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The Role of Halal Oracle Systems in Ensuring Shariah Compliance in Islamic Blockchain Applications

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Abstrak. *Adopsi teknologi blockchain yang pesat dalam keuangan Islam menyoroti kebutuhan mendesak akan mekanisme yang memastikan setiap transaksi, input data, dan proses otomatis tetap mematuhi prinsip-prinsip Syariah. Komponen penting dalam mencapai kepatuhan ini adalah sistem oracle, yang menghubungkan data off-chain ke jaringan blockchain. Namun, oracle konvensional seringkali tidak memiliki filter etika, sehingga berpotensi tidak selaras dengan hukum Islam. Studi ini mengonseptualisasikan sistem Halal Oracle, sebuah solusi yang mengintegrasikan presisi teknis dengan tata kelola Syariah. Dengan menggunakan metode kualitatif deskriptif berdasarkan tinjauan pustaka, makalah ini mengkaji kerangka operasional Halal Oracle, membandingkannya dengan model konvensional, dan mengeksplorasi aplikasinya di sektor digital Islam seperti rantai pasok halal, zakat digital, dan kontrak pintar yang sesuai dengan Syariah. Temuan menunjukkan bahwa Halal Oracle menggabungkan lapisan kurasi, sertifikasi, dan audit berdasarkan yurisprudensi Islam, sehingga memperkuat akuntabilitas dan legitimasi dalam ekosistem blockchain Islam. Studi ini juga menyoroti tantangan-tantangan termasuk kebutuhan akan standardisasi regulasi, interoperabilitas teknis, dan penyelarasan lintas yurisdiksi.*

Kata kunci: *Oracle Halal; Blockchain; Kepatuhan Syariah; Fintech Islam.*

Abstract. *The rapid adoption of blockchain technology in Islamic finance highlights the urgent need for mechanisms that ensure every transaction, data input, and automated process remains compliant with Shariah principles. A critical component in achieving this compliance is the oracle system, which connects off-chain data to blockchain networks. However, conventional oracles often lack ethical filters, resulting in potential misalignments with Islamic law. This study conceptualizes the Halal Oracle system, a solution that integrates technical precision with Shariah governance. Using a descriptive qualitative method based on literature review, this paper examines the operational framework of Halal Oracles, contrasts them with conventional models, and explores their applications in Islamic digital sectors such as halal supply chains, digital zakat, and Shariah-compliant smart contracts. The findings indicate that Halal Oracles incorporate layers of curation, certification, and auditing based on Islamic jurisprudence, thereby reinforcing accountability and legitimacy within Islamic blockchain ecosystems. The study also highlights challenges including the need for regulatory standardization, technical interoperability, and cross-jurisdictional alignment.*

Keywords: *Halal Oracle; Blockchain; Shariah Compliance; Islamic Fintech.*

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Abstract & Indexing

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Introduction

Blockchain technology has emerged as a transformative digital infrastructure in Islamic finance and the halal industry due to its capacity to provide transparency, efficiency, immutability, and data integrity. Its application extends across smart contracts, payment systems, remittances, zakat and waqf administration, sukuk issuance, and various halal supply chain operations, making it a strategic tool for enhancing trust and accountability in Shariah-compliant financial products and services (Alaeddin *et al.*, 2021; Chong, 2021; Dahdal *et al.*, 2022). In the halal sector, blockchain solutions facilitate end-to-end traceability of goods, enabling stakeholders to verify halal assurance transparently from producers to consumers (Ashari, 2021; Bux *et al.*, 2022; Effendi *et al.*, 2023). This synergy highlights blockchain's growing relevance in advancing Islamic digital economies.

However, the successful utilization of blockchain in Islamic finance and halal industries depends on its capacity to integrate real-world data in a manner consistent with Shariah principles. Smart contracts can automate compliance only to the extent that the data fed into them is authentic, accurate, and halal-certified; failure to ensure this risks compromising legal and ethical integrity (Amin *et al.*, 2023; Wiwoho *et al.*, 2023). Therefore, although blockchain ensures the immutability of stored data, the bridge connecting the blockchain to external information—the oracle—becomes a critical determinant of Shariah compliance. Smart contracts, by design, operate automatically and deterministically based on predefined encoded conditions, limiting their ability to interpret the contextual and dynamic nature of Islamic jurisprudence. Islamic contracts often require consideration of fairness, uncertainty, intention, and social benefit—criteria that do not always translate into binary logic suitable for automated execution (Amato *et al.*, 2021; Wiwoho *et al.*, 2023). Because smart contracts lack the flexibility to allow post-agreement negotiation or reinterpretation based on evolving circumstances, their application in Islamic finance risks oversimplifying complex legal constructs (Heidari *et al.*, 2023; Zheng *et al.*, 2020). This rigidity becomes particularly problematic when contractual modifications are necessary to uphold Shariah values such as justice, mutual consent, welfare (*maslahah*), and avoidance of uncertainty (*gharar*). While blockchains ensure operational transparency and efficiency, their inflexible structure may conflict with the Islamic principle that contractual terms can be legitimately altered when circumstances demand ethical reconsideration (Chong, 2021; Zulkepli *et al.*, 2023). Thus, the deterministic execution of smart contracts alone cannot sufficiently guarantee Shariah validity without external mechanisms for ethical verification. To address these limitations, the emergence of halal oracle systems has gained attention as a vital technological innovation for integrating Shariah standards into blockchain ecosystems. Halal oracles serve as intermediaries that supply smart contracts with verified halal data, ensuring that only information conforming to Shariah criteria enters the blockchain (Beniiche, 2020; Mammadzada *et al.*, 2020).

By validating asset legitimacy, halal certification status, and compliance with Islamic contractual rules, halal oracles strengthen the legal and ethical integrity of Islamic blockchain applications, including halal supply chains and Islamic financial instruments (Benali *et al.*, 2025; Hasan *et al.*, 2020; Mokodompis *et al.*, 2024). The importance of halal oracles is aligned with fundamental principles of Islamic law regarding the authenticity and fairness of information—*shahādah* (testimony), *'adālah* (source integrity), and *maslahah* (public welfare). Without a mechanism that verifies the reliability of off-chain data, blockchain transactions remain vulnerable to misinformation, which may introduce elements of gharar and undermine Shariah compliance. Despite research progress on blockchain and oracle technologies, studies rarely address the explicit incorporation of Shariah norms in oracle validation processes, exposing a critical scholarly and practical gap (Iskandar & Sulaiman, 2024; Lateh & Rejab, 2021). Given this gap, the present study offers a novel contribution by proposing an integrative approach that combines Islamic legal principles with blockchain-based data verification through halal oracles. Unlike previous works that

predominantly address blockchain's technical architecture or Shariah compliance as independent discourses, this research positions halal oracles as both a technological component and an embodiment of Shariah values in the digital economy. Accordingly, the goals of this study are to conceptualize halal oracles, identify key Shariah compliance challenges in blockchain-based data sourcing, and explore their potential implementation in Islamic blockchain systems to ensure that every automated decision remains valid according to Islamic law and ethics.

Research Methodology

This research utilizes a descriptive qualitative method based on literature study with the aim of describing and analyzing in depth the concept of halal oracles in the Islamic blockchain system. The data source used is secondary data sourced from relevant and credible literature, scientific journals, books, and official documents related to blockchain technology, oracles, and shariah principles in fintech. The data collection technique was conducted through a systematic literature study by collecting, reviewing, and filtering various reliable sources of information to obtain a comprehensive overview of the research topic. Furthermore, the data analysis technique is carried out with a content analysis approach, where the researcher will identify and organize the main information contained in the existing sources. Through this analysis, the researcher can develop a clear understanding of the concepts and principles of halal oracles that match the needs of the Islamic blockchain system.

Results and Discussion

Results

Concept and Mechanism of Halal Oracle System

In the context of blockchain technology, oracle systems play an important role as a link between the real world (off-chain) with the private and deterministic blockchain network. Since blockchains cannot access external data directly, oracles become the bridge that allows smart contracts to make decisions based on information from outside the system, such as market prices, weather data, or financial information. In general, oracles are of various types, including software oracles, hardware oracles, inbound and outbound oracles, as well as consensus and human oracles, each with specialized functions to ensure that incoming external data is accurate and relevant. However, despite their technical advantages, conventional oracle systems pose serious challenges, especially in terms of security, data validity, and ethical integrity. In the context of a decentralized system, the absence of a thorough data verification process can lead to the risk of gharar (uncertainty) as well as legal ambiguity, which is contrary to the principles of Shariah.

Figure 1. General Architecture of a Blockchain Oracle

Based on these challenges, the concept of Halal Oracle System was born as an innovative solution that integrates technical accuracy with sharia legitimacy. Halal Oracle is a multi-layered system designed to ensure that every data entering the blockchain has gone through a curation, audit, and validation process based on Islamic legal principles. The process starts from collecting data that only comes from trusted sources such as halal certification agencies, halal raw material providers, and Islamic financial institutions. The data collected then goes through a layer of curation, which includes consistency checks, conformity with halal standards, as well as the involvement of sharia experts in data interpretation and selection. The next stage is sharia auditing, where the data is examined in depth to ensure it is free from elements of riba, gharar, and maysir, as well as in accordance with applicable fatwas and muamalah fiqh rules. After the data passes the audit process, it is then validated and integrated into the blockchain-based smart contract system. This stage guarantees that any automated decisions such as payments, murabaha contracts, or zakat distribution can only be executed if the data used is fully halal and sharia-compliant. Thus, the Halal Oracle is

not only a technical mechanism, but also serves as a moral and legal guardian in ensuring that the Islamic digital finance ecosystem runs within a religiously legitimate corridor. This system reflects the application of sharia maqashid principles, such as hifz al-mal (protection of wealth) and al-amanah (honesty), to modern digital technology.

Figure 2. Architecture of the Halal Oracle System

The comparison between the conventional and Halal Oracle architectures reveals a fundamental shift from a purely technical to a Shariah-ethical framework. While conventional oracles emphasize speed and automation, Halal Oracles embody Islamic legal and moral scrutiny, serving as both data filter and ethical enforcer.

Implementation of Oracle in Islamic Blockchain Applications

The implementation of Halal Oracle in Islamic blockchain applications makes an important contribution towards data validity and Shariah compliance in the digital financial ecosystem. Having previously described the technical mechanism and architecture of Halal Oracle, this section will focus on its application in a real context. One of the most concrete applications is seen in the blockchain-based automated zakat system. In this system, Halal Oracle serves to connect smart contracts with real-world data needed for zakat calculation, such as daily gold prices and valid mustahik (zakat recipient) data. Gold price data is taken from legitimate Islamic financial institutions, while mustahik data comes from official zakat bodies (Rejeb, 2020). With this validated data, smart contracts can automatically calculate the nisab, determine the amount of zakat, and distribute the funds to the right recipients. This process ensures efficiency, transparency and full compliance with Islamic law (Yusuf *et al.*, 2024). Other than zakat, Halal Oracle is also very instrumental in the implementation of smart contracts for Islamic financial instruments such as murabahah, ijarah, or musyarakah. In this case, Halal Oracle provides supporting data such as asset value, profit margin, and source of funds from halal-certified institutions. Before the automatic contract is executed, the system will verify that the transaction object is halal, the source of funds does not contain elements of riba, and all contract terms have been fulfilled according to fiqh principles (Rejeb, 2020). Thus, Halal Oracle enables automatic execution of contracts without compromising sharia principles, and at the same time supports the growth of the Islamic fintech industry in a scalable and reliable manner. Another innovation offered by Halal Oracle is its ability to adapt to changes in fatwas or halal standards. If there is an update to the law or a ruling from a sharia authority, for example regarding the classification of crypto assets or new standards in trading, the Halal Oracle system can automatically update its validation logic.

This is possible thanks to an integrated sharia audit layer that is connected to the latest fatwa database. In this way, Halal Oracle is not only a data hub, but also acts as a normative control mechanism that ensures the entire digital process remains within the relevant and current corridors of Islamic law. Halal Oracle also enhances transparency and accountability in the blockchain system by providing a validation trail that can be traced to its source, whether it comes from certification bodies, Islamic financial institutions, or halal supply chain actors. This feature allows regulators, auditors, and fatwa committees to conduct thorough supervision and avoid potential fraud (*tadlis*) or uncertainty (*gharar*) which is prohibited in Islam. With this implementation, Halal Oracle is not just a technical solution, but also an ethical foundation that ensures that digital automation in Islamic finance upholds spiritual values, beliefs, and legal religious laws.

Challenges and Needs of Shariah Certification

Shariah certification is becoming increasingly important in the world of information technology, especially in the context of using data-driven systems, such as Oracle, which is widely used by digital service providers. One of the main challenges in implementing Shariah

certification is the potential risk of non-halal data. Data processed in information systems, including those provided by Oracle providers, must be ensured that it does not contain haram elements, such as transactions related to riba, gambling, or haram goods. This is important to ensure that all activities involving information technology comply with Shariah principles, which require all forms of transactions and data processed to be in accordance with Islamic law. The Oracle provider, as a data validator, needs to perform strict checks on the type and source of data it manages (Mohamed & Ali, 2019). Shariah certification for oracle providers aims to provide assurance that the systems they manage have been verified in accordance with Shariah principles. This process involves closely monitoring the entire flow of transactions and data processed by the service provider, from data collection to distribution.

One way to ensure this is to involve an institution or body authorized in sharia certification, such as the National Shariah Council (DSN) MUI in Indonesia. This certification aims to reduce the potential risk of non-halal data that can occur if there is no adequate oversight of data sources and transactions. Shariah-certified Oracle providers will increase the trust of customers who prioritize compliance with Shariah principles in every aspect of their operations (Nazeri *et al*., 2023). In addition to ensuring compliance, Halal Oracle systems plays an important role in enhancing accountability and building trust in Islamic finance. Any data that goes into the system can be traced back to its source, whether it comes from a halal certification organization, a financial institution or a supply chain operator.

This means that if a transaction is questioned, the system can reveal exactly where the data came from and how it was validated. This transparency increases confidence not only for users, but also for regulators, auditors, and even fatwa committees. It minimizes the potential for fraud (*tadlis*) and uncertainty (*gharar*), which are strictly prohibited in Islamic law. Moreover, when these checks are automated through smart contracts, it reduces human error while strengthening compliance. In a digital economy that often has issues with trust, Halal Oracle offers a system that is open to audit and faithful to Islamic principles.

Halal Oracle as a Pillar of Ethics in the Islamic Blockchain Ecosystem

The main findings of this study show that Halal Oracle is not just an additional technology in the blockchain ecosystem, but a fundamental element to ensure data validity based on shariah principles. As emphasized by Ahmad *et al* (2017) a trusted halal supply chain system requires transparency and validation at every point from raw materials to distribution. Blockchain has the technical ability to record data permanently and irreversibly, but shariah validity of data can only be ensured if the input process is safeguarded by a system like Halal Oracle. In this context, Halal Oracle acts as an extension of the principle of *shahadah* (valid certification), where only data from trusted and certified sources can populate smart contracts.

With this mechanism, Halal Oracle directly strengthens the *ḥifẓ al-mal* (protection of property) aspect, as it prevents the possibility of fraud or the use of incorrect data that could harm the parties to the contract. Last but not least, Halal Oracle reflects the transposition of Islamic ethical values into the digital world. In an era where data is a highly valuable asset, data integrity is part of the integrity of worship, especially in Islamic financial transactions. Therefore, the role of Halal Oracle also has a deeper spiritual dimension than ordinary oracle technology. One of the key strengths of the Halal Oracle system lies in its ability to combine technical integrity with shariah legitimacy in a way that is both seamless and purposeful. On the technical side, the system ensures that all data entering the blockchain is secure, cannot be tampered with, and can be traced transparently. But beyond technical soundness, the data must also be religiously acceptable. This is where shariah legitimacy comes in. Each data point is not only checked for accuracy, but also for its compliance with Islamic ethical and legal standards. Whether it's validating the halal status of a supply chain or ensuring that a transaction is free from riba and gharar, Halal Oracle applies layered checks rooted in Islamic jurisprudence. These include curation, fiqh

audits, and alignment with fatwa decisions. This dual assurance ensures that the system is not just reliable, but also trustworthy in a moral sense. It represents a rare fusion in modern digital system, where automation serves not only efficiency, but also ethical accountability.

Theoretical Foundation

The development of the Halal Oracle system cannot be separated from several key theoretical foundations. From an Islamic perspective, the most important framework is maqasid shariah, which prioritizes the protection of essential values such as religion (*hifẓ al-din*), wealth (*hifẓ al-mal*), intellectuality *(hifẓ al-aql*), and trust (*al-amanah*). Halal Oracles operationalizes these goals by maintaining shariah-compliant data flow within the blockchain system. For example, the principle of *al-tahaqquq* (layered verification) is reflected in the multiple checkpoints built into the system from data curation to shariah auditing. Meanwhile, *al-amanah* underscores the responsibility to ensure data truthfulness and transparency, especially in religious financial matters. From a technological standpoint, the concept of Digital Trust Theory also applies. This theory argues that in a decentralized ecosystem, trust is built not through institutions, but through cryptographic proof and system integrity. Halal Oracle adds a second layer of trust which is religious validity that makes it unique in combining technical verification and moral assurance.

Comparative Analysis: Conventional Oracle vs. Halal Oracle

The fundamental difference between conventional oracles and Halal Oracle lies in their epistemology and purpose of utilization. Conventional oracles are designed for the efficiency of capturing external data, connecting it to the blockchain, and executing smart contracts based on certain technical parameters. There is no moral or ethical filtering of the type of data entered (Beniiche, 2020). This is a huge gap when applied in the Islamic financial ecosystem which requires halalness not only of the outcome, but also of the process and source. In contrast, the Halal Oracle brings a new dimension, namely the existence of a shariah curation system that involves fiqh audits, process tests, and fatwa-based social control. According to Asnawi *et al* (2023) this oracle model does not only rely on technological verification, but also requires the involvement of the Shariah Supervisory Board or halal certification agency. This forms a layered verification system that reflects the principle of al-taḥaqquq (layered proof). In other words, if conventional oracles rely on a trustless system through code, the Halal Oracle builds a trusted system through a combination of technology and moral authority. This is in line with Mohamed & Ali (2019) idea that the integration of technology and normative shariah principles is a pillar of the future of digital Islamic finance.

Practical Implementation and Strategic Value of Halal Oracle

In the broader landscape of Islamic blockchain applications, the Halal Oracle does not merely serve as a supporting feature, but it also plays a central and decisive role. As the primary filter that ensures Shariah compliance of all off-chain data, it becomes the ethical backbone of the entire ecosystem. While blockchain technology provides transparency and immutability, these qualities alone are not enough in a religious context. Without mechanisms such as the Halal Oracle, the risk of non-halal or ambiguous data processing remains significant. Hence, Halal Oracle positions itself at the intersection of faith and automation as every smart contract and every digital transaction begins with verified and halal data. From this foundational role, the implications of Halal Oracle extend to various sectors of the Islamic economy. This research identifies three strategic areas where the system is having a transformative impact:

Halal Supply Chain Digital

In the halal supply chain, the key issue is transparent and verifiable traceability of product origin. Halal Oracle allows each raw material, manufacturer, processing method, and distribution data to be recorded on the blockchain only if it has been verified as halal. Thus, the risk of mixing with non-halal ingredients can be minimized. This implementation is especially important for the food, medicine, and cosmetics industries (Ahmad *et al*., 2017).

Automatic Zakat and Smart Waqf System
In zakat, the validity of the calculation of the nisab and the list of mustahik are elements that determine the validity of worship. Halal Oracle can be connected to official shariah gold price data and mustahik data from trusted zakat institutions. As a result, the process of calculating, reporting, and distributing zakat can be automated in a shariah-compliant, efficient, and transparent manner (Rejeb, 2020).

Automatic Deal Execution
In murabaḥah, ijarah, or musyarakah contracts, Halal Oracle can provide parameters such as margin, contract term, and asset value from certified sources. This supports automatic execution of contracts while upholding the principles of ribh al-mashru' (legitimate profit), bay' al-ma'lum (transactions with known objects), and avoiding gharar (uncertainty) (Zulkepli *et al*., 2023).

Discussion
In the context of applying blockchain technology in Islamic finance, the Halal Oracle system emerges as an innovative solution that integrates Shariah principles into automated processes. The Halal Oracle serves as an intermediary that ensures that the data used in smart contracts has been verified and meets halal criteria, thus preventing potential violations of Islamic law. Research by Ahmad *et al*. (2017) demonstrates that an effective halal supply chain system requires transparency and validation at every stage, from the procurement of raw materials to the distribution of products. This aligns with findings presented by Beniiche (2020), emphasizing the importance of oracle systems that are not only technically efficient but also consider ethical aspects and Shariah compliance. Therefore, the implementation of Halal Oracle can enhance accountability and trust within the Islamic digital finance ecosystem, providing assurance that every transaction conducted adheres to Islamic values and Shariah principles.

Conclusion

This study underscores the strategic importance of Halal Oracle system in safeguarding Shariah compliance within blockchain based Islamic finance. By offering a mechanism for ethically curated, validated, and auditable data, Halal Oracles bridge the technological and jurisprudential divide that conventional oracles often neglect. Beyond their technical role, they act as ethical gatekeepers, reinforcing the spiritual integrity of financial automation. The study contributes to building a normative framework for digital Shariah enforcement while identifying practical sectors, such as halal supply chains, digital zakat, and smart contracts, where Halal Oracles offer transformative potential. Future research should focus on prototyping cross jurisdictional Halal Oracle systems and integrating them with fatwa issuance and digital Shariah supervisory tools.

References

Ahmad, M. A., Ismail, N., & Othman, M. R. (2017). The objective of halal supply chain: Merging the Shariah perspective and the industrial requirements. *International Journal of Academic Research in Business and Social Sciences, 7*(3), 2222–6990. https://doi.org/10.6007/IJARBSS/V14-I12/23772.

Alaeddin, O., Al Dakash, M., & Azrak, T. (2021). Implementing the blockchain technology in Islamic financial industry: Opportunities and challenges. *Journal of Information Technology Management, 13*(3), 99–115. https://doi.org/10.22059/JITM.2021.83116.

Amato, F., Cozzolino, G., Moscato, F., Moscato, V., & Xhafa, F. (2021). A model for verification and validation of law compliance of smart contracts in IoT environment. *IEEE Transactions on Industrial Informatics, 17*(11), 7752–7759. https://doi.org/10.1109/tii.2021.3057595.

Amin, W. L. M., Ali, S. A. M., Ali, S. A. M., Jusoh, N. S., & Zulfakar, M. M. (2023). Blockchain technology: A structural shift

in the banking sector: Consumer-oriented measures. *International Journal of Academic Research in Accounting Finance and Management Sciences, 13*(2). https://doi.org/10.6007/ijarafms/v13-i2/18019.

Ashari, R. T. (2021). Pengembangan sistem logistik produk halal di Indonesia. *Halal Research Journal, 1*(1), 8–19. https://doi.org/10.12962/j22759970.v1i1.13.

Asnawi, N., Mahsun, M., & Danila, N. (2023). Industrial halal blockchain: The great potential of the digital economy in Indonesia. *IQTISHODUNA: Jurnal Ekonomi Islam, 12*(1), 223–240. https://doi.org/10.54471/IQTISHODUNA.V12I1.1876.

Benali, F. Z., Miftahussurur, W. M., Santos, R. A. S., & Hasan, Z. (2025). The algorithmic fiqh: Qiyas and the cryptocurrency paradigm. *IJIL, 8*(1), 1–28. https://doi.org/10.35719/c3g8zb70.

Beniiche, A. (2020). A study of blockchain oracles. https://doi.org/10.48550/arXiv.2004.07140.

Bux, C., Varese, E., Amicarelli, V., & Lombardi, M. (2022). Halal food sustainability between certification and blockchain: A review. *Sustainability, 14*(4), 2152. https://doi.org/10.3390/su14042152.

Chong, F. H. L. (2021). Enhancing trust through digital Islamic finance and blockchain technology. *Qualitative Research in Financial Markets, 13*(3), 328–341. https://doi.org/10.1108/qrfm-05-2020-0076.

Dahdal, A., Truby, J., & Ismailov, O. (2022). The role and potential of blockchain technology in Islamic finance. *European Business Law Review, 33*(2), 175–192. https://doi.org/10.54648/EULR2022005.

Effendi, K. A., Mukhlis, T. I., Padmanegara, O. H., & Widajatun, V. W. (2023). Analisis transformasi halal awareness dan teknologi blockchain terhadap penguatan halal value chain di Indonesia. *Jurnal Ilmiah Ekonomi Islam, 9*(3), 3275. https://doi.org/10.29040/jiei.v9i3.10383.

Hasan, R., Hassan, M. K., & Aliyu, S. (2020). Fintech and Islamic finance: Literature review and research agenda. *International Journal of Islamic Economics and Finance (IJIEF), 3*(1). https://doi.org/10.18196/ijief.2122.

Heidari, S., Hashemi, S., Khorsand, M.-S., Daneshfar, A., & Jazayerifar, S. (2023). Towards standardized regulations for blockchain smart contracts: Insights from Delphi and Swara analysis. *AJM, 11*(02), 1–15. https://doi.org/10.31620/ajm.1.

Iskandar, E., & Sulaiman, E. (2024). Komunikasi bisnis syariah: Membangun relasi bisnis berdasarkan prinsip-prinsip Islam. *Jurnal Riset Manajemen Bisnis Akuntansi Dan Ekonomi, 3*(1). https://doi.org/10.58468/jambak.v3i1.104.

Lateh, N., & Rejab, S. N. M. (2021). Sharia issues about Bitcoin cryptocurrency transactions. In *Enhancing Halal Sustainability* (pp. 119–128). https://doi.org/10.1007/978-981-33-4854-7_11.

Mammadzada, K., Iqbal, M., Milani, F., García-Bañuelos, L., & Matulevičius, R. (2020). Blockchain oracles: A framework for blockchain-based applications. In *Lecture Notes in Business Information Processing* (Vol. 393, pp. 19–34). https://doi.org/10.1007/978-3-030-58779-6_2.

Mohamed, H., & Ali, H. (2019). *Blockchain, fintech, and Islamic finance: Building the future in the new Islamic digital economy*. De Gruyter Press.

Mokodompis, I. I., Pedju, R. P., & Muhammad, A. A. (2024). Integrating Islamic law and modern regulation: Cryptocurrency as a Sharia-compliant digital asset in Indonesia. *JSLE, 1*(2), 83–93. https://doi.org/10.63077/r27rd104.

Nazeri, A. N. N., Nor, S. M., Abdul-Rahman, A., Abdul-Majid, M., & Ab Hamid, S. N. (2023). Exploration of a new zakat management system empowered by blockchain technology in Malaysia. *ISRA International Journal of Islamic Finance, 15*(4), 127–147. https://doi.org/10.55188/IJIF.V15I4.568.

Rejeb, D. (2020). Blockchain and smart contract application for zakat institution. *International Journal of Zakat, 5*(3), 20–29. https://doi.org/10.37706/IJAZ.V5I3.260.

Wiwoho, J., Trinugroho, I., Kharisma, D. B., & Suwadi, P. (2023). Islamic crypto assets and regulatory framework: Evidence from Indonesia and global approaches. *International Journal of Law and Management, 66*(2), 155–171. https://doi.org/10.1108/ijlma-03-2023-0051.

Yusuf, M. Z., Aufa, M. F., & Umam, K. (2024). Blockchain zakat in law perspective and its implication on zakat management. *Istinbath, 23*(2), 292–305. https://doi.org/10.20414/IJHI.V23I2.720.

Zheng, Z., Xie, S., Dai, H., Chen, W., Chen, X., Weng, J., & Imran, M. (2020). An overview on smart contracts: Challenges, advances, and platforms. *Future Generation Computer Systems, 105*, 475–491. https://doi.org/10.1016/j.future.2019.12.019.

Zulkepli, M. I. S., Mohamad, M. T., & Azzuhri, S. R. (2023). Leveraging blockchain-based smart contracts in Islamic financial institutions: Issues and relevant solutions. *International Journal of Islamic Economics and Finance Research, 6*(1), 18–28. https://doi.org/10.53840/ijiefer96.