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Blockchain Integration in the Halal Supply Chain: A *Maqashid Sharia* Analysis of Transparency, Traceability, and Consumer Trust

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Abstract:
Despite growing scholarly attention to halal industry governance, existing studies tend to examine managerial regulation, supply chain logistics, and sharia values as separate domains, leaving a gap in how digital technologies can be systematically integrated within a sharia-normative framework to resolve the persistent problems of low transparency, weak traceability, and declining consumer trust in halal supply chains. This study aims to analyze the integration of blockchain technology into halal supply chains from a *Maqashid Sharia* perspective and to examine its implications for transparency, traceability, and consumer trust. The research adopts a qualitative approach using a library research method, drawing on secondary data systematically retrieved from academic databases such as Google Scholar and Scopus, including scientific journals, industry reports, and policy documents published mainly within the last five to ten years. Data are analyzed using thematic analysis through systematic coding processes, including open coding, axial coding, and selective coding, to identify key themes such as transparency, technological integration, and sharia compliance. The findings reveal that blockchain technology significantly enhances transparency through a decentralized and immutable ledger system that enables real-time data access and improves end-to-end traceability across the supply chain. The integration of Internet of Things (IoT) further supports the implementation of the Thayyib principle by enabling continuous quality monitoring, including temperature control and hygiene conditions during storage and distribution. Moreover, smart contracts contribute to mitigating risks associated with uncertainty and speculation by ensuring automated, rule-based, and transparent transactions. From the perspective of *Maqashid Sharia*, these findings confirm that blockchain implementation reinforces hifz al-mal through fraud prevention and hifz al-nafs through continuous quality assurance, positioning blockchain not merely as a technological innovation but as a strategic necessity to enhance the credibility and global competitiveness of the halal industry.

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Introduction

The development of the global halal industry shows an increasingly rapid trend along with the increasing Muslim population of the world and increasing consumer awareness of products that are not only religiously halal, but also safe, quality, and ethical. The halal industry has now developed into a global economic sector that covers various fields, such as food, pharmaceuticals, cosmetics, and logistics. In fact, halal products are no longer consumed by Muslims alone, but also by non-Muslims because they are considered a symbol of product quality and safety (Hida et al., 2021). This phenomenon shows that the halal industry has undergone a transformation from just a religious obligation to a part of a global lifestyle and international quality standards.

However, in the midst of this growth, the halal industry faces serious challenges, especially in maintaining halal integrity along the halal supply chain. The complexity of the global supply chain involving various actors, cross-countries, and various sources of raw materials increases the risk of contamination, both physically, chemically, biologically, and non-halal This risk does not only occur at the production stage, but also in distribution and storage, making the halal supervision system even more complex and prone to failure.

The main problem in the halal supply chain is low transparency and traceability. Conventional systems that still rely on manual documentation and static certification are not yet able to provide accurate and real-time information assurance. This condition opens up opportunities for data manipulation, labeling errors, and weak cross-regional supervision. As a result, the level of consumer confidence in halal products may decline, especially in the context of increasingly open and competitive global trade.

On the other hand, the development of digital technology presents new opportunities as well as challenges for the halal industry. Digital transformation in the sharia economy has been proven to be able to increase economic efficiency, transparency, and inclusion, but it also requires adequate infrastructure, regulation, and digital literacy readiness (Farah Qalbia & M. Reza Saputra, 2023). Technologies such as blockchain, Internet of Things (IoT), and smart contracts have begun to be developed as solutions to improve data integrity and transparency in sharia-based digital economy systems.

In the context of halal supply chain, blockchain technology offers innovative solutions through a distributed record-keeping system that is transparent, immutable, and accessible in real-time (bin Lahuri & Akmalia, 2025; Putri et al., 2025). The integration of blockchain with other technologies such as IoT even allows the creation of a more accurate and reliable product tracking system, thereby increasing consumer

confidence in halal products (Putri et al., 2025). This makes blockchain one of the strategic technologies in the development of halal assurance systems in the digital era.

A number of previous studies have shown that the management of the halal industry must include the entire process from upstream to downstream, and be based on Islamic economic principles sourced from the Qur'an and Hadith (Romadhon et al., 2025). In addition, strengthening the halal value chain ecosystem is the key to maintaining the integrity of the halal industry through synergy between the government, business actors, and consumers (Asri & Ilyas, 2022). The perspective of sharia maqashid also emphasizes that the halal industry is not only aimed at the economy, but also to achieve benefits through the principles of justice, transparency, and social responsibility (Bakhri et al., 2022).

However, these studies still tend to discuss managerial, regulatory, and sharia values aspects separately. This fragmentation reflects a structural vacuum: partial approaches that treat technology, regulation, and sharia values in isolation are insufficient to resolve simultaneous problems of low transparency, weak traceability, and eroding consumer trust, because none of them establishes a verifiable and continuously auditable mechanism that connects technical performance directly to sharia compliance. Blockchain, as a multi-layered technological infrastructure combining distributed ledgers, IoT-based monitoring, and smart contracts, offers precisely this kind of continuous and verifiable linkage, which conventional managerial or regulatory instruments alone cannot provide. On the other hand, Indonesia as a country with the largest Muslim population in the world has great potential to become the center of the global halal industry, but until now it still faces various structural challenges and has not been fully optimal in taking advantage of these opportunities. Therefore, technological innovation in the halal system is no longer just an option, but an urgent need to increase global competitiveness.

Recent empirical attempts to model blockchain integration in halal logistics illustrate this limitation concretely. Blockchain adoption within Indonesia's halal food supply chain zones remains constrained by structural entry barriers — infrastructure costs estimated at USD 15,000–25,000 per year and unresolved regulatory complexity — forcing a phased, producer-level pilot rather than full-scale integration (Cholifah et al., 2026). Similarly, regulatory and consumer readiness for blockchain-based halal certification in Indonesia remains uneven (Karyani et al., 2024). These findings indicate that existing models succeed mainly at the level of technical feasibility but stop short of resolving how such systems should be evaluated against sharia objectives — a gap this study addresses by anchoring blockchain's technical capabilities within the Maqashid Sharia framework.

Based on this description, the novelty of this research lies in the integration between blockchain technology, halal supply chain, and sharia maqashid in one comprehensive analytical framework. This research not only examines the technical aspects of blockchain implementation, but also assesses its conformity with sharia principles and its implications for increasing transparency and consumer trust. This multidisciplinary approach is expected to be able to fill the gap in previous research and contribute to the development of a more reliable and sustainable technology-based halal system. Unlike standard digital traceability frameworks that primarily emphasize technical accuracy and operational efficiency, this study positions *Maqashid Sharia* as the normative benchmark against which blockchain's technical features are evaluated, thereby offering a conceptually distinct contribution: a sharia-grounded criterion for judging not only whether a supply chain is traceable, but whether it is truly maslahah-oriented and just.

Practically, the findings of this study are expected to benefit halal regulatory bodies such as Indonesia's Halal Product Assurance Organizing Agency (BPJPH) in designing digital-based halal certification and supervision policies, as well as supply chain operators seeking to strengthen real-time traceability and compliance monitoring across production and distribution networks.

The purpose of this research is to analyze the implementation of blockchain in the halal supply chain from a sharia perspective and examine its implications on transparency, traceability, and consumer trust in halal products. Thus, this research is expected to make a theoretical contribution to the development of a technology-based Islamic economy as well as a practical contribution in supporting the transformation of the halal industry towards a more transparent, accountable, and competitive system at the global level.

Methodology

This research uses a qualitative approach with the library research method, which aims to analyze the integration of blockchain technology in the halal supply chain and its conformity with sharia principles. The qualitative approach was chosen because this research focuses on an in-depth understanding of conceptual and normative phenomena, especially in the context of Islamic economics and digital transformation (Hasan & Hilalludin, 2025;Suhandi, 2023). Literature studies are used as the main method by utilizing various secondary data sources such as scientific journals, books, official reports, and policy documents relevant to the research topic (Asri & Ilyas, 2022). This approach is also commonly used in the study of sharia economics which is conceptual and normative.

The research process is carried out through several systematic stages. The first stage is problem identification, which is to examine global phenomena related to the complexity of the halal supply chain, low transparency, and declining consumer trust in halal products. The second stage is literature searching, which is carried out by collecting scientific articles from reputable databases—namely Google Scholar, Scopus, and Garuda—using combinations of keywords such as "blockchain halal supply chain," "*Maqashid Sharia*," "halal traceability," and "smart contract sharia compliance," alongside halal industry reports and policy documents related to blockchain technology and sharia economics. The third stage is literature selection (screening) based on relevance criteria, year of publication (main last 5-10 years), and relevance to research themes such as halal supply chain, blockchain, and sharia maqashid. Inclusion criteria comprised peer-reviewed articles and institutional reports published primarily within the last five to ten years that directly addressed blockchain, halal supply chain, or Maqashid Sharia, while sources unrelated to these themes or lacking methodological transparency were excluded. Through this screening process, a total of 34 documents were selected for in-depth analysis.

The next stage is data extraction and organization, which is identifying important information from each literature that has been selected. At this stage, the data is classified based on the focus of the study, such as: (1) halal supply chain characteristics, (2) transparency and traceability issues, (3) the role of digital technology (blockchain, IoT), and (4) the perspective of sharia maqashid in economic activities. This process aims to compile a conceptual database that will be further analyzed systematically.

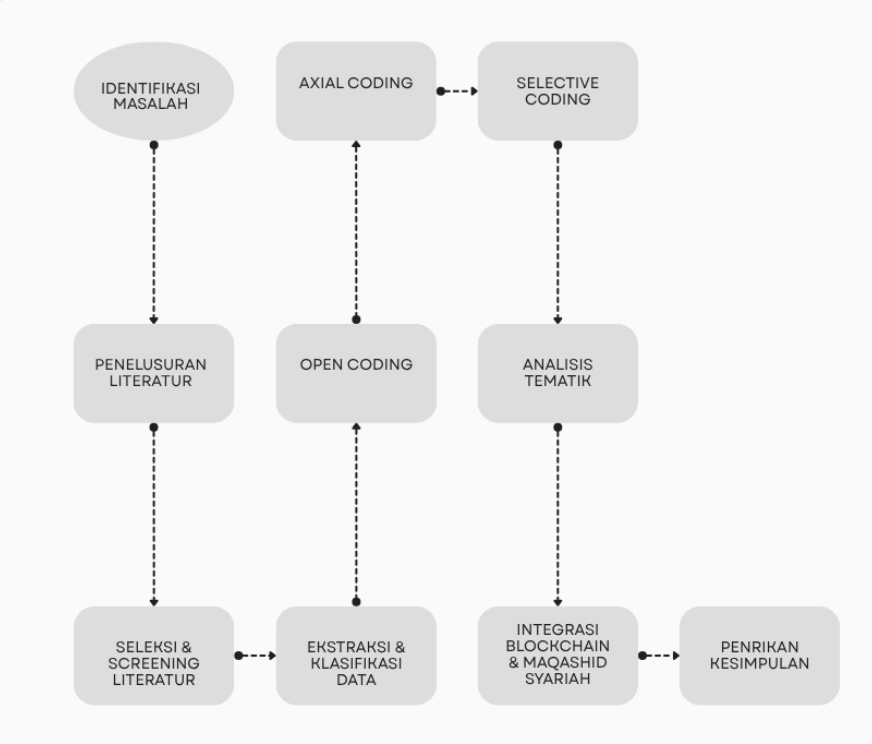
To increase the rigor of the research, data analysis is carried out using thematic analysis techniques that involve the coding process (Heriyanto & Nurislaminingsih, 2025). The coding stages are carried out in three main steps. First, open coding, which identifies key concepts from each literature, such as transparency, traceability, consumer trust, sharia compliance, and digitalization. Second, axial coding, which is grouping these concepts into broader categories, such as system transparency and sharia compliance categories. Third, selective coding, which is integrating these categories into the main themes of the research, such as: (1) transparency and traceability in the halal supply chain, (2) integration of blockchain technology, and (3) compliance with sharia maqashid. This process is carried out iteratively to ensure the consistency and validity of the data interpretation.

This thematic analysis approach allows researchers to comprehensively identify patterns of relationships between concepts. For example, the theme of transparency is not only understood as a technical aspect, but also as part of the value of trust in the Islamic economy. Meanwhile, the theme of sharia compliance is associated with the

principles of sharia maqashid which emphasizes justice, benefit, and protection of consumers (Bakar et al., 2021; Jailani et al., 2025). Thus, the analysis is not only descriptive, but also normative and integrative.

To ensure the validity of the research, triangulation of sources was carried out, which is comparing various literature from different perspectives, both from the aspects of technology, supply chain management, and Islamic economics. In addition, the researcher also uses a cross-analysis approach to see the consistency of findings between studies, so that the results of the analysis are more comprehensive and can be scientifically accounted for.

To provide a more systematic picture, the research flow is presented in the form of Figure 1 as follows: Gambar 1. Research Flow of the Study



The image shows the stages of research from problem identification to conclusion drawing through an in-depth and comprehensive thematic analysis process.

With this method, the research is expected to be able to make a theoretical contribution to the development of a halal supply chain based on blockchain technology as well as a practical contribution in increasing transparency and consumer trust in the global halal industry.

Results and Discussion

Blockchain Technology Integration in Halal Supply Chain Management from a Maqashid Shariah Perspective

The halal industry is an economic system that is not only oriented towards meeting the consumption needs of Muslims, but also reflects ethical values, quality, and safety in production and distribution activities. From an Islamic economic perspective, the concept of halal cannot be separated from the principle of halalan thayyiban, which means that products are not only halal under sharia law, but also good, safe, and of high quality. Therefore, the management of the halal industry must include the entire process from upstream to downstream, including raw materials, production processes, distribution, and storage (Hasanah et al., 2025; Hida et al., 2021).

In the context of the supply chain, the concept of halal supply chain emphasizes the importance of maintaining halal integrity at every stage. This includes the separation of halal and non-halal products, supervision of logistics processes, and the implementation of operational standards in accordance with sharia principles (Febriyanni, 2022; Rizaldy et al., 2024). However, the complexity of the global supply chain leads to an increased risk of halal violations, both intentional and unintentional (Minu & Awaluddin, 2025; Susilo et al., 2025). Therefore, a system is needed that can ensure transparency and traceability across the board.

In line with this, the concept of halal value chain emphasizes the integration of all actors in the halal industry ecosystem, ranging from producers, distributors, to consumers. This ecosystem involves various stakeholders such as governments, industry, certification bodies, and consumers, all of whom play a role in maintaining the integrity of the halal system (Asri & Ilyas, 2022). Without strong integration, halal systems will struggle to guarantee consistency of standards throughout the supply chain.

In recent years, the development of digital technology has opened up new opportunities in halal supply chain management. Technologies such as blockchain, IoT, and big data allow for increased data transparency, efficiency, and accuracy (Wahyudi, Danu, et al., 2025). Blockchain, in particular, offers a decentralized and non-manipulable record-keeping system, thus being able to increase trust between parties in the supply chain (Kurniawati et al., 2025).

Previous research has shown that the integration of blockchain in the supply chain can increase transparency, reduce the risk of fraud, and improve operational efficiency. In addition, the integration of blockchain with IoT allows for real-time monitoring of product conditions, such as storage temperature and environmental

conditions, which is crucial in maintaining the quality of halal products ; Putri et al., 2025).

In the sharia perspective, the use of digital technology must also meet the principles of sharia maqashid, namely maintaining religion (ḥifẓ ad-dīn), soul (ḥifẓ an-nafs), intellect (ḥifẓ al-'aql), heredity (ḥifẓ an-nasl), and property (ḥifẓ al-māl) (Hamidi, 2025;Farah Qalbia & M. Reza Saputra, 2023). Therefore, technological innovations such as blockchain and smart contracts must not only be technically effective, but also in accordance with the values of fairness, transparency, and benefits.

Based on the results of the literature review, this study found several main findings that can be summarized in the following table:

Table 1. Synthesis of Research Findings

Aspects	**Problems**	**Blockchain Solutions**	**Sharia Implications**
Transparency	Fragmented data	Distributed ledger	Trust and Honesty
Traceability	Hard to track	Tracking real-time	Avoiding gharar
Trust	Low	Immutable Data	Increase trust
Quality (Thayyib)	Unmonitored	IoT + blockchain	Guarantee quality
Kontrak	Susceptible to manipulation	Smart contract	Avoiding the Maysir

From the table, it can be concluded that blockchain has great potential in overcoming various problems in the halal supply chain. This technology not only improves operational efficiency, but also strengthens sharia values in the economic system.

A *Maqashid Sharia* Analysis of Transparency, Traceability, and Consumer Trust Blockchain Integration in the Halal Supply Chain

Blockchain serves as a digital record-keeping system that allows every transaction in the supply chain to be recorded transparently and immutably. This is especially important in the context of a halal supply chain that requires a high level of trust.

Using blockchain, every stage in the supply chain from production to distribution, can be recorded in real-time. This information can be accessed by all

parties involved, including consumers, thereby increasing the transparency and accountability of the system.

Case Studies and System Comparisons

In contrast to the findings of previous research which were conceptual, this section elaborates on the real implementation of blockchain technology in the halal supply chain and compares it with conventional systems to provide a more contextual and applicable understanding. This approach is important to demonstrate how the previously identified concepts of transparency and traceability are implemented in industry practice.

One example of blockchain implementation in the halal supply chain can be seen in the development of a blockchain-based traceability system that is integrated with IoT in the halal food industry. The system allows every stage of production and distribution from raw materials to final products, to be recorded automatically and in real-time through digital sensors. In a study conducted by Susanty et al. (2024), blockchain-based halal traceability was translated into a concrete system design that records halal assurance data at every stage of the chicken meat supply chain from farmers and slaughterhouses to distributors and food processors using distributed ledgers and smart contracts for tamper-proof verification. This stage-by-stage structure replaces the periodic, spot-check audits typical of conventional halal assurance practices with continuous, node-level monitoring, narrowing the window in which contamination or non-halal substitution could otherwise go undetected. This shows that blockchain not only serves as a record-keeping tool, but also as a proactive surveillance system.

In practice, the use of blockchain has also been adopted by various global companies to improve the transparency of the food supply chain. This technology allows all stakeholders to access the same data simultaneously, thereby reducing information asymmetry between manufacturers, distributors, and consumers. This condition is fundamentally different from conventional systems that still rely on manual documentation and certification that are static and fragmented.

The comparison between conventional systems and blockchain shows a paradigm shift in halal supply chain management. In the conventional system, the halal verification process tends to be carried out periodically and is limited to certain points in the supply chain. This leads to limitations in detecting violations in real-time. In contrast, blockchain allows continuous verification that can be done automatically and transparently at every stage of the process.

Furthermore, from an operational efficiency perspective, blockchain systems are able to reduce reliance on third parties in the verification process, thereby speeding up

the flow of information and reducing administrative costs. This is in line with the findings that blockchain technology can improve efficiency and reduce the risk of fraud in supply chain management (Sharabati & Jreisat, 2024). Additionally, the immutability characteristics of the blockchain ensure that the recorded data cannot be altered, thus improving the overall reliability of the system.

The implications of these differences are not only technical, but also have an impact on consumer confidence. In the conventional system, consumers tend to rely on halal labels as the only indicator of the halal quality of products. However, with blockchain, consumers can access product information directly and transparently, allowing for increased data-driven trust.

Thus, this case study shows that the implementation of blockchain in the halal supply chain not only strengthens the aspects of transparency and traceability as found in the literature review, but also presents a structural transformation in the halal management system. Blockchain is not just a supporting tool, but also plays a key role in creating a halal system that is more integrated, accountable, and reliable in the digital era.

Analysis of *Maqashid Syariah*

The analysis of blockchain integration in the halal supply chain can not only be seen from a technical aspect, but also needs to be reviewed through the framework of sharia maqashid as a normative foundation in Islamic economics. In contrast to the previous approach which tends to be descriptive, this section places the sharia maqashid as a critical analysis tool to assess the extent to which blockchain technology contributes to the achievement of benefits in the halal system.

First, in the context of *ḥifẓ ad-dīn* (religious protection), blockchain plays a role in strengthening the overall halal guarantee of products. A transparent and non-manipulable recording system allows halal verification to be carried out on an ongoing basis, not just at the initial certification stage. This reduces the potential for sharia violations in the supply chain and ensures that consumers obtain products that comply with religious provisions consistently.

Second, *ḥifẓ an-nafs* (life protection) is reflected in improving food safety through blockchain-based and IoT-based traceability systems. In practice, the ability to track product conditions in real-time, such as temperature and hygiene during distribution, not only improves product quality, but also contributes to the protection of consumer health. This shows that the integration of technology not only has an impact on efficiency, but also on the safety aspect which is part of the sharia maqashid.

Third, *ḥifẓ al-'aql* (protection of reason) is related to information transparency that allows consumers to make rational and data-based decisions. Blockchain reduces

information asymmetry in the market by providing access to product information in an open and verified manner. Thus, consumers are no longer completely dependent on halal labels, but can verify independently, ultimately improving the quality of decision-making.

Fourth, *ḥifẓ an-nasl* (protection of offspring) can be understood in the context of sustainability of consumption quality. Halal products that are guaranteed not only in terms of halal, but also from the aspect of thayyib, will have a long-term impact on the health of future generations. The integration of blockchain with a quality monitoring system shows that the principles of halalan thayyiban can be implemented more systematically and measurably in the digital era.

Fifth, *ḥifẓ al-māl* (property protection) is realized through the prevention of fraud and manipulation in the supply chain. The immutable characteristics of blockchain allow every transaction to be recorded permanently, thereby reducing the risk of fraud that can harm businesses and consumers. This creates a more just and efficient economic system, in accordance with the principles of justice in Islam.

This linkage illustrates a direct analytical bridge between the technical sub-theme of traceability identified in the open-coding stage and the selective theme of hifz al-māl: because every transaction is permanently and transparently recorded, the technical capacity for traceability directly operationalizes the sharia objective of protecting property from fraud and manipulation, rather than merely coexisting with it as a separate technical feature.

Furthermore, the integration of blockchain in the halal supply chain can also be analyzed through the concepts of maslahah (benefit) and adl (justice). This technology creates a more inclusive and transparent system for all stakeholders, thereby reducing information inequality and increasing accountability. In this context, blockchain serves not only as a technological innovation, but also as an instrument for realizing ethical values in the Islamic economy. This is in line with the view that sharia maqashid is oriented towards achieving the welfare of the community at large through a fair and transparent system (Bakhri et al., 2022; Farah Qalbia & M. Reza Saputra, 2023; Hamidi, 2025).

Thus, this analysis shows that blockchain integration in the halal supply chain has legitimacy not only technically, but also normatively from a sharia perspective. This technology contributes directly to the achievement of the goals of *Maqashid Sharia*, so that it can be positioned as part of the transformation of the Islamic economic system that is adaptive to technological developments, but still based on the values of justice and welfare.

Smart Contracts in Sharia Perspective

One of the important innovations in blockchain is smart contracts, which are digital contracts that are executed automatically based on predetermined conditions. In the context of the halal supply chain, smart contracts can be used to ensure that each transaction meets halal standards before being further processed.

Smart contracts reduce *gharar* by:

1. Provide clear and transparent rules
2. Reduce ambiguity in transactions
3. Guarantees automated execution without human intervention

Thus, the risk of uncertainty in transactions can be minimized.

Smart contracts can also reduce *maysir* by:

1. Eliminates speculation in the transaction process
2. Guarantee that transactions are only made if the conditions are met
3. Avoid manipulative practices in the supply chain

In the perspective of *maqashid sharia*, smart contracts contribute to:

1. Transparency (trust)
2. Justice (*adl*)
3. Legal certainty (*yaqin*)

Aspects of *Thayyib* and Technology-Based Quality Audit

In addition to halal, the aspect of thayyib is also an important part of the halal industry. Thayyib covers product quality, safety, and cleanliness. In this context, technologies such as IoT can be used to monitor the condition of the product in real-time.

For example:

1. Temperature sensor to ensure product is not damaged
2. Monitoring the cleanliness of transportation
3. Contamination detection during distribution

The data from these sensors is then recorded in the blockchain, so that:

1. Cannot be manipulated
2. Can be audited at any time
3. Increase consumer confidence

This integration reflects the implementation of the thayyib principle in the digital system, which not only ensures halal, but also overall product quality.

Integration with *Maqashid Syariah*

The integration of blockchain in the halal supply chain can be analyzed through sharia maqashid:

Table 2. Blockchain Integration in the Perspective of Sharia Maqashid

Maqashid	**Implementation**
Hifz al-Din	Maintaining the halalness of the product
Hifz al-Nafs	Ensuring food safety
Hifz al-Mal	Preventing fraud
Hifz al-Aql	Information transparency
Hifz al-Nasl	Ensuring the quality of consumption

Thus, blockchain technology not only serves as a technical tool, but also as an instrument to achieve benefits in the Islamic economy.

This research contributes in two main aspects:

1. Theoretical Contributions

   This research develops a conceptual framework that integrates:

   a. Blockchain
   b. Halal supply chain
   c. *Maqashid syariah*

   This approach enriches the Islamic economic literature with a multidisciplinary perspective that combines technology and sharia values.

2. Practical Contribution

   This study has implications for:

   a. The government →the development of digital-based halal regulations
   b. Industry → increased transparency and efficiency
   c. Consumers → increased trust in halal products

In addition, this research also supports Indonesia's efforts to become the center of the global halal industry through the use of digital technology as a competitive advantage.

Overall, the results of the study show that the integration of blockchain in the halal supply chain is not only a technical solution, but also a strategic innovation that is able to bridge the needs of modern industries with sharia principles. By combining technological transparency and sharia maqashid values, this system has the potential to create a more reliable, efficient, and sustainable halal ecosystem at the global level.

To translate these contributions into practice, industry stakeholders are recommended to: (1) adopt phased blockchain implementation starting with high-risk nodes in the supply chain, such as raw material sourcing and cold storage, to manage infrastructure costs; (2) establish public-private cost-sharing schemes between halal certification bodies and logistics operators to lower the entry barrier for small and medium halal enterprises; and (3) integrate blockchain audit trails directly into BPJPH's halal certification renewal process, so that technical infrastructure investment is directly rewarded through streamlined compliance verification rather than treated as a separate cost center.

Conclusion

Overall, this study demonstrates that blockchain integration in the halal supply chain is best understood not as an isolated technical upgrade, but as a structural mechanism that closes the long-standing gap between managerial, regulatory, and sharia-normative approaches to halal governance identified at the outset of this research. By embedding distributed ledger technology, IoT-based monitoring, and smart contracts within the analytical framework of *Maqashid Sharia*, this study shows that technical performance and sharia compliance can be evaluated as a single, continuously verifiable system rather than as separate concerns. This reframing carries strategic implications: for regulators such as BPJPH, it suggests a pathway toward continuous, technology-assisted certification; for industry, it offers a competitive differentiator grounded in verifiable trust rather than static labeling; and for the broader Islamic economic literature, it contributes a sharia-grounded criterion for assessing digital transformation that extends beyond technical traceability toward the achievement of maslahah. As Indonesia positions itself as the center of the global halal industry, this integrated framework offers a concrete direction for aligning technological innovation with sharia objectives at scale.

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