS integration results in difficulty for industries to implement the integration. They need guidance to understand which clause can be integrated.

The third rank is attitudes (B3). The attitude of the employee affects the process of HAS and QMS integration. Commonly, the employee does not seem aware of the importance of integration because they are short-oriented. The implementation of integration will bring changes to the organization and management. Usually, the employees are not willing to accept that changes. The fourth rank is resources (B1). Resources are the barriers that arise from the internal company. For example, the employees lack knowledge about halal, quality, and food safety. It can be overcome through training, but the company has not

enough budget for training. It will affect the implementation of HAS and QMS integration. The fifth rank is technical implementation (B2). This barrier could arise from the internal company, such as a lack of communication and teamwork, inadequate integrated audit methods, and different management system requirements. The last rank is economic (B5). The lack of value in HAS and QMS integration in the market can affect the stakeholders' point of view. It will give the stakeholders a different point of view about HAS and QMS integration.

3.2.2. The sub-barrier ranks

Resources: The rank of sub-barriers in resources is B11>B12>B14>B13 can be seen in **Fig 5**. Lack of budget integration, weighing 0.4056, is the most important sub-barriers that should be overcome. If the company has no budget for integration, it cannot hold a training or recruit an expert. Training is necessary to improve employee knowledge to integrate the HAS and QMS. It could affect the lack of employee knowledge about halal and quality (B12), with a weight of 0.3081. The third rank is lack of internal auditor (B14), with a weight of 0.1874. The internal auditor, who is an expert in HAS and QMS integration, is important in evaluating the integration in the company. The last rank is lack of employee motivations (B13), with a weight of 0.0990. Employee motivation can be improved through appreciation and training. If the employee is enthusiastic about integration, it can be a good sign to implement HAS and QMS integration.

Technical Implementation : The rank of sub-barriers in technical implementation is B23>B22>B24>B21 and can be seen in **Fig.6.** Inadequate integrated method (B23) is ranked first with a weight of 0.3324. The company cannot evaluate the HAS and QMS integration if it has no integrated audit. The second rank is lack of communication and teamwork (B22), with a weight of 0.3039. During the integration, if the communication between divisions is not good, the integration cannot be done effectively. The third rank with a weight of 0.2437 is lack of administration and management support (B24). The role of top management is important in technical implementation. Line managers and the team is directly involved in the integration process. The different management system requirement (B21) is ranked 4th with a weight of 0.1164. It also impacts the technical implementation. The employee could be confused about which clauses can be integrated.

Attitudes: The weight of B32 has the same weight as B31, with a weight of 0.50, and can be seen in Fig 7. Lack of employee awareness about integration (B31). The top management needs to deliver the goal of integration to all the employees so they can be aware of the importance of integration. Information about the importance can be delivered in many ways, such as through social media, announcements in every corner of the company, and pamphlets. Through these methods, the employee's awareness could increase. The second is short-term oriented employee perception (B32). Some employees resist the change in the company culture. They think they only have to finish today's work and do not think about the future. It can hinder the integration because they are not willing to involve in the integration process.

Guidance : The rank of sub-barriers in the guidance is B42>B42>B43 and can be seen in **Fig.8**. The first rank is lack of guidance and concept of halal assurance system integration (B42) with a weight of 0.5733. The company needs guidance explaining each management system clause in detail and which clauses could be integrated. It will be helpful for the company because they can learn every integration step through guidance. The second rank is the lack of consultants and external auditors who understand integration (B41), with a weight of 0.26. The consultants and external auditors can help the company solve integration problems.

Lack of certification bodies that understand the concept of quality assurance system integration is ranked third with a weight of 0.167. If the number of certification bodies is still lacking, the HAS and QMS integrated certification cannot be accomplished because no one can certify it.

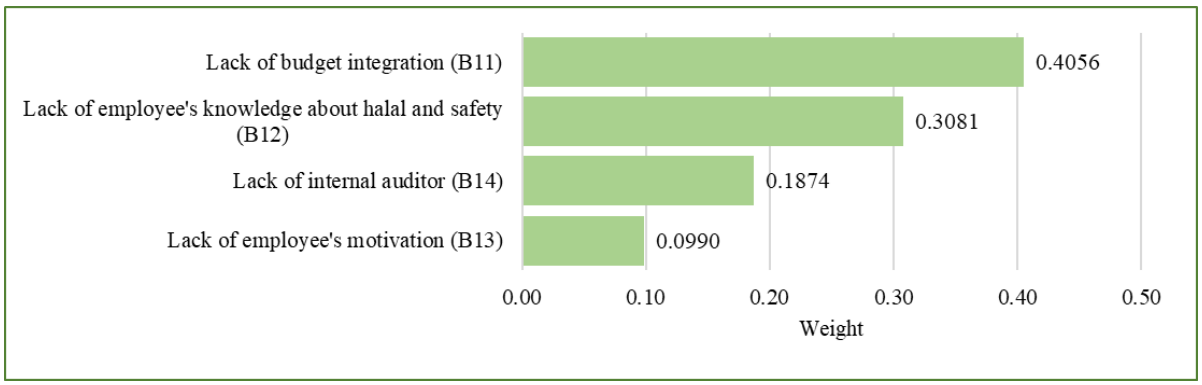

Fig 5. The rank of Resources sub-barriers

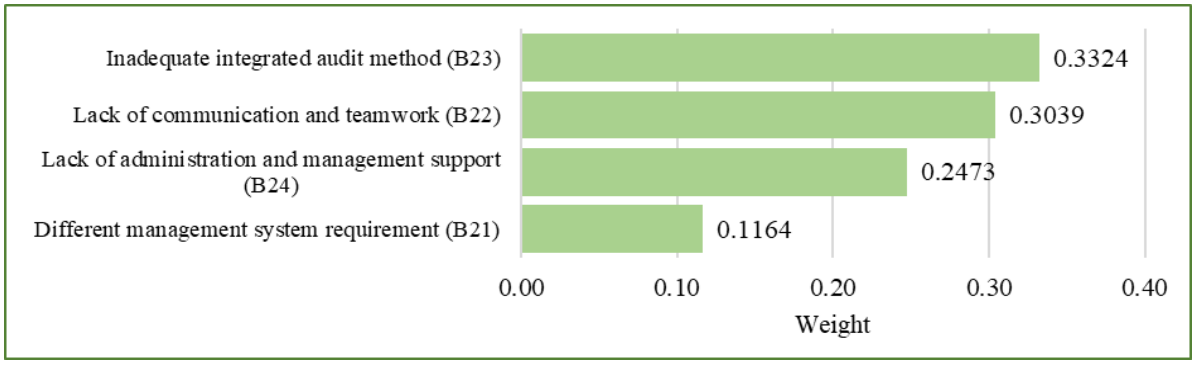

Fig 6. The rank of Technical implementation sub-barriers

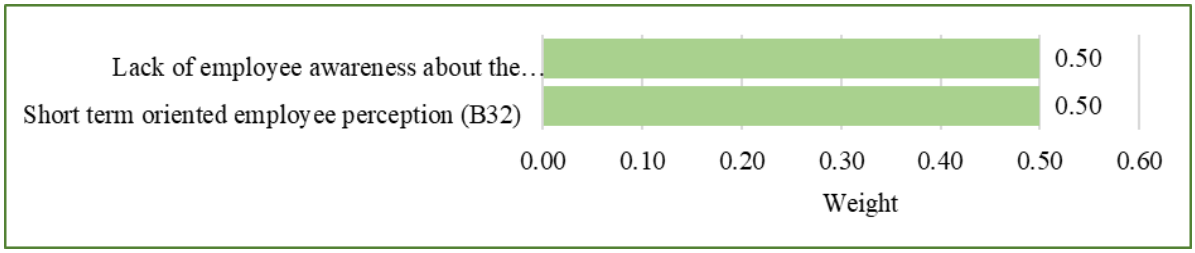

Fig 7. The rank of Attitudes sub-barrier

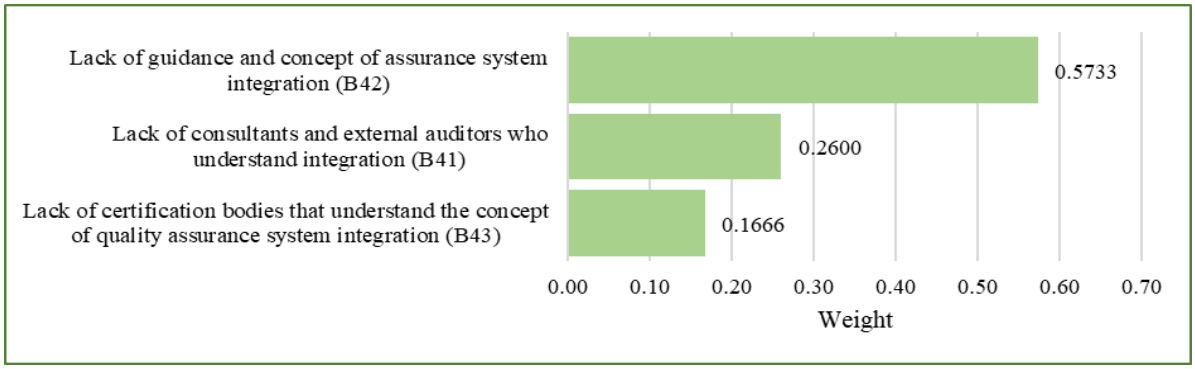

Fig 8. The rank of Guidance sub-barrier

Economic: The rank of sub-barriers in economics is B51>B52 and can be seen in **Fig 9**. The first is the lack of value of quality assurance system integration in the market (B51), with a weight of 0.70. The values can be customer satisfaction, full employee participation, and continuous improvement (Asif, 2008.). If the integration does not give a good value, it will affect the difference in stakeholder demands (B52). Each stakeholder has a different point of view about the importance of HAS and QMS integration. It hinders integration.

Regulation: The rank of B61>B62 can be seen in **Fig. 10**. The sub-barrier with no international halal standard (B61) is ranked 1 with a weight of 0.70. The problem of absence of international halal standards is a major challenge facing the global halal industry. Almost every country has standard regulations regarding halal, which led to the emergence of different standards. For example, halal certification in Indonesia is based on the halal standard issued by the Indonesian Ulema Council (MUI), the Malaysian Standard (MS) issued by the Malaysian Islamic Progress Agency (JAKIM), the halal standard in Turkey issued by the Standards and Metrology Institute for Islamic State. (SMIIC), the halal standard in Singapore issued by the *Majlis Ugama* Islam Singapore (MUIS) (Azam and Abdullah, 2020). Companies exporting to these countries should follow different halal standards, causing companies to pay more to meet each halal standard in different countries (Abdallah et al., 2021). The difference in halal standards is also a problem in the integration of HAS and QMS. If there is no international halal standard, then the integration of HAS and QMS will differ in each country with halal standards.

Continuous regulatory changes (B62) is a problem that is ranked 2 with a weight of 0.30. Continuous changes will always cause the company to have procedures and systems owned, which led to forces the company to continue to review the company's targets, procedures, and objectives on a regular basis. The problem that often arises from this sub-barrier is that the company is still in the stage of preparing a procedure. However, new regulations have emerged, causing the company to have to adjust the procedures that are being prepared.

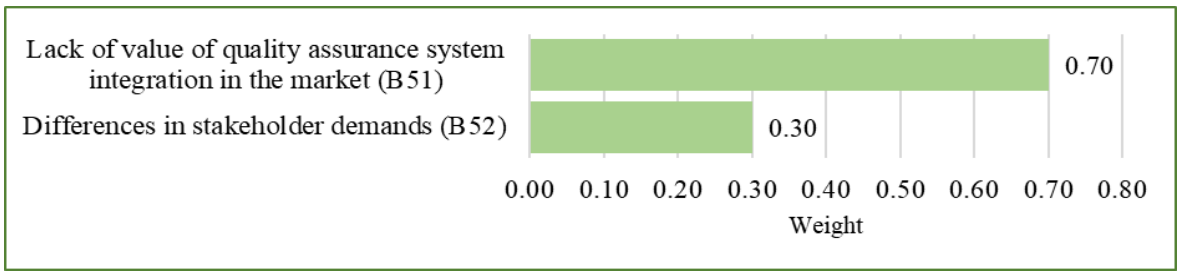

Fig 9. The rank of Economic sub-barriers

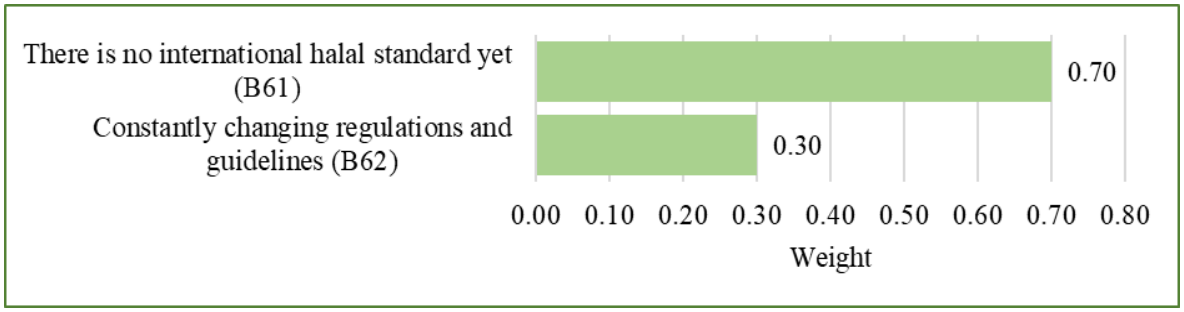

Fig 10. The rank of Regulation sub-barriers

Table 6. Overall rank of HAS and QMS integration barrier and sub-barrier

Barrier	Barrier weight	Barrier Ranks	Sub-barrier	Sub-barrier weight	Final weight	Rank
Resources (B1)	0.1632	4	Lack of budget integration (B11)	0.4056	0.0662	7
			Lack of employee's knowledge about halal and safety (B12)	0.3081	0.0503	8
			Lack of employee's motivation (B13)	0.0990	0.0162	11
			Lack of internal auditor (B14)	0.1874	0.0306	10
Technical Implementation (B2)	0.0447	5	Different management system requirement (B21)	0.1164	0.0052	15
			Lack of communication and teamwork (B22)	0.3039	0.0136	13
			Inadequate integrated audit method (B23)	0.3324	0.0149	12
			Lack of administration and management support (B24)	0.2473	0.0111	14
Attitudes (B3)	0.2322	3	Lack of employee awareness about the importance of integration (B31)	0.50	0.1161	3
			Short term-oriented employee perception (B32)	0.50	0.1161	3
Guidance (B4)	0.2625	2	Lack of consultants and external auditors who understand integration (B41)	0.2600	0.0683	6
			Lack of guidance and concept of quality assurance system integration (B42)	0.5733	0.1505	2
			Lack of certification bodies that understand the concept of quality assurance system integration (B43)	0.1666	0.0437	9
Economic (B5)	0.0017	6	Lack of value of quality assurance system integration in the market (B51)	0.70	0.0012	16
			Differences in stakeholder demands (B52)	0.30	0.0005	17
Regulations (B6)	0.2956	1	There is no international halal standard yet (B61)	0.70	0.2069	1
			Constantly changing regulations and guidelines (B62)	0.30	0.0887	5

3.2.3. The overall rank

The overall rank of barriers and sub-barriers of HAS and QMS integration is shown in **Table 6.** The sub-barrier weight was achieved through FAHP analysis in each sub-barrier and the final weight was achieved by multiplying the barrier weight and its sub-barrier weight. The rank of final weight of sub-barriers are B61>B42>B31,B32>B62>B41>B11>B12> B43>B14>B13>B23>B22>B24>B21>B51> B52. The sub-barrier's highest weight is that there is no international halal standard yet (B61) with a weight of 0.2069. The second rank is lack of guidance and concept of quality assurance system integration (B24) with a weight of 0.1505.

4. Conclusion

There are six main barriers and 17 sub-barriers in HAS and QMS integrations. The six main barriers are resources, technical implementation, attitudes, guidance, economics, and regulation. Experts from the agro-industrial sector are involved in this study. The analysis is done using two methods, Interpretive Structural Modelling (ISM) and Fuzzy Analytical Hierarchy Process (FAHP). ISM is used to determine the key barriers of HAS and QMS integration and its relations. Meanwhile, FAHP is used to rank the barriers and sub-barriers. The ISM result shows that the key barriers of HAS and QMS integrations are regulation and guidance. These two barriers affect the other barriers.

FAHP analysis for main barriers shows that the regulation and guidance are ranked first and second. The ISM and FAHP show the same results, which regulation and guidance are the most important barrier that should be overcome first. Sub-barrier, which ranked first, is that there is no international halal standard yet. Outcome of this research will be helpful knowledge for industries that will integrate HAS and QMS, beneficial for

Halal Training Providers to arrange integration guidelines, and also helpful for policymakers related to regulation arrangement. The author is still developing strategies to overcome these barriers and sub-barriers, which will be published in the following paper.

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