

Identification of the Potential of Information Technology in the JPH System

Kayla Aulia^{1*}

¹Department of Islamic Economic Law, Darussalam Gontor University, Indonesia

*Corresponding author: kaylaauliam17@gmail.com

DOI: <https://doi.org/>

ABSTRACT

Keywords:

*Halal
Certification;
Information
Technology;
Blockchain;
BPJPH;
Traceability.*

The Halal Product Assurance System (JPH) is a vital tool for ensuring that products comply with Islamic law for Muslim consumers in Indonesia. The objective of this study is to identify the potential for using information technology to improve the efficiency and accountability of the halal certification process, optimize traceability, and foster innovation in the oversight of halal products. This study examines the role of the Halal Product Guarantee Agency (BPJPH) in integrating technologies such as blockchain and DNA barcoding to improve transparency and reduce bureaucratic barriers. A descriptive-analytical method was used. The research indicates that integrated information systems and data technologies can resolve debates over eligibility standards and boost public confidence in halal labels in both domestic and international markets. Thus, a strategic solution for advancing the halal industry in Indonesia is digital transformation within the JPH ecosystem.

Article Info:

Submitted:
01/1/2020

Revised:
10/02/2020

Published:
27/02/2020



This work is licensed under a [Creative Commons Attribution-ShareAlike 4.0 International \(CC BY-SA 4.0\)](https://creativecommons.org/licenses/by-sa/4.0/)

How to cite: Author 1, A. (2020). Title of The Article. *Falah: Jurnal Ekonomi Syariah*, 5(1), 1-14.

<https://doi.org/>

INTRODUCTION

The Halal Product Assurance System (JPH) is crucial for ensuring that goods sold to the public meet halal requirements in accordance with Islamic law. The system in Indonesia is continuously being improved

by the Board of Quality Brands (BPJPH). This paper aims to identify the potential of information technology within the JPH system and focuses on enhancing the efficiency and accountability of the halal certification process, optimizing the traceability and auditing of halal products, and fostering innovation in the supervision and enforcement of halal product regulations.

For Muslim consumers, the halal label signifies adherence to their religion as well as the assurance that they are choosing products that meet widely accepted eligibility requirements. Consumers may feel isolated or even deceived if information about a product's halal status is unclear or ambiguous. This indicates that greater transparency in communication and better halal food labeling by governments, producers, and the public is needed. Although halal labels are designed to be clear, in practice they are often difficult to understand and can lead to controversy (Usmi et al., 2024, p. 2).

A halal label, on the other hand, serves as proof that a product is halal. All businesses with halal certification must display a halal label that conforms to the nationwide standard format for halal labels. Halal certification offers many benefits to customers, one of which is the assurance that the products they purchase are safe and reliable. All customers certainly desire this. Additionally, Muslim customers are required by Allah to use halal products. Businesses recognize that halal certification impacts their success in the global market because it adds value to their products, helping them compete against various competitors. Products that hold halal certification are more easily trusted by customers because halal certification indicates that the product is safe (Fuadi et al., 2022, p. 3).

The Role of Fatwas in Halal Product Regulations: The Indonesian Ulema Council (MUI) is the body that determines the halal status of products. MUI fatwas on this matter, known as MUI Fatwas, provide the Indonesian public with guidance and legal guidelines based on Islamic law. Based on the interpretation of Islamic law, these fatwas establish standards for determining the halal status of a product. Additionally, the responsibility lies with the Agency for the Guarantee of Halal Products (BPJPH) for the administration of halal-certified products in Indonesia. BPJPH uses MUI fatwas to assess halal products, which serve as the basis for the certification and inspection processes to ensure their halal status.

Products on the market can be guaranteed through the Halal Product Guarantee (JPH) system, particularly in Indonesia, a country with the world's largest Muslim population. As the halal industry grows and customer demand increases, issues related to the certification, traceability, and oversight of halal products have become more complex. A strategic solution to enhance the efficiency, transparency, and accountability of the JPH ecosystem is information technology (Akbar & Fauziah, 2023, p. 2).

Currently, Indonesia's halal industry is experiencing significant growth due to increased consumer awareness of halal certification. To support the halal industry, the Indonesian government has taken measures such as implementing the Halal Assurance System (SJH), which is overseen by the Halal Product Assurance Agency (BPJPH). According to Law No. 33 of 2014 on halal product assurance, to meet the needs of a continuously growing market, many food and beverage businesses, as well as those in other sectors, are beginning to obtain halal certification (Azwar & Aqbar, 2024, p. 2).

The Halal Product Assurance System (SJPH) is defined as a crucial tool for ensuring that products on the market meet halal requirements. Its implementation is formally governed by government regulations and competent certification bodies, and the objective of the HASS is to establish a system that is transparent, accountable, and reliable. Manufacturers must implement the HASS in many countries with Muslim majorities to ensure that their products are suitable for consumption by Muslim consumers who are becoming increasingly discerning and selective.

However, issues related to the implementation of the SJPH cannot be ignored. Some countries face challenges such as differing halal standards, varying certification procedures, and high costs for small and medium-sized enterprises (SMEs). Furthermore, the success of this system is hindered by a lack of

awareness and understanding regarding the importance of ensuring halal products. Since products that have been certified in one country are not necessarily recognized as halal in another, differences in halal standards between countries hinder international trade(Nugroho, n.d., p. 2).

The Halal Product Guarantee Agency was established by the Minister of Religion of the Republic of Indonesia and operates as an institution that guarantees the halal status of products. A legal framework that encompasses the concepts, principles, and basis for its establishment. The content of halal product law is based on the desire of the Indonesian people to improve their quality of life, economy, and freedom to practice religious values, not merely for business interests(S. A. Hasibuan et al., 2022, p. 7).

LITERATURE REVIEW

In their study, Sifa and Anita (2022) found that MSME operators in South Bangka face the problem of insufficient information and outreach regarding halal certification.

Emma et al. (2025) demonstrated an increase in participants' competencies following the training. However, there is currently no systematic mechanism for monitoring and evaluating the effectiveness of the mentoring practices. In the next phase, it is necessary to strengthen the evaluation and follow-up mentoring aspects to ensure the sustainability of the program and achieve a more optimal impact in supporting the mplementation of halal certification.

Heru et al. (2024) show that the Mataram City government has implemented halal certification practices through free and social services to help MSME operators comply with these certification requirements.

Muhammad Faqih and Ani (2023) address the challenges and debates surrounding the role of fatwas in the regulation and governance of halal products in Indonesia. Several controversies have arisen regarding the validity of fatwas and the diversity of interpretations of Islamic law in Indonesia.

Rully et al. (2022) aimed to improve the quality of MSME products in Cibitung Tengah Village by conducting an evaluation of activities following the introduction of halal certification management.

METHODOLOGY

This study employs a qualitative methodology and descriptive analysis. The data analyzed include a literature review on halal regulatory policies, reports on service reforms by the Ministry of Religious Affairs, and empirical data on the use of information technology by the BPJPH. The analysis focuses on the six stages of certification and the implementation of digital twin technology, as well as a DNA barcode system for monitoring raw materials.

RESULT AND DISCUSSION

Improving the Efficiency and Accountability of the Halal Certification Process

Accountability comes from the English language and can be defined as "responsibility" or "the state of being accountable." Yanti and Arifin (2020) define accountability as the responsibility of an individual or group to utilize and manage additional resources and implement the rules assigned to them in order to achieve their goals. By applying accountability, you can influence how public organizations operate.

Accountability can thrive and flourish in an open and democratic environment, as well as in an environment where people can speak freely. Consequently, representative accountability and various forms of accountability are the most important components of good governance. There are five aspects of accountability (Alim & Rudiyanto, 2024, p. 4): Accountability, Integrity, and the Law, Managers, Programs, Policies, and Financial Accountability.

Protection, justice, legal stability, accountability, transparency, productivity, and professionalism are the fundamental principles for the certification and labeling of halal products. The institution responsible for the Organization responsible for halal product assurance (BPJPH) is the JPH Law. The JPH Law is a mandatory law, which means that every product sold in Indonesia must be certified as halal. This is in contrast to previous halal certification, which was voluntary.

Halal labels or halal certification boost business profits by increasing sales, building customer trust, and enhancing marketing efforts. Halal certification is also a strategic choice for retaining customers, gaining a competitive edge, and adding value to products. Furthermore, it can expand global markets and enable businesses—especially micro, small, and medium-sized enterprises—to export (Aprilia & Priantina, 2022, p. 2).

Halal certification is a written document issued by the Indonesian Ulema Council (MUI) certifying that a product is halal and compliant with Islamic law. Additionally, recognized halal certification is also granted following a comprehensive evaluation by the Indonesian Ulema Council, through the organization responsible for the supervision of food, pharmaceuticals, and cosmetics (LPPOM MUI). Halal labels must be certified by the Food and Drug Supervisory Agency (POM MUI) (Trihantana et al., 2022, p. 3).

Halal labeling by the BPOM based on recommendations from the MUI and halal certification verified by the LPPOM as well. The halal logo is affixed to the product packaging as proof that the product complies with halal requirements.

To protect consumers through guarantees that products are halal, including halal certification and labeling, which work together to provide peace of mind, security, safety, and confidence in the availability of products considered halal by the public interested in consuming and using them, and can also help businesses improve the quality of their products (Trihantana et al., 2022, pp. 3–4).

1. Compliance with Halal Certification

- a. Phenomenon: Some business owners pursue halal certification without understanding or applying the principles underlying it. This often results in business practices that contradict the ethics of the Qur'an.
- b. Relevance: Demonstrates that a comprehensive evaluation of the existing certification process is necessary and how this process can better reflect the essence of halal.

2. The Effect of Labeling on Purchasing Decisions (Rayyahun et al., 2025, p. 4)

- a. Trend: Many shoppers choose products with halal labels, but they don't always understand what the certification means. Some customers question the authenticity of halal labels.
- b. Relevance: Demonstrates the importance of being clear and fully understanding what is required for halal certification in order to align with the principles of the Qur'an.

The process for obtaining halal certification consists of six stages, from the submission of the application to the issuance of the halal certificate (Saputra & Hadi, 2023, p. 7):

- a. Business operators must submit an application for halal certification along with all required documents, including halal certificates for the raw materials used, a list of raw materials, and other documents. This application must include additional attachments related to the production process.
- b. In the second stage, the BPJPH will conduct document verification and an on-site audit at the production facility after receiving the application. The purpose of document verification is to ensure that the business operator's documents are complete and comply with the established requirements.
- c. The third stage—an on-site audit at the production facility—is to ensure that the manufacturing process and quality management system used by the business comply with established halal standards.
- d. The fourth stage consists of laboratory testing, conducted by the BPJPH and institutions accredited by the BPJPH to ensure that the product does not contain ingredients prohibited by Islam.
- e. In the fifth stage, BPJPH will evaluate the results of laboratory tests and audits to determine whether the product qualifies for halal certification.
- f. Finally, a halal certificate is issued by BPJPH for products that meet halal standards.

Case Studies or Empirical Data Related to Service Reform at the Ministry of Religious Affairs (I. A. Hasibuan & Suparto, 2024, pp. 18–19):

- a. **Halal Certification through the Halal Product Guarantee Agency (BPJPH):** Providing services related to halal certification now has a more organized and integrated procedure since the establishment of the BPJPH. This supports the development of the halal industry in Indonesia by making it easier for businesses to obtain permits.
- b. **Improved Efficiency, Accountability, and Public Satisfaction**
 - a. **Operational Efficiency:** Service processes have become faster and more cost-effective thanks to a clearer organizational structure and the use of information technology. For example, the process of obtaining permits for places of worship can now be completed in a few weeks, whereas previously it took months.
 - b. **Greater Accountability:** Formal organizations are more transparent, particularly regarding budget management, when they have structured workflows.
 - c. **Public trust in the Ministry of Religious Affairs** has increased because its financial reports and activities are more accessible.

In 2017, the BPJPH was established to administer the JPH, issue halal certificates, and ensure legal certainty regarding the halal status of products: the BPJPH collaborates with LPHs, the MUI, and other relevant institutions. Before a halal certificate is issued, documents are reviewed, audited by LPHs, and certified as halal by the MUI. BPJPH continues to improve the system and ensure that halal products are widely available to the public. This is done despite some challenges in implementing the JPH Law, such as a shortage of qualified auditors and inadequate facilities.

To ensure compliance with standards recognized as valid in Indonesia, the process is overseen by the Board of Halal Product Handling (BPJPH). BPJPH is responsible for tracking and inspecting every step of the manufacturing process, from raw materials to the final product, to provide assurance to customers that the goods they possess have been validated as halal. The BPJPH is also involved in oversight through continuous audits and inspections to ensure there are no violations of existing standards (Widodo et al., 2024, pp. 2–3).

BRIN will conduct a Halal Product Service Satisfaction Survey in 2024 as part of the BPJPH evaluation. The purpose of this survey is to determine the public's level of satisfaction with halal-certified services available nationwide. The study involves approximately ten thousand people from various stakeholders or related businesses. It is conducted using a descriptive analysis method. The results will be used in the future to assess and improve the quality of halal certification services. The Minister of State Apparatus Empowerment and Bureaucratic Reform Regulation No. 14 of 2017 on Guidelines for Conducting Public Satisfaction Surveys of Public Service Units serves as the basis for this survey. The survey includes nine service components, including(Widodo et al., 2024, p. 5):

- a. Requirements.
- b. Standard operating procedures (SOPs).
- c. Completion time.
- d. costs or fees.
- e. service products
- f. service provider's capabilities
- g. or the behavior of service providers
- h. and perceptions regarding anti-discrimination and anti-corruption.

BPJPH has collaborated with businesses and academic institutions to use data technology to enhance transparency and the effectiveness of halal product controls. One example is a collaboration with local technology companies and universities in Indonesia to develop and implement a blockchain-based data system during the halal certification process. BPJPH launched a pilot project in 2022 to monitor and ensure the halal product distribution chain of several well-known food and beverage manufacturers in Indonesia using blockchain technology. All components of the supply chain are immutable, clearly traceable from raw materials to the final product, and easily accessible via blockchain, ensuring data integrity and accountability(Widodo et al., 2024, p. 6).

By implementing this initiative, BPJPH successfully addressed a number of controversies related to eligibility standards, such as issues regarding the use of specific ingredients in cosmetics and food products. The policies subsequently adopted have strong legitimacy because they are based on broad participation and support from various stakeholders. This initiative not only strengthens Indonesia's halal laws but also builds greater trust among the industry and the public in BPJPH's general standards.

The study reveals that the integration of digital technology, particularly blockchain, into the BPJPH certification system significantly enhances transparency and operational efficiency. This advancement aligns with the findings of earlier studies that underscore the transformative role of technology in improving administrative processes and public satisfaction within the Ministry of Religious Affairs. Specifically, the use of blockchain technology addresses critical challenges in supply chain integrity and data accountability, fostering greater industry and public trust. Furthermore, the collaborative approach between BPJPH, technology firms, and academic institutions illustrates a successful model for implementing digital reforms in a complex regulatory environment. These findings suggest that continued investment in technological infrastructure and stakeholder engagement will be essential for the further development and global competitiveness of Indonesia's halal industry. In summary, the digitalization of halal certification through BPJPH represents a substantial leap forward in achieving legal certainty and public service excellence.(Widodo et al., 2024, p. 7)

The government must establish clear and practical guidelines regarding Halal labeling. This process has just begun with the creation of a clear definition of Halal products and the rules that distributors and manufacturers must follow. A firm legal foundation will help implement Halal labeling, reduce uncertainty, and increase public confidence in the products they purchase. Halal certification bodies can receive significant support from the government to ensure they are independent and of high quality. One of the

responsibilities of these certification bodies is to verify and ensure that products and production procedures meet recognized halal standards.

they operate transparently and in accordance with applicable regulations. In addition to establishing regulations, the government must actively monitor labels indicating halal status. This includes monitoring marketed products and enforcing compliance with halal labeling regulations. Businesses that sell counterfeit halal labels or violate product halal regulations must be strictly punished. The government must actively monitor halal labeling regulations. This includes routine inspections of producers and certification bodies, as well as legal action against violations. Strict controls will enhance public confidence in halal labels and reduce the likelihood of fraud(Usmi et al., 2024, p. 4).

The government must invest in infrastructure and technology to support the effective implementation of halal labeling, including the development of information and communication technology systems capable of facilitating the supervision and monitoring of halal products from start to finish. Sufficient infrastructure will make the supervision and certification process easier, and halal label fraud will be detected faster and more accurately; the government can also participate in promoting international regulations regarding halal labeling and facilitating agreements among that enhance mutual recognition of halal certification, making global trade in halal goods easier and providing producers with greater access to market their products worldwide.

If halal and non-halal labels are unclear, consumers—especially Muslims—may become very concerned. Consumers trust halal labels as proof that the goods and services they purchase align with their religious beliefs. If there is a lack of transparency, they may become skeptical or even feel deceived if the food they consume does not meet halal requirements. Furthermore, a lack of transparency fosters fraud and deception in the market. This endangers not only customers but the entire business ecosystem. Lack of transparency may cast further doubt on current halal certification bodies. If certification procedures are unclear or lack accountability, customers and the public at large may question the credibility of certifications issued by these organizations. This affects public trust in any product bearing a halal label, even though most may meet the requirements(Usmi et al., 2024, p. 6).

The halal industry faces many complex aspects related to technological change and innovation. First, halal verification and certification conducted using technologies such as blockchain-based systems require efficiency and accuracy. Second, supply chain monitoring through technologies like the Internet of Things (IoT) must be adapted to account for halal principles and prevent contamination.

Third, the use of advanced production technologies, such as automation, must ensure that the resources and methods employed comply with halal regulations. Fourth, while technology can be used to process and market acceptance of products considered halal, such as animal- or plant-based foods, must be implemented(Wahyudi et al., 2023, p. 8).

Optimizing Halal Product Traceability and Audits

In addition to being a mandatory requirement for halal trade, the SJPH encourages businesses to continuously develop new products and improve their quality. Halal certification encourages producers to adopt more sustainable production practices by meeting strict production standards, including hygiene, food safety, and business ethics.

Not only in the food and beverage sectors, but also in cosmetics, pharmaceuticals, and other consumer product sectors that follow Sharia principles, halal product innovation is also growing rapidly. With the SJPH, this innovation can be more quickly accepted by the market and gain consumer trust, enhancing global competition for halal products(Nugroho, n.d., p. 6).

With the growth of the halal industry, by providing food, lodging, and additional services aligned with halal standards, the prospects for Indonesian Muslim tourism may be maximized, creating numerous opportunities for economic growth. Indonesia's halal industry can also leverage digital supply chain monitoring and other advancements in production, packaging, and distribution.

Furthermore, greater investment and government support for the growth of halal companies in Indonesia will open up possibilities that must be fully leveraged. The goal is to enhance the competitiveness of Indonesia's halal industry in both domestic and international markets through financial incentives, infrastructure, and other support programs. Indonesia's halal industry has the potential to grow more rapidly and consistently by leveraging these investments and support (Azwar & Aqbar, 2024, pp. 14–15).

This significant growth is driven by rising demand for halal goods and services both domestically and internationally, as well as government efforts to promote the halal industry through various programs and policies, such as establishing the Halal Product Guarantee Agency (BPJPH) to improve certification procedures and regulations for halal products. Intellectual property rights (IPR) protection, however, is essential to realizing this potential.

In this context, digital twin technology offers a creative solution for protecting IPR while optimizing the halal-based economy. A digital twin is a virtual representation of a physical product that enables real-time monitoring and analysis, allowing businesses to more easily track and monitor their product lifecycle efficiently. According to Semeraro and colleagues (2021), digital twins can therefore be used in the halal food industry to ensure that all production processes and raw materials meet established ethical standards and to detect potential IPR violations. Additionally, this technology enables businesses to comply with government regulations and halal certification bodies and improve their products before they are sold (Quddus et al., 2024, p. 3).

To be competitive in the global halal market, the development of comprehensive halal infrastructure is required. Indonesia has taken several steps to build halal infrastructure. One of these is establishing the Halal Product Guarantee Commission (BPJPH) and setting halal certification regulations. A study conducted by Rokhman and Taruno states that developing infrastructure that meets halal standards can increase customer confidence and enhance the competitiveness of Indonesian halal products in the international market.

Additionally, a major obstacle is the lack of adequate logistics infrastructure to establish a global halal hub. According to research by Ardianto, the absence of integrated and effective logistics infrastructure impacts the distribution and global reach of Indonesian halal products. The production, storage, and distribution of halal products require robust infrastructure (Istiqlal, 2023, pp. 5–7).

In Indonesia, the Ministries of Agriculture, Marine Affairs and Fisheries, Forestry, Industry, Trade, and Health, the Indonesian Food and Drug Administration (BPOM), and local governments are responsible for food safety.

The Deputy for Processed Food Supervision is responsible for food safety and security issues at the Indonesian Food and Drug Administration (BPOM). This Deputy heads five subdivisions overseeing the following areas: standardization, and registration of fresh food, supervision of high-risk foods, new technologies, and public and business empowerment (Hung, 2020, p. 6).

Training and outreach programs conducted by the government and related agencies, such as the JPH, enhance businesses' understanding of the importance of halal certification and the processes that must be followed. MSMEs that participate in these outreach and training programs tend to be better prepared and more confident in undergoing the certification process.

Those who proactively pursue certification are motivated by long-term benefits for their businesses, such as increased customer trust and market expansion. Halal certification is considered essential to ensure business sustainability. From this perspective, halal certification is a critical investment for small and medium-sized enterprises (SMEs)(Rinjani et al., 2024, pp. 5–6).

Technological challenges, such as limited internet access and weaker technological systems, should not hinder SMEs from pursuing digital business operations. In conclusion, digitalization and technology present both benefits and challenges for SMEs in Indonesia. However, efforts are needed to improve digital literacy and technological skills, secure support from various stakeholders—including the government—and enhance access to capital, infrastructure, and business competitiveness(Syailendra & Putri, 2023, p. 12).

Halal certification: Many halal small and medium-sized enterprises strive to obtain official halal certification from authorized organizations so that clients can gain confidence from this certification, as it demonstrates the halal status of the products to buyers, assuring them that the products they purchase meet halal requirements.

Halal SMEs have the ability to develop innovative products that adhere to halal standards by combining creativity and technology to meet the needs of an ever-evolving market. When discussing Halal SMEs, it is important to remember that the concept of “halal” extends beyond ingredients and production processes; marketing, promotion, and the entire product lifecycle must be managed in accordance with halal standards(Femy Sasongko et al., 2021, p. 4).

The supply chain, also known as the supply chain, is a series of activities related to how goods and services move and are processed, starting from the manufacturing of raw materials until the consumer receives the final product. This supply chain effectively integrates suppliers, manufacturers, warehouses, shipping, retailers, and customers. The supply chain involves numerous individuals, technologies, actions, information, and resources required to complete the process of delivering goods or services from the supplier to the customer. Activities within the supply chain are carried out to transform components, raw materials, and other natural resources into goods that are subsequently shipped to the end customer. Overall, this supply chain pertains to the transportation and development of goods and services from start to finish.

This halal supply chain involves many parties. Seed selection, fertilizer use, and resource hygiene are all the supplier's responsibility. Production is responsible for the warehousing system, raw material processing, and hygiene during the production process. Distribution is responsible for the cleanliness of transport vehicles and ensuring that halal products are kept separate from other products. Additionally, manufacturers, suppliers, distributors, and halal certification bodies collaborate within the halal supply chain(Sudarmanto et al., 2023, p. 92).

The ability to track the flow of products within a new product and also within a company's distribution chain is referred to as a traceability system. This capability ensures that goods can be identified as specific by recording the identity of the product flow and systematically collecting, processing, and storing information.

The ability to track products throughout the food production chain, starting from the customer to the manufacturing facility and even back to the supplier, distributor, or producer, is known as traceability. The purpose of traceability is to identify the source of a product that does not meet certain requirements, such as identifying sources that may cause contamination. Traceability can be established for various reasons and serves multiple purposes, such as enhancing transparency in the production chain. The availability of data regarding transparency in aspects such as production processes, food safety, animal welfare, the use of medications, and other factors tends to increase consumer confidence in the safety of their food(Zulhafizh, 2019, p. 31).

Additionally, the objective of implementing a traceability system is to reduce the likelihood of claims and product recalls. Furthermore, a traceability system can be established to improve the efficiency of product recalls. Through traceability, local governments can identify products that pose a risk to the public.

A traceability system is typically defined as the relationship between data systems, information systems, and physical conditions—or the movement of materials within a logistics network. By utilizing technology to record data, the system enables products to be traced to their intended locations within the logistics network and automatically registered. Furthermore, arrival details are immediately sent to the tracking database. The three main pieces of information regarding materials include the tracking identification, location, and time used in the tracing process. Unsafe and substandard materials in the supply chain will be reduced with a good traceability system (Zulhafizh, 2019, p. 32).

Standard Operating Procedures (SOP) Halal: This section explains the Halal Standard Operating Procedures (SOPs) established by LPPOM MUI, which are used by the factory to carry out various procedures, such as purchasing materials, inspecting and receiving materials, adding new suppliers and materials, halal certification, and processing material invoices (Zulhafizh, 2019, p. 48).

- a. Standard Operating Procedures (SOP) for As part of the MUI Halal Assurance System, the following ingredients are purchased:
 1. The materials must correspond to the list of materials recognized by LP POM MUI.
 2. The purchaser must ensure that the material name and code, company name, and factory name and location are listed on the halal document or halal certificate.
- b. As part of the MUI Halal Assurance System, the standard operating procedures (SOP) for the following are the prices of the purchased materials (Zulhafizh, 2019, p. 49):
 1. Ensure that the manufacturer, name, and location of the factory, as well as the material name and code, correspond to the list of materials recognized by LPPOM MUI.
 2. If the material requires a unique logo for the halal certificate, the logo must be present on all packaging of the material.
 3. Since materials are issued an official halal certificate for each shipment, ensure that the lot number, quantity, manufacturing date, and expiration date meet the requirements specified in the halal document.
 4. Substances not matching the list.
 5. Record and include inventory cards, product request notes, and proof that the materials have been received for every material movement from the warehouse, whether incoming or outgoing.
- c. Standard Operating Procedures (SOP) for Replacement and New Suppliers, based on the MUI Halal Assurance System, are as follows (Zulhafizh, 2019, p. 50):
 1. For materials classified as critical, ensure that new suppliers must hold a halal certificate issued by MUI or an institution recognized by LPPOM MUI.
 2. If the supplier does not have a halal certificate, it is recommended to find another supplier who holds a halal certificate from MUI or a similar institution recognized through LPPOM MUI.
 3. If there are no new suppliers with a halal certificate, a re-inspection must be conducted.

4. It is very important to ensure that the ingredients to be purchased match the information stated in the legal documents or halal certificate (ingredient name and code, company name, and factory name and location).
 5. Suppliers must verify whether they are distributors or direct manufacturers, and if they are distributors, a written agreement must be established with the supplier to ensure that they will only source ingredients provided by the manufacturers listed in the document that are deemed halal.
 6. Guidelines for the use of manufacturers must be established.
- d. SOP for the MUI Halal Assurance System: When using new materials:
1. Before using new materials, verify whether they are classified as critical ingredients and possess a halal certificate issued by an institution recognized by LPPOM MUI or MUI itself.
 2. If the material does not have a halal license, it is recommended to find an alternative material that has a halal certification issued by MUI or LPPOM MUI.
 3. If no identical alternative material can be found, technical specifications must be reviewed to determine the material's origin and the production process flowchart, and this must be communicated to LPPOM MUI through an internal auditor's review.
 4. Report the plan to use the new material to LPPOM MUI through the internal auditor.
 5. New materials that have been approved by LPPOM MUI may be used.
- e. The Standard Operating Procedures (SOP) for Halal Production based on the MUI Halal Assurance System are as follows (ZULHAFIZH, 2019, p. 51):
1. Production worksheets must include formulas and ingredient matrices recognized by LPPOM MUI.
 2. Only materials listed in the resource list known and accepted by LPPOM MUI are permitted.
 3. Materials must be free from contaminated and illegal substances.
 4. Only halal materials may be used in the production line.
 5. Furthermore, if the production line is used for haram materials, the production line must be shut down.
 6. Ensure that the manufacturing area does not contain materials or products not used in production.
 7. Ensure that all records regarding all production processes are properly and completely documented.
- f. SOPs for changes to formulas and the creation of new products, based on the MUI Halal Assurance System, are as follows:
1. The rationale for changes to formulas and the creation of new products is based on the list of food items recognized by LPPOM of MUI.
 2. Changes in the composition of new products must be reported as soon as the latest halal certification process begins.
 3. There is no need to report changes to the formulation to LPPOM MUI when developing new products or using different ingredients.

4. Changes to a formula that use new ingredients (alternative ingredients) but do not result in a new product must be reported to LPPOM MUI through an internal auditor.
5. All plans to develop new formulations that do not result in new products must be submitted to LPPOM MUI.
6. Only after LPPOM MUI approval can the new formula be used.
7. If no agreement is reached with LPPOM MUI, the newly created formula cannot be used.

Investment objectives and the types of investments made in information technology are among the matters a business should address, particularly when the company is still in its early stages—namely, construction and development. Fundamentally, the role played by information technology varies for each company. This is because every business has methods that distinguish one from another. One of the objectives of investment in information technology is to improve efficiency, which is expected from the application of information technology across various sectors. Another objective of investment is to enhance business efficiency or to do things correctly (Zulhafizh, 2019, p. 58).

Technological Innovations for the Supervision and Enforcement of Halal Products

One of the latest innovations in information technology is the digital twin, which is increasingly adopted across various economic sectors. A digital twin is a virtual representation of a physical system, object, or process that facilitates monitoring, analysis, and simulation within a real-time digital model. It reflects the physical condition of the observed object, enabling the collection and analysis of information regarding performance and other parameters to improve operational productivity and efficiency. In the operating principle of the digital twin, data collected from sensors installed on physical objects is integrated; this data can be obtained instantly and automatically via Internet of Things (IoT) technology, enabling continuous monitoring and rapid response to various potential situations (Quddus et al., 2024, p. 4).

Halal traceability technology, also known as halal traceability, is used to track and trace the production processes and supply chains of halal products. The purpose of this technology is to enhance the transparency of halal products, ensure food safety, and prevent counterfeiting.

The expansion of advanced technologies in supply chain management is one of the major changes brought about by the Industry 4.0 era. Blockchain, Radio Frequency Identification (RFID) tags, Quick Response (QR) codes, the cloud, the Internet of Things, and artificial intelligence (AI) are some of the technologies that can be used for halal traceability. These technologies improve the effectiveness and transparency of halal supply chain management (Sudarmanto et al., 2023, p. 105).

Blockchain is a system that allows people to share various things globally, such as conducting financial transactions with cryptocurrency, transferring securities, sharing health data, and sharing other important data and information.

Because of its ability to eliminate intermediaries from the supply chain during transactions, blockchain is beginning to attract many users. It is a solution that allows users to engage in secure agreements with anonymous parties they do not know (Lase et al., 2021, p. 3).

Using blockchain technology for halal certification is one of the new innovations being implemented in various countries to enhance the reliability of the halal certification system. This innovation aims to improve the transparency, accountability, and effectiveness of the halal certification and product distribution processes. Studies indicate that the use of blockchain can help address key issues in the halal certification system, such as certificate forgery, lack of traceability, and challenges in ensuring halal compliance throughout the supply chain.

reveals that, although the government wants to use blockchain for halal certification, agencies such as BPJPH still need to refine the system and educate businesses. This is necessary so that blockchain-based certification can be implemented and accepted by all parties. Additionally, it indicates that advancements in blockchain-based halal certification have made information about halal products more reliable. With blockchain, customers can easily track a product's halal status through a digital app integrated with the halal certification database. This technology enhances transparency and boosts competition in the global halal industry(Oktaviana, 2025, p. 5).

Blockchain technology records financial transactions and information with the highest level of security. This produces a transparent and secure ledger that can be accessed by all relevant parties.

In Islamic finance, transactions that adhere to Islamic principles can be easily verified by relevant parties. This is because the blockchain, as a publicly recorded ledger, is accessible to all involved parties. By using blockchain, it is straightforward to trace transactions back to their source and ensure that all parties involved are accountable. With blockchain technology, Islamic financial transactions become easier, more transparent, and more accountable. This technology also enables monitoring of transactions to ensure they do not deviate from Sharia principles(Arwani & Priyadi, 2024, p. 6).

If information on digital platforms is symmetrical, sellers and buyers have equal access to information. In such situations, customers can be confident that the goods and services advertised on halal online platforms comply with Islamic regulations. Businesses can enter the growing halal market with integrity because clear and accurate data helps customers make more confident purchasing decisions. Digital platforms play a significant role in building a halal economy that benefits both customers and businesses by providing trust and transparency. However, information asymmetry can significantly impact the decisions made by consumers and vendors.

In such situations, adverse selection—also known as detrimental selection—is a common phenomenon. This condition arises when individuals with more information, such as producers or sellers, take advantage of consumers' lack of knowledge. For example, people who buy food online risk purchasing non-halal food if they are unaware of the product's halal status(Btr & Zulham, 2025, p. 4).

The Internet of Things (IoT) is a rapidly evolving traceability technology in the halal product supply chain. The Internet of Things is a network of wirelessly connected devices. These include sensors, actuators, mobile phones, Radio Frequency Identification (RFID) tags, and others. Often, this technology transmits data to cloud servers via an internet connection. Cloud services can help securely share data, improve profitability through more efficient decision-making processes, and reduce waste and operational inefficiencies.

By utilizing the Internet of Things (IoT), halal integrity within the halal food supply chain (HFSC) can be maintained, and issues related to preserving halal integrity among halal supply chain stakeholders can be resolved. To remain competitive, the halal food ecosystem must recognize the potential of Internet of Things (IoT) technology to address regulatory standards, consumer demands, and business opportunities through operational efficiency and in-depth decision support within the HFSC. To ensure product halal status, the Internet of Things enables real-time monitoring of product conditions, such as temperature and humidity(Sudarmanto et al., 2023, p. 106).

IoT enables direct monitoring of product conditions such as temperature and humidity throughout food distribution. This demonstrates that container temperature sensors can detect temperature spikes that risk damaging products. Additionally, real-time monitoring systems provide early warnings, allowing for corrective actions before products are damaged. It adds that information obtained from this monitoring

will be used as evidence for food quality and safety audits. However, it notes that internet infrastructure and sensor networks remains limited in rural areas, suggesting the use of edge computing to address network latency in monitoring at remote locations, and noting that many SMEs still do not use digital monitoring systems due to cost constraints and a lack of technological understanding.

Blockchain is a permanent and transparent recording system. When combined with the Internet of Things (IoT), all data collected by sensors is automatically recorded on the blockchain, making it tamper-proof. This enhances customer trust in the product. By scanning a QR code, customers can verify information about the product's origin, processing methods, and shipping conditions. This is particularly relevant for organic or halal products. Additionally, this system helps companies comply with strict food safety and transparency regulations. Standards such as BPOM, HACCP, and ISO 22000 emphasize reliable and traceable record-keeping, and IoT and blockchain can support these requirements. It should be noted, however, that integrating IoT and blockchain is challenging and requires sufficient digital infrastructure and technical training. Furthermore, it should be noted that some supply chain actors are not prepared to manage blockchain-based decentralized systems (Putri et al., 2025, pp. 3–4).

QR Codes for Food Traceability (FT) have been widely used as a technology to store data about food products. These codes can not only store and convey information but can also be converted into traceability codes. QR Codes can also serve as a link between buyers and sellers and protect consumer rights by providing information on the quality and safety of halal food (Sudarmanto et al., 2023, p. 106).

"Big data" is a term used to describe extremely large and complex datasets. Big Data technology has the capability to process data of any volume, variety, or velocity. This technology offers numerous benefits for enhancing the traceability of the halal product supply chain.

People can also use AI to investigate the supply chain of halal products. AI technology can help make intelligent decisions, enhance data security, and improve data efficiency. Artificial intelligence (AI) uses computer programs to perform actions that would otherwise require human intelligence. Learning, perception, problem-solving, language understanding, and logical reasoning are all functions that artificial intelligence algorithms can perform. AI is used in many areas today, such as personal assistants and self-driving cars. It is possible that artificial intelligence (AI) will eventually replace humans in many jobs. Many companies are currently considering what types of jobs could be replaced by artificial intelligence (AI) (Sudarmanto et al., 2023, p. 107).

A key aspect of life for Muslim communities in Indonesia is ensuring that the products they use or consume are halal. The majority of Indonesia's population is Muslim. Developers have considered blockchain as a system that can help ensure halal compliance. The National Ministry of Sharia Economy and Finance (KNEKS) has been responsible for developing a halal tracking and monitoring system. Data will be provided by this system throughout the production and distribution processes, all the way until the product reaches the customer. The system will evaluate processing techniques, timing, location, involved suppliers, and other data that can determine the halal status of a product.

The use of blockchain will shift perspectives regarding the functions and responsibilities of the National Cybersecurity Agency (BSSN). This is because BSSN is the most suitable institution to regulate, implement, and oversee blockchain technology. Consider BSSN's primary tasks under the current framework: utilizing, developing, and consolidating every element that constitutes blockchain (Lase et al., 2021, p. 16).

CONCLUSION

The digitization of the JPH system improves the efficiency and accuracy of halal product traceability. To maintain data integrity and consumer trust, innovations such as blockchain, the Internet of Things, and laboratory DNA analysis are essential. The government must continue to improve digital literacy among small and medium-sized enterprises (SMEs) and strengthen internet infrastructure in rural areas to ensure the widespread adoption of these technologies across all industrial sectors.

REFERENCES

- [1.] Akbar, M. F., & Fauziah, A. (2023). Peran Fatwa, Regulasi, dan Tata Kelola dalam Meningkatkan Kualitas dan Keamanan Produk Halal di Indonesia. *International Conference On Islam Education Management and Sharia Economics* , 4 (1). <https://prosiding.stainim.ac.id>
- [2.] Alim, M. N., & Rudiyanto. (2024). Akuntabilitas Proses Sertifikasi Halal Berbasis Self Declare pada Halal Center Universitas Trunojoyo Madura. *Muttaqien* , 5 (1). <https://doi.org/https://doi.org/10.52593/mtq.05.1.06>
- [3.] Aprilia, S., & Priantina, A. (2022). Analisa Strategi Peningkatan Sertifikasi Halal Sektor Kuliner Di Bangka Selatan. *International Journal Mathla'ul Anwar of Halal Issues* , 2 (1). <https://doi.org/10.30653/ijma.202221.46>
- [4.] Arwani, A., & Priyadi, U. (2024). Eksplorasi Peran Teknologi Blockchain dalam Meningkatkan Transparansi dan Akuntabilitas dalam Keuangan Islam: Tinjauan Sistematis. *Jurnal Ekonomi Bisnis Dan Manajemen* , 2 (2). <https://doi.org/10.59024/jise.v2i2.653>
- [5.] Azwar, & Aqbar, K. (2024). Strategi Penguatan Industri Halal di Indonesia: Analisis SWOT. *AL-KHIYAR: Jurnal Bidang Muamalah Dan Ekonomi Islam* , 4 (1). <https://doi.org/10.36701/al-khiyar.v4i1.1432>
- [6.] Btr, M. A., & Zulham. (2025). Kewajiban Transparansi Informasi Halal Pada Platform Digital Shopee Food. *Indonesian Journal of Humanities and Social Sciences* , 6 (1). <https://ejournal.uit-lirboyo.ac.id/index.php/IJHSS>
- [7.] Femy Sasongko, D., Wahyu Hestya Budianto, E., Ulhaq Arkaan, D., & Herawati, A. (2021). Internalisasi Nilai Moderasi Beragama Dalam Sistem Ekonomi Syariah Pada UMKM Halal Melalui Produk Pembiayaan Syariah. *Martabe: Jurnal Pengabdian Masyarakat* , 7 (4). <https://doi.org/10.31604/jpm.v7i4.1303-1320>
- [8.] Fuadi, Soemitra, A., & Nawawi, Z. M. (2022). Studi Literatur Implementasi Sertifikasi Halal Produk UMKM. *Jurnal Ekonomi Dan Manajemen Teknologi (EMT)* , 6 (1). <https://doi.org/10.35870/emt.v6i1.541>
- [9.] Hasibuan, I. A., & Suparto. (2024). MEMBANGUN ORGANISASI FORMAL : TAHAPAN STRATEGIS KEMENAG DALAM MENINGKATKAN EFEKTIVITAS LAYANAN PUBLIK. *MADDINA: Jurnal Manajemen Dakwah* , 1 (2). <https://jurnal.iaihnwpancor.ac.id/index.php/madina/index>
- [10.] Hasibuan, S. A., Andoko, & Fatmawati, I. (2022). Legalitas Pendaftaran Sertifikasiproduk Halal Sebagai Implementasi Undang-Undang Jaminan Produk Halal Di Indonesia. *Journal Analytica Islamica* , 11 (2). <https://doi.org/10.30829/jai.v11i2.12831>
- [11.] Hung, M. S. (2020). Efektivitas penegakan hukum terhadap produsen makanan berbahaya menuju Indonesia sehat 2025. *Jurnal Gagasan Hukum* , 02 (02). <http://journal.unilak.ac.id/index.php/gh/article/view/8558>

- [12.] Istiqlal, F. (2023). Membangun Global Halal Hub Indonesia: Strategi dan Peluang untuk Mencapai Kompetitif di Pasar Global. *Halal Research Journal* , 3 (2). <https://doi.org/10.12962/j22759970.v3i2.614>
- [13.] Lase, S. M. N., Adinda, A., & Yuliantika, R. D. (2021). Kerangka Hukum Teknologi Blockchain Berdasarkan Hukum Siber di Indonesia. *Padjajaran Law Review* , 9 (1) <https://hbr.org/2017/02/a-brief-history-of->
- [14.] Nugroho, F. (n.d.). Dampak Penerapan Sistem Jaminan Produk Halal terhadap Perdagangan Syariah .1–10.
- [15.] Oktaviana, T. C. (2025). Potensi Industri Halal dalam Meningkatkan Ekonomi Digital : Studi Kasus pada Shopee Barokah. *Jurnal Sahmiyya* , 4 (1).
- [16.] Putri, C. N., Ramadhani, A. J., Rifki, M. A., Mutiah, Damora, M. A. C., & Budiawati, Y. (2025). SUPPLY CHAIN MANAGEMENT BERBASIS IOT DALAM MENINGKATKAN KEAMANAN PANGAN : LITERATURE REVIEW. *Integrative Perspectives of Social and Science Journal (IPSSJ)* , 2 (3).
- [17.] Quddus, M. S., Sari, A. P., & Firdaus, F. M. (2024). Pemanfaatan Digital Twin dalam Perlindungan Hak Kekayaan Intelektual Sebagai Strategi dalam Mengoptimalkan Potensi Ekonomi Halal di Indonesia. *Journal of Mandalika Literature* , 6 (2). <http://ojs.cahayamandalika.com/index.php/jml%0APemanfaatan>
- [18.] Rayyahun, A., Abubakar, A., & Galib, M. (2025). Rekonstruksi Paradigma Jual Beli Dalam Perspektif Al-Quran : Evaluasi Kritis Terhadap Sertifikasi Dan Labelisasi Produk Halal. *Jurnal Studi Ekonomi Dan Bisnis Islam (SEBI)* , 7 (1). <https://doi.org/https://doi.org/10.37567/sebi.v7i1>
- [19.] Rinjani, H. S., Mulhimmah, B. R., & Hanafi, S. (2024). Kewajiban Sertifikasi Halal Produk dalam Pandangan Pelaku UMKM di Kota Mataram. *Buletin Hukum Ekonomi Syariah* , 2 (1).
- [20.] Saputra, E., & Hadi, M. K. (2023). Peran Sains Dan Teknologi Dalam Meningkatkan Efisiensi Ekonomi Islam Di Indonesia. *Religion: Jurnal Agama, Sosial, Dan Budaya* , 1 (2023). <https://maryamsejahtera.com/index.php/Religion/article/view/229%0Ahttps://maryamsejahtera.com/index.php/Religion/article/download/229/224>
- [21.] Sudarmanto, E., Yani, A., Mustaqim, Y., Shobaruddin, D., Abadi, M. D., Saifuddin, W. A., Hayati, N., Rismawati, Wardhana, M. A., Salju, Wahidin, Gani, I., Husein, M. T., & Wulandjani, H. (2023). Manajemen Strategik dan Keberlanjutan Bisnis (P. . Zubaidi Wahyono & M. Sabik Khumaini, Lc. (eds.); pertama, Issue April). MINHAJ PUSTAKA. www.minhajpustaka.id
- [22.] Syailendra, M. R., & Putri, I. F. (2023). Tinjauan Hukum Mengenai Perlindungan UMKM serta Efektivitas Permendag No . 31 Tahun 2023 terhadap Social Commerce Tiktok Shop. *INNOVATIVE: Journal Of Social Science Research* , 3 (31). <https://j-innovative.org/index.php/Innovative%0ATinjauan>
- [23.] Trihantana, R., Suryani, E., & Puloh. (2022). Strategi Pengenalan Manajemen Sertifikasi Halal Dalam Meningkatkan Kualitas Produk Usaha Mikro Kecil Dan Menengah Di Desa Cibitung Tengah, Kecamatan Tenjolaya, Kabupaten Bogor. *Sahid Empowerment Journal* , 2 (01). <https://doi.org/10.56406/sahidempowermentjournal.v2i01.63>
- [24.] Usmi, V., Nagara, S. H., Majestica, A., Sukmawati, S., & Lestarka, D. P. (2024). Hak atas Informasi bagi Konsumen terhadap Labelisasi Halal dan Non Halal pada Industri Kuliner. *Indonesian Journal of Law and Justice* , 2 (1), 9. <https://doi.org/10.47134/ijlv.v2i1.3173>

- [25.] Wahyudi, F. S., Setiawan, M. A., & Armina, S. H. (2023). Industri Halal: Perkembangan, Tantangan, and Regulasi di Ekonomi Islam. *Innovative: Journal Of Social Science Research* , 3 (6).
<http://j-innovative.org/index.php/Innovative/article/view/6506%0Ahttps://jinnovative.org/index.php/Innovative/article/download/6506/4522>
- [26.] Widodo, A. C., Nuryanto, Y., & Rudiana. (2024). Pengawasan Jaminan Produk Halal (JPH) Oleh Badan Penyelenggara Jaminan Produk Halal (BPJPH). *JIIP (Jurnal Ilmiah Ilmu Pendidikan)* , 7 (10). <http://jiip.stkipyapisdompou.ac.id>
- [27.] Zulhafizh, M. (2019). PERANCANGAN SISTEM HALAL TRACEABILITY PADA INDUSTRI PENGOLAHAN PRODUK AYAM (Vol. 11, Issue 1) [Institut Teknologi Sepuluh Nopember Surabaya]. http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI