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The Development of the Halal Food Industry in Bangun Purba Through the Utilization of AI Systems in the SIHALAL Application to Enchance Halal Product Assurance for SMEs

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Abstract
This study aims to explore the development of the halal food industry in Bangun Purba through the utilization of artificial intelligence (AI) systems in the Sihalal application to enhance halal product assurance for Small and Medium Enterprises (SMEs). The research employs a qualitative method using SWOT analysis to identify the strengths, weaknesses, opportunities, and threats in implementing AI technology in the Sihalal application. Data were collected through in-depth interviews, observations, questionnaires and documentation with SMEs operators, consumers, and other relevant stakeholders. Research results indicate that the use of AI in the Sihalal application offers significant advantages, including increased efficiency in the halal certification process, reduced risk of human error, and enhanced consumer confidence in halal products. SWOT analysis is conducted using the IFAS matrix, which outlines the strengths and weaknesses factors, and the EFAS matrix, which describes the opportunities and threats factors. The external and internal factors of SMEs in Bangun Purba show a total external score of 2.84 and a total internal score of 2.77. Thus, the IE for SMEs in Bangun Purba is located at the coordinates in quadrant I. Quadrant I represents a very favorable situation. These SMEs have opportunities and strengths (S-O) to take advantage of existing opportunities. The strategy that should be implemented in this condition is to support an aggressive growth-oriented strategy.

Keywords: Halal Food Industry; Artificial Intelligence; SIHALAL Application; SMEs; SWOT Analysis

1. Introduction

Halal food producers are crucial for Muslims, especially Generation Z, who spend more time at restaurants and stalls than consuming home-cooked meals. This trend is higher compared to previous generations. (Febriandika, 2023). Halal is often associated solely with material things. However, in Islam, halal encompasses actions and work, commonly referred to as Muamalah [1].

The significant growth of the Muslim population has created a high demand for halal business requirements. According to the RISSC (The Royal Islamic Strategic Studies Centre, 2023), the Muslim population in Indonesia reached 240.62 million in 2023, accounting for 86.7% of the total national population of 277.53 million. Indonesia has successfully secured the top three position in the Global Islamic Economy Indicator (GIEI) State of the Global Islamic Economy (SGIE) Report 2023, released by Dinar Standard in Dubai, United Arab Emirates. Having previously ranked fourth in 2022, Indonesia now ranks third, behind Malaysia and Saudi Arabia.

According to Aqil Irham, the Head of the Halal Product Assurance Agency of the Ministry of Religious Affairs, the improvement in Indonesia's ranking proves that efforts to strengthen the Halal Product Assurance ecosystem, which is an important part of the sharia economy, are increasingly showing positive results. These efforts are certainly inseparable from the transformation of halal certification services that we continue to improve, both in terms of service quality and various government innovations, both regulatory and through various programs, all of which provide affirmation for micro, small, and medium enterprises (SMEs), especially in the form of halal certification that is increasingly easy, fast, transparent, affordable, and even free through the Sehati program. The SGIE 2023 report also notes that Indonesia has been actively forging partnerships with several countries globally to provide halal product assurance services. For example, a halal product assurance cooperation

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between Indonesia and the Islamic Republic of Iran was established through the signing of a memorandum of understanding (MoU). Previously, Indonesia had also signed JPH cooperation agreements with five countries, namely Chile, Argentina, Hungary, Belarus, and Turkey.

According to the Law on Halal Product Assurance, halal certification refers to the halal status of a product that is recognized and issued by the BPJPH (Halal Product Assurance Organizing Agency) based on a written halal fatwa issued by the MUI (Indonesian Ulema Council) in accordance with Law Number 33 of 2014 concerning Halal Product Assurance and Government Regulation Number 39 of 2021 concerning the Implementation of [1] Halal Product Assurance. Starting from October 17, 2024, there are three categories of products circulating in the national market that are required to have halal certification. First, food and beverage products. Second, raw materials, food additives, and processing aids for food and beverage products. Third, slaughterhouse products and slaughterhouse services.

An accordance with the Head of the Food and Drug Monitoring Agency Regulation No. 03.1.23.06.10.5166 of 2010 concerning the Inclusion of Information on the Origin of Certain Ingredients, Alcohol Content, and Expiration Date on Labeling of Drugs, Traditional Medicines, Food Supplements, and Food, if drug, traditional medicine, food supplement, and food products contain certain ingredients derived from pork, they must include a special label to inform that the product contains pork and/or in its manufacturing process comes into contact with pork-based materials. E-Numbers are codes used to facilitate the identification of Food Additives (FA) that have been proven safe and officially approved for use in processed food products in accordance with European Union standards. Pork has the code E471 in product halal certification.

The significance of the halal status of a product, both for consumption and use, has led the Indonesian government and Muslim society to jointly develop a halal certification system (Nahlah, et al., 2023). The Indonesian government has made various efforts to increase halal certification for Micro, Small, and Medium Enterprises (SMEs). One of these efforts is the launch of the Free Halal Certification (SEHATI) program for SMEs by the Ministry of Religious Affairs and BPJPH (Halal Product Assurance Organizing Agency) to facilitate SMEs in obtaining halal certification (Elif, et al., 2022).

With the existence of such a program, socialization and mentoring for halal certification have also been carried out through Indonesian community service activities, "Socialization and Mentoring for Free Halal Certification (SEHATI) with a Self-Declare Scheme for Micro-Entrepreneurs in Domas Village". This socialization and mentoring aim to increase awareness and understanding of the importance of halal certification for Micro, Small, and Medium Enterprises (SMEs), so that micro and small business actors are aware of the free halal certification program with a self-declare scheme for micro and small businesses, the costs of which are borne by the BPJPH DIPA, and micro and small business actors understand the procedures and mechanisms for registering for the free halal certification program for MSMEs with a self-declare scheme through the SIHALAL website (Elif, et al., 2022).

Table 1.1 Top 10 Per Sector

Numbers	Islamic Finance	Food	Travel	Fashion	Pharmaceutical and Cosmetic	Media dan Recreation
1	Malaysia	Malaysia	Turkiye	Turkiye	Singapore	Malaysia
2	Saudi Arabia	Indonesia	UAE	Malaysia	Belgium	Singapore
3	Iran	Turkiye	Tunisia	Indonesia	Malaysia	China
4	Bahrain	Singapore	Saudi Arabia	Singapore	France	Qatar
5	Kuwait	Thailand	Malaysia	Italy	Indonesia	UK
6	UAE	Australia	Morocco	Spain	Turkiye	Indonesia
7	Indonesia	UAE	Jordan	China	Egypt	Bahrain
8	Oman	Brazil	Bahrain	UAE	Thailand	Netherlands
9	Qatar	Kazakhstan	Kazakhstan	UK	UK	Canada
10	Maldives	Bahrain	Uzbekistan	Germany	Tunisia	Turkiye

Source: State of the Global Islamic Economy Report 2024

Based on the background explained above, the researcher wants to know the development of the halal food industry in Bangun Purba District with the utilization of SIHALAL (AI) using digital technology in the form of the "SIHALAL" Application. As a digital technology that will help the process of accelerating the SMEs community in obtaining halal certification, quickly, precisely, and accurately. Based on the phenomena described above, the author is interested in conducting research entitled "The Development of the Halal Food Industry in Bangun Purba with the Utilization of the System (AI) in the SIHALAL Application in Increasing Halal Product Assurance (JPH) for SMEs".

2. Literature Review

2.1 Theory The Law of One Price

This can be illustrated by looking at a negotiated price market from one of the first recorded economic experiments by Chamberlin (1948). Recall that in this institutional setting, buyers and sellers move around the room, interacting in person, and trying to make deals on a one-to-one basis. This allows people on one side of the room to agree to different prices than people on the other side of the room (Behavioral Economics, 2011:78).

2.2 Halal Food Industry

Halal comes from Arabic words, such as halla, hillan, yahillu, and "halal", which means what is permitted by sharia law. Thus, the halal industry considers the production of industrial products to be in accordance with sharia regulations, which are permitted in Islam. The concept of sharia states that everything consumed by Muslims, both food and non-food, must come from halal sources. According to Law Number 33 of 2014 concerning Halal Product Guarantee, the state must protect and guarantee the halal status of a product. This is the goal of the halal industry (Mohammad & Backhouse, 2014).

2.3 Artificial Intelligence (AI)

Artificial Intelligence is intelligence added to a system that can be arranged in a scientific context (Siahaan et all, 2020). AI has existed since the emergence of modern computers, namely in the 1940s and 1950s. The ability of new electronic machines to store large amounts of information, process at very high speeds rivaling human capabilities (Baihaqi, 2022).

2.4 Halal Certification and Halal Product Assurance (HPA)

Halal certification is a guarantee from the competent authority in testing the halalness of a food, beverage and related product (Luluk, Anas & Andre, 2023). Halal certification issued by the Food, Drug and Cosmetics Assessment Institute (LPPOM-MUI) which states that a product is in accordance with Islamic law. Halal certification can be used to create halal labels (Alva & Ahmad, 2022).

Referring to Law Number 33 of 2014 concerning Halal Product Assurance (JPH), what is meant by halal products are products that have been declared halal in accordance with Islamic law. Products are goods and/or services related to food, beverages, medicines, cosmetics, chemical products, biological products, genetically engineered products, and goods used, utilized, or utilized by the public (Law of the Republic of Indonesia Number 33 of 2014 concerning Halal Product Assurance, 2014).

2.5 Small Medium Enterprises (SMEs)

SMEs can be interpreted as empowering mainstay areas to accelerate economic recovery to accommodate priority programs and empower various sectors and potentials. While small businesses are an increase in various community empowerment efforts (Kurniawan, 2022).

3. Research Method

Qualitative research is often referred to as naturalistic research because this type of research is conducted in a natural environment, or natural environment, where the research subjects are not changed and the presence of the researcher does not affect how natural objects develop. Qualitative research is used to obtain in-depth data, which has real meaning. The results of using qualitative methods not only produce data or information that is difficult to find; they also produce new knowledge and meaningful information that can be used to solve problems and improve the quality of human life (Sugiyono, 2022). The population in the study is the area that the researcher wants to study. According to Sugiyono (2011: 80) "Population is a generalization area consisting of objects/subjects that have certain qualities and characteristics that are determined by the researcher to be studied and then conclusions are drawn". The opinion above is one of the references for the author to determine the population. The population that will be used for research is the MSME community in Bangun Purba District, Sialang Village, Dusun III as well as consumers. In 2022 before the SIHALAL (Halal Information System) system was updated, there were 207 halal certification registrants, after the SIHALAL system was updated, registrants increased in 2023.

A sample is part of the number and characteristics possessed by the population to be studied (Sugiyono, 2022). In qualitative sample research, respondents are not used; they use sources, participants, information and friends. The sample in this study was taken using a nonprobability sampling technique, which is a sampling technique that does not provide equal opportunities for members of the population to be selected as samples (Sugiyono, 2022). By using a purposive sampling technique, which is a sampling technique with certain considerations because it is considered to have the information being researched (Sujarweni, 2018). The sample was selected based on an evaluation of the characteristics of the population members, so that information can be obtained according to the research objectives, there were 20 samples taken by the researcher. The informant determination technique must meet several criteria, which are explained as follows:

1. The subject has been involved in halal food UMKM activities for a long time and intensively in Bangun Purba
2. The subject is still fully and actively involved as a halal food entrepreneur in Bangun Purba
3. The subject has the time and opportunity to be asked for information as it is, honestly, and not made up or engineered. Data collection techniques are carried out by initial observation, interviews and filling out lists and collecting required documents.
4. Subjects register through halal assistants using the SIHALAL application.

Primary data sources are data obtained directly by researchers from the person concerned, either verbally or through interviews, and data resulting from filling out questionnaires. Data collection techniques using observation, interviews and questionnaires.

Data analysis techniques is Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis is a strategic planning

tool often used to create strategies for businesses, industries, governments, and countries. According to, this analysis can be applied to people, companies, and even countries, as it identifies the relationship between internal and external environments. SWOT analysis categorizes an organization's internal strengths and weaknesses and external opportunities and threats. It is based on logic that can maximize strengths and opportunities and minimize weaknesses and threats. Strategic planning must analyze the company's strengths, weaknesses, opportunities, and threats. SWOT analysis compares external factors of opportunities and threats with internal factors of strengths and weaknesses. Internal factors are entered into a matrix called the internal strategic factor matrix or IFAS (Internal Strategic Factor Analysis Summary). Meanwhile, external factors are entered into a matrix called the external strategic factor matrix or EFAS (External Strategic Factor Analysis Summary). After the matrix of internal and external strategic factors is compiled, the results are then entered into a quantitative model, namely the SWOT matrix to formulate strategies.

1. IFAS Matrix

Table 3.1 Internal Strategy Factor Matrix

Internal Strategy Factors	Weight	Rating	Skor
Strength	X	Y	X x Y
Amount	X	Y	X x Y
Weakness	X	Y	X x Y
Amount	X	Y	X x Y
Total	X	Y	X x Y

Source: Rangkuti (2018)

2. EFAS Matrix

Table 3.2 External Strategy Factor Matrix

External Strategy Factors	Weight	Rating	Skor
Opportunity	X	Y	X x Y
Amount	X	Y	X x Y
Threat	X	Y	X x Y
Amount	X	Y	X x Y
Total	X	Y	X x Y

Source: Rangkuti (2018)

The technique used to determine the weight is the pairwise comparison technique. This technique serves to compare each variable. The determination of the weight (significant value) on each variable is as follows:

1 = Internal / external factors are less important than other strategic factors.
2 = Internal / external factors are equally important than other strategic factors.
3 = Internal/external factors are more important than other strategic factors.
The weight value is obtained from the significant value of a factor divided by the total significant value.
The rating of strengths and weaknesses is based on the following information:
1 = Weaknesses that have little effect.
2 = Weaknesses that have a big effect.
3 = Strengths that have a small effect.
4 = Strengths that have a big effect.
Rating the opportunities and challenges based on the following information:
1 = Threats that have little effect.
2 = Threats that have a big effect.
3 = Opportunities that have a small effect.
4 = Opportunities that have a big effect.

To determine the score of each variable, the factor weight is multiplied by the rating value. The weight points for each variable are summed to determine the total weight points. A total IFAS score below 2.5 means that the industry is internally weak, while above 2.5 means that the industry is internally strong. An EFAS total score of 4.0 indicates that the industry is highly responsive to industry opportunities and threats, while 1.0 indicates that the industry does not take advantage of opportunities or does not avoid threats.

The SWOT quadrant matrix is carried out to identify ways or alternatives that can be used to take advantage of strengths and opportunities or avoid threats and overcome weaknesses. The method is to reduce the total score of the weighting of strength factors with weaknesses then the results will be placed on the horizontal axis (x axis) and reduce the total score of the weighting of opportunity factors with threats then the results are placed on the vertical axis (y axis). The result of coordinating the two shows the position with the appropriate strategy for the company to carry out.

Figure 3.1 SWOT Analysis Diagram
Source: Rangkuti (2018)

The SWOT matrix displays eight boxes, namely the two left boxes display external factors (opportunities and threats), the top two boxes display internal factors (strengths and weaknesses) and the other four boxes are strategic issues that arise as a result of the meeting between external and internal factors.

Table 3.3 SWOT Matrix

IFAS **EFAS**	**STRENGTHS (S)** Determine 5-10 internal strength factors	**WEAKNESSES (W)** Determine 5-10 internal weakness factors
OPPORTUNITIES (O) Determine 5-10 external opportunity factors	STRATEGY S-O Create a strategy that uses strengths to capitalize on opportunities	STRATEGY W-O Create strategies that minimize weaknesses to take advantage of opportunities
THREATS (T) Determine 5-10 external threats factors	STRATEGY S-T Create a strategy that uses strengths to overcome threats	STRATEGY W-T Create strategies that minimize weaknesses and avoid threats

Source: Rangkuti (2018)

From the SWOT matrix image above, SWOT analysis is used if the company's strategy maker is able to maximize the role of strength factors and take advantage of opportunities while acting as a tool to minimize weaknesses in the organization and suppress threats that arise and are handled appropriately.

- SO strategy, namely by utilizing all strengths to seize and utilize opportunities as much as possible.
- ST strategy, a strategy in using the company's strengths to overcome threats.
- WO strategy, this strategy is implemented based on the utilization of existing opportunities by minimizing existing weaknesses.
- WT strategy, this strategy is based on defensive activities and tries to minimize weaknesses and avoid threats.

SWOT analysis is used as a determinant of company or organization strategy policies in maximizing strength factors and taking advantage of existing opportunities while playing a role in minimizing weaknesses in the company and suppressing various threats that will arise. SWOT analysis can also be used to assist strategic analysis and logical references in systematic discussions about a situation and the main alternatives that the company might consider.

4. Results and Discussion

4.1 Strategies carried out by SMEs in Bangun Purba to implement and optimize the use of the SIHALAL application with the (AI) system to increase the guarantee of halal products

Based on the results of in-depth interviews with halal assistants and business actors, it is known that internal and external factors in the form of threats, opportunities, strengths and weaknesses are as follows:

Table 4.1 Identification of Internal Factors of Halal Food Industry in Medan City

Internal	
Strength (S)	**Weakness (W)**
1. High quality halal products 2. The presence of halal assistants in assisting in making halal certification and cooperation with PLN in providing production machinery 3. Increasing the efficiency and accuracy of SIHALAL technology 4. Submission of halal certification files can be done online 5. Support for Modern Technology	1. Limited human resources in understanding halal certification and lack of knowledge about technology 2. Complicated halal certification procedures in the SIHALAL application 3. Halal certification obligations are not emphasized enough and sanctions have not been implemented 4. Adaptation to changes in culture and work processes 5. Lack of strong brands

Source: Researcher Processed Data (2024)

Table 4.2 Identification of External Factors of Halal Food Industry in Medan City

External	
Opportunity (O)	**Threats (T)**
1. Government Support 2. Increased Operational Efficiency 3. Utilization of SIHALAL Application 4. Access to Wider Market 5. Increased Product Innovation 6. Increased Promotion from E-Commerce	1. Tight competition 2. Resistance to new technologies 3. Limited access to technology 4. Limited knowledge and skills 5. Pandemics and economic crises 6. Data privacy issues

Source: Researcher Processed Data (2024)

From the identification of strategic factors for the development of the halal food industry in Bangun Purba by utilizing the AI system in the SIHALAL application to improve Halal Product Assurance, it is known that internal and external factors and the results of the calculation of the weight and rating of each internal and external factor are as follows.

Table 4.3 Evaluation of Internal Strategy Factors for the Development of the Halal Food Industry for SMEs in Bangun Purba by Utilizing the AI System in the SIHALAL Application

Number	Strategy Factors	Weight	Rating	Skor
	Strength (S)			
1	High Quality Halal Products	0,14	4,00	0,56
2	Increased Efficiency and Accuracy of SIHALAL AI Technology	0,13	3,55	0,46
3	Increasing Consumer Trust	0,13	3,55	0,46
4	Competent Human Resources	0,11	3,15	0,34
5	Modern Technology Support	0,11	3,05	0,33
	Amount (S)	0,62		2.15
	Weakness (W)			
1	Limited Financial Resources	0,07	1,85	0,12
2	Limitations of Literacy About AI Technology	0,06	1,75	0,10
3	Access to Technology Devices and Infrastructure	0,06	1,6	0,09
4	Traditional Production Process	0,06	1,55	0,09
5	Limited Access to Broader Market	0,07	1,85	0,12
6	Lack of a Strong Brand	0,06	1,75	0,10
	Amount (W)	0,38		0,62
	Total (S+W)			2,77

Source: Researcher Processed Data (2024)

Based on Table 4.3 analysis of the internal factors above, it can be seen that the value of the internal factors of MSMEs in Bangun Purba is quite good with a weighting value of (0.14), this shows that the internal strength lies in the quality of halal products that are guaranteed. Therefore, it can be concluded that consumers prioritize the quality of halal products. The level of weakness is at a weight of (0.07), in terms of limited financial resources and access to a wider market.

Table 4.4 Evaluation of External Strategy Factors for the Development of the SMEs Halal Food Industry In Bangun Purba with the Utilization of AI System on SIHALAL Application

Number	Strategy Factors	Weight	Rating	Skor
	Opportunity (O)			
1	Government Support	0,13	4	0,52
2	Access to a Broader Market	0,12	3,7	0,44
3	Collaboration with Halal Institutions	0,1	3,2	0,32
4	Increased Global Competitiveness	0,09	3	0,27
5	Utilization of SIHALAL (AI)	0,1	3,05	0.30
6	E-Commerce	0.1	3,2	0,32
7	Potential Market Opportunities	0,1	3,1	0,31
	Amount (O)	0,74		2,48
	Threats (T)	0,13	4	0,52
1	Intense Competition	0,04	1,25	0,05
2	Resistance to New Technology	0,04	1,2	0,04
3	Limited Access to Technology	0,04	1,3	0,05
4	Pandemic and Economic Crisis	0,03	1	0,03
5	Data Privacy Issues	0,06	2	0.12
6	Limited knowledge and skills	0.05	1,5	0,07
	Amount (T)	0,26		0,36
	Total (O+T)			2,48

source: Researcher Processed Data (2024)

From table 4.4, it can be seen that the score of external factors is (2.84) opportunities and threats are quite high for the development of MSMEs in Bangun Purba. From the calculation results obtained from the IFAS and EFAS tables used in making the swot analysis diagram.

1. Total strength score: 2,15
2. Total score of weaknesses: 0,62
3. Total opportunity score: 2,48
4. Total threat score: 0.36 to find the coordinates, can be found in the following way:

a. Internal analysis coordinates (strength score - total weakness score)
= 2,15 - 0,62 =1,53
b. External analysis coordinates (total opportunity score - total threat score)
= 2,48 - 0,36 = 2,12

Next, it is transferred into the form of a swot matrix diagram as follows:

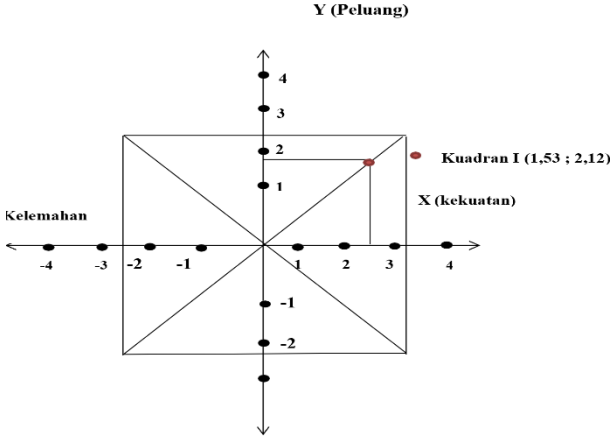

Figure 4.1 SWOT Diagram
Source: Researcher Processed Data (2024)

From the results of the SWOT picture above, it turns out that the coordinate points are located in the quadrant. From the previous analysis, the results show that MSMEs are in quadrant I. Quadrant I is a very favorable situation. These SMEs have opportunities and strengths (S-O) so that they take advantage of existing opportunities. The strategy that must be applied in this condition is to support an aggressive growth policy (growth oriented strategy). Therefore, the strategies that the company will carry out are:

4.2 Artificial Intelligence (AI) System in SIHALAL Application Can Help SMEs in Bangun Purba Improve Product Halal Guarantee

Application of the AI system in the SIHALAL application significantly strengthens the competitive advantage of MSMEs in the halal food industry in Bangun Purba District. This technology not only speeds up and reduces the cost of the halal certification process, but also provides predictive analysis that assists SMEs in identifying and addressing potential problems before they occur. Interviews with halal assistants and SMEs owners revealed that the application of the AI system in the SIHALAL application has a major positive impact. SMEs owners find it helpful in meeting halal standards, which were previously considered complex and time-consuming. They also experience increased knowledge and skills in using this technology, which in turn improves product quality and opens up wider market opportunities. Continuous support from the government and related parties, in the form of training and technical assistance, is highly appreciated by MSME players. This support helps them understand and optimally utilize AI technology, so they feel more confident in running their business and optimistic about the future of their business. Overall, this study shows that the AI system in the SIHALAL application is an effective tool to improve operational efficiency, product quality, and competitiveness of SMEs in the halal market. With the right support, this technology can continue to provide better business outcomes.

4.3 The obstacles faced by MSMEs in Bangun Purba in Adopting AI Technology Through the SIHALAL Application to Ensure Product Halalness

Although the SIHALAL AI application has proven effective in helping MSMEs obtain halal certification, there are several obstacles faced in its utilization. First, most MSMEs still have limitations in terms of technological literacy, so it takes extra time and effort to understand and use this application optimally. Secondly, inadequate access to technological devices and infrastructure is also a challenge, especially for MSMEs located in remote areas.

Table 4.5 SWOT Matrix for the Development of the SMEs Halal Food Industry in Bangun Purba with the Utilization of AI Systems in the SIHALAL Application

IFAS / EFAS	STRENGTHS (S)	WEAKNESSES (W)
	1. High-quality halal products 2. Having a halal assistant to assist with halal certification and collaborating with PLN to provide production machinery 3. Improving the efficiency and accuracy of SIHALAL technology 4. Supporting Modern Technology	1. Lack of a strong brand 2. Limited financial resources 3. Lack of access to a wider market
OPPORTUNITIES(O)	**STRATEGY SO**	**STRATEGY WO**
1. Government Support 2. Improved Operational Efficiency 3. Utilization of the SIHALAL Application 4. Access to a Wider Market 5. Increased Product Innovation and Enhanced Promotion of E-Commerce	1. Increasing the utilization of SIHALAL technology. 2. Utilizing e-commerce platforms to enhance product promotion through SIHALAL, as well as increasing product innovation to attract a wider market and improve operational efficiency	1. Increasing the development of 2. intensive training programs to enhance MSMEs' understanding of halal certification and the technology implemented in the Sihalal application. 3. Enhancing strong brands through product innovation programs and collaboration with e-commerce platforms to improve promotion and market access, leveraging increased operational efficiency and promotional support from e-commerce platforms. 4. Enhancing the utilization of government support to expand access to resources and market opportunities, and improving understanding of regulations and market need
THREATS (T)	**STRATEGY ST**	**STRATEGY WT**
1. Fierce competition 2. Resistance to new technologies 3. Limited access to technology 4. Limited knowledge and skills 5. Pandemic and economic crisis 6. Data privacy issues	1. Strengthening collaboration with halal facilitators and PLN to improve production efficiency and the quality of halal products using SIHALAL technology. 2. Conducting intensive training to improve knowledge and skills in managing SIHALAL technology, so that MSMEs can maximize its use. 3. Improving the integration of robust policies and infrastructure to address the impact of the pandemic and economic crisis, and ensuring strict data protection to maintain customer trust.	1. Develop branding strategies to strengthen MSME brand identity and increase consumer trust. 2. Search for and develop alternative markets to reduce dependence on markets impacted by intense competition and the economic crisis. 3. Educate and raise awareness about the benefits of new technologies, such as AI in the Sihalal application, to address technology retention.

Source: Researcher Processed Data (2024)

4.4 Potential Market Opportunities for the Halal Food Industry in Bangun Purba Can Be Expanded Through the Implementation of SIHALAL Utilizing AI

The potential opportunity for the halal food market is increasingly wide open for MSMEs in Bangun Purba with the help of the SIHALAL application. This application not only simplifies the halal certification process, but also opens access to market information and the latest trends in the halal food industry. With halal certification easier to obtain, MSME products can be more trusted by consumers, both in local and international markets.

4.5 Risks and Threats for MSMEs in Bangun Purba in Global Competition and Improving Product Halal Standards through AI Systems in the SIHALAL Application

The application of artificial intelligence (AI) systems in the SIHALAL application brings the potential for significant

improvements in ensuring the halalness of MSME products in Bangun Purba. However, in the context of global competition, MSMEs face several risks and threats that need to be considered carefully. First, the adoption of AI technology may require significant costs and resources for MSMEs that are limited in this regard. This can be a major barrier to adopting new technologies, especially in the midst of intensifying global competition.

5. Conclusions

Based on the results of research on the development of the halal food industry in Bangun Purba by utilizing the AI system in the SIHALAL application to improve halal product assurance for MSMEs, the following conclusions can be drawn.

1. The results of the analysis of the internal factors above can be seen that the value of the internal factors of MSMEs in Bangun Purba is quite good with a weighting value of (0.14), this shows that the internal strength lies in the quality of halal products is very guaranteed. The level of weakness at weight (0.07) in terms of limited financial resources and access to a wider market. The level of opportunity (0.13) from the Government support factor. And the level of threat (0.07) in limited knowledge and skills. From the results of the calculations obtained from the IFAS and EFAS tables used in making the SWOT analysis diagram are: Total strength score (2.15), total weakness score (0.62), total opportunity score (2.48), total threat score (0.36).
2. The AI artificial intelligence system in the SIHALAL application can help MSMEs in Bangun Purba improve product halal assurance, AI can be used to optimize the halal verification process, improve the efficiency and accuracy of identifying halal ingredients in order to have high halal product quality and accelerate responses to changes in halal regulations or standards. This not only increases consumer confidence but also expands market access for MSMEs to compete in the halal food industry.
3. The obstacles faced by MSMEs in Bangun Purba in adopting AI technology through the SIHALAL application to ensure product halalness, in this case most MSMEs still have limitations. First, technological literacy, so it takes extra time and effort to understand and use this application optimally. Second, inadequate access to technological devices and infrastructure is also a challenge, especially for MSMEs located in remote areas. Third, there are obstacles in terms of culture and work habits. Many MSME players are accustomed to traditional ways of working.
4. Potential market opportunities for the halal food industry in Bangun Purba can be expanded through the implementation of SIHALAL which utilizes AI, because this application not only facilitates the halal certification process, but also opens access to market information and the latest trends in the halal food industry. With halal certification that is easier to obtain, MSME products can be more trusted by consumers, both in local and international markets.
5. Risks and threats for MSMEs in Bangun Purba in the context of global competition and improving product halal standards through AI systems on the SIHALAL App, in the context of global competition, MSMEs face several risks and threats that need to be carefully considered. First, the adoption of AI technology may require significant costs and resources for MSMEs that have limitations in this regard. Another threat is the need for more

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