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Analysis of the Compatibility of Blockchain and Bitcoin Technology in the Digital Financial System: A Legal and Islamic Economic Review of Financial Innovation in the Digital Era

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ABSTRACT: This study aims to critically examine the compatibility of Bitcoin and blockchain technology with Islamic economic and legal principles within the context of a rapidly evolving digital financial system. Employing a literature review method based on the PRISMA approach, this research analyzes five authoritative classical Islamic jurisprudence texts alongside 40 scholarly articles from credible academic sources. The primary focus lies in evaluating how these emerging technologies correspond with key Islamic financial values, particularly the prohibitions of *riba* (interest), *gharar* (excessive uncertainty), and *maysir* (speculation/gambling), while also exploring their potential for innovation in building a Shariah-compliant financial infrastructure. The findings demonstrate that while Bitcoin, due to its high volatility and speculative nature, poses significant concerns under Shariah principles mainly due to its proximity to elements of *maysir* and *gharar* blockchain technology itself offers considerable promise. As a decentralized and transparent ledger system, blockchain can enhance justice (*'adl*), trust (*amanah*), and efficiency in Islamic financial transactions. It supports the reduction of transaction costs, improves transparency, and eliminates reliance on intermediaries aligning with core objectives of Islamic economic ethics. Furthermore, blockchain technology provides a foundation for innovative financial instruments that uphold Shariah compliance, such as asset-backed *stablecoins*, automated *smart contracts* for contracts like *murabahah* or *mudarabah*, and real-time Shariah audits. The study finds increasing institutional support across Southeast Asia and the Middle East, where Islamic finance authorities, governments, and fintech developers are actively working to embed blockchain into compliant financial ecosystems. In conclusion, although Bitcoin's speculative characteristics challenge its Shariah compliance, blockchain technology opens significant opportunities to innovate and strengthen Islamic digital finance. The realization of this potential depends on sustained collaboration among Shariah scholars, technologists, regulators, and financial institutions to ensure all developments are guided by the objectives of *maqasid al-shariah*. This research contributes to the ongoing discourse on how Islamic values can shape the future of ethical and inclusive financial technologies.

Keywords: Bitcoin, Blockchain, Islamic Economy, Financial System, Digital Finance.

INTRODUCTION

The purpose of this study is to analyze the compatibility of using Bitcoin and blockchain technology within the Islamic economic system. Since its introduction in 2008, Bitcoin as a decentralized digital currency has attracted significant attention from both investors and governments due to its advantages, such as fast transactions and low fees. Moreover, the blockchain technology underlying Bitcoin has been applied across various sectors such as supply chains, governance, and voting systems, thanks to its ability to ensure transparency and data security. Nevertheless, questions have arisen regarding the extent to which this technology aligns with the principles of Islamic economics.

Although Bitcoin and blockchain have brought many advancements to the digital financial system, their emergence raises major concerns about their compatibility with the values taught in Islamic economics. In the modern economic context, Bitcoin offers an alternative to the traditional financial system dominated by banks and financial institutions, providing opportunities for cross-border investments and transactions. However, does this technology align with Islamic economic principles that emphasize justice, transparency, and the prohibition of *riba* (interest), *gharar* (uncertainty), and *maysir* (gambling)?

The central issue investigated in this paper is whether the use of Bitcoin and blockchain technology is acceptable within the Islamic economic system. The research question addressed is: "How can Islamic economic principles be applied in the implementation of blockchain and Bitcoin technologies in the digital financial system, and what is the potential for innovation in supporting a Shariah-compliant financial system?"

By answering this question, this paper aims to contribute to the understanding of how these new technologies interact with the principles of Islamic finance and what innovations can be integrated with blockchain to advance the Shariah-compliant financial system.

The motivation for this research stems from the lack of comprehensive studies on the acceptance of digital technologies such as Bitcoin and blockchain in Islamic economics, especially those that consider Shariah values. Therefore, this research is expected to provide a clearer perspective on whether these technologies can be integrated into a Shariah-compliant financial system without contradicting Islamic economic principles.

Novelty: This question allows for a deeper exploration of technological innovation and how its application can interact with modern Islamic legal and economic principles. It also opens the door to discussions related to the rapidly developing digital financial systems.

METHOD

This study follows PRISMA guidelines for a literature review. Articles used in this study were sourced from databases such as Google Scholar, NOORBOOK.com, and *Maktabah Syamilah* using keywords like 'blockchain', 'Bitcoin', 'digital finance', and 'Islamic economics'. After screening titles, abstracts, and full texts, 5 primary Islamic texts and 40 academic articles met the inclusion criteria as illustrated in the PRISMA flow diagram**.**

The population includes academic research, journal articles, official reports, and legal sources discussing Bitcoin, blockchain technology, Islamic economics, and Shariah principles in the context of digital finance. The sample consists of prior studies and classical Islamic texts relevant to the topic.

This study employed a structured library research method (*studi pustaka*) to collect and analyze data. The research relied exclusively on secondary sources, which were critically selected for their relevance to the topics of Islamic economic principles, blockchain technology, and digital finance systems within a Shariah-compliant framework.

Primary data was collected from classical and contemporary Islamic jurisprudence texts to ground the discussion in foundational Shariah principles. These sources included major works such as *Al-Mughni* by Ibn Qudamah, *Majmu' Syarh al-Muhazzab* by Imam Nawawi, *Islam wa Dallilatuhu* and *Mu'amalat Maliyah Mu'ashirah* by Wahbah az-Zuhaili, and *Qodoyah Mu'ashirah* by Muhammad Abu Zahrah. These texts were consulted to explore the concepts of riba, gharar, maysir, justice (*'adl*), trust (*amanah*), and public benefit (*maslahah*), which are key in evaluating technological innovations like blockchain from an Islamic perspective.

In parallel, contemporary academic journals and peer-reviewed articles were systematically reviewed. These sources were accessed through digital academic databases and repositories such as Google Scholar and institutional open-access platforms. The literature comprised over 40 journal articles published between 2020 and 2023, focusing specifically on blockchain's role in Islamic digital finance, Shariah-compliant financial technology, and cryptocurrency regulation in Muslim-majority contexts. Some key references included the works of Abidin et al. (2021), Ahmad & Zainuddin (2023), Abdullah & Rizal (2022), and Kamil & Rahman (2022), among others.

The selection criteria for these sources included thematic relevance, methodological rigor, and geographic focus articularly on Southeast Asia and the Middle East, where the adoption of Islamic financial technologies is more pronounced. Research articles addressing practical implementations, regulatory perspectives, and fatwa interpretations related to Bitcoin and blockchain were prioritized.

Additionally, fatwa compilations and institutional opinions were reviewed from organizations such as Majma' al-Fiqh al-Islami, DSN-MUI (Dewan Syariah Nasional Majelis Ulama Indonesia), and other international Islamic financial standard-setters. These were used to assess the evolving positions of Islamic authorities on blockchain-based applications.

To complement textual analysis, governmental and institutional reports from countries leading Islamic fintech development particularly Indonesia, Malaysia, and the UAE were used to contextualize the academic findings with policy trends and innovation strategies.

All collected data was categorized according to thematic relevance: (Abu Zahrah, M, 2000) theological and jurisprudential foundations, (Ibn Qudamah, A., 1999) technical analysis of blockchain and Bitcoin, (Nawawi, I, 1996) case studies of implementation, and (Zuhaili, W., 1997) normative analysis for Shariah compliance. This integrative approach ensured that the study reflects both traditional Islamic scholarship and contemporary digital finance discourse.

Analysis involved identifying patterns and key themes in the literature connecting Bitcoin and blockchain to Islamic economics. The compatibility of this technology with Shariah principles was examined along with its impact on the stability of the Islamic financial system. A conceptual model was developed to explain how Bitcoin and blockchain could be integrated into a Shariah-compliant financial system.

RESULTS AND DISCUSSION

Research shows that blockchain technology, as a decentralized digital system that records transactions permanently and transparently, holds great potential to support the principles of Islamic economics. This technology can enable a more just, open, and efficient financial system. In Islamic economics, core values such as justice, information transparency, and the prohibition of riba (interest), gharar (uncertainty), and maysir (gambling or speculation) form the foundation of financial conduct. Blockchain's ability to reduce gharar through high data transparency, facilitate transactions without intermediaries, and lower transaction costs aligns well with Islamic principles that emphasize efficiency and fairness in economic dealings (muamalah).

The following are Islamic Shariah principles that align with the concept of blockchain technology, making it potentially compatible with the development of Islamic economics:

1. Justice

{إِنَّ اللهَ يَأْمُرُ بِالْعَدْلِ وَالإِحْسَان}

" Indeed, Allah commands justice and good conduct..."
(An-Nahl: 90)

Blockchain allows for transparent and immutable transaction records, ensuring that all parties receive their rights without manipulation or fraud. This aligns with Allah's command to uphold justice in all aspects of life, including economics.

2. Trustworthiness (Amanah)

{إِنَّ اللهَ يَأْمُرُكُمْ أَنْ تُؤَدُّوا الْأَمَانَاتِ إِلَى أَهْلِهَا}

Artinya: *" Indeed, Allah commands you to render trusts to whom they are due"* (An-Nisa: 58)

Bitcoin's volatility and speculative nature can lead to significant losses, conflicting with this principle. In contrast, blockchain—when applied within a Shariah framework—supports efficiency and transparency, reducing the risk of loss and fulfilling the principle of trust.

3. No Harm and No Mutual Harm (La Darar wa La Dirar)

{لا ضرر ولا ضرار}

" Do not harm yourself or others." (Ibn Majah, Ahmad, dan Malik)

Speculative use of Bitcoin may cause major losses and financial instability, which contradicts this hadith. However, blockchain technology when used ethically minimizes such risks and contributes to a more secure financial system.

4. Public Benefit (Maslahah)

{ومَا أَرْسَلْنَاكَ إِلَّا رَحْمَةً لِلْعَالَمِينَ}

"And We have not sent you (O Muhammad), except as a mercy to the worlds." (Surah Al-Anbiya: 107)

In Islam, all actions are ultimately aimed at promoting the welfare (*maslahah*) of the ummah. When used appropriately, blockchain technology can serve this purpose especially through its application in zakat, waqf, and equitable microfinance by delivering widespread benefits to communities, particularly those excluded from conventional financial systems.

Despite blockchain's potential, Bitcoin as one of its implementations is not fully compatible with Shariah principles. This is primarily due to its high price volatility and speculative nature, which closely resemble the element of maysir (gambling) clearly prohibited in Islam. As stated in the Qur'an:

{يَسْـَٔلُونَكَ عَنِ ٱلْخَمْرِ وَٱلْمَيْسِرِ ۖ قُلْ فِيهِمَآ إِثْمٌ كَبِيرٌ وَمَنَٰفِعُ لِلنَّاسِ وَإِثْمُهُمَآ أَكْبَرُ مِن نَّفْعِهِمَا ۗ وَيَسْـَٔلُونَكَ مَاذَا يُنفِقُونَ قُلِ ٱلْعَفْوَ ۗ كَذَٰلِكَ يُبَيِّنُ ٱللَّهُ لَكُمُ ٱلْـَٔايَٰتِ لَعَلَّكُمْ تَتَفَكَّرُونَ}

They ask you ˹O Prophet˺ about intoxicants and gambling. Say, "There is great evil in both, as well as some benefit for people but the evil outweighs the benefit." They ˹also˺ ask you ˹O Prophet˺ what they should donate. Say, "Whatever you can spare." This is how Allah makes His revelations clear to you ˹believers˺, so perhaps you may reflect (Albaqarah:219)

This verse highlights that even if an activity offers some benefit, if the harm outweighs it as with gambling it is prohibited. In the context of Bitcoin, when used for extreme price speculation without intrinsic value or clear benefit in accordance with Shariah, it may fall under the category of maysir.

Moreover, Bitcoin lacks backing from real assets and is often used as an investment tool without clear utility, thus approaching the prohibited element of gharar (uncertainty) in Islamic transactions. This is in line with the hadith of the Prophet Muhammad (peace be upon him):

{نهى رسول الله صلى الله عليه وسلم عن بيع الغر}

"The Messenger of Allah (peace be upon him) forbade sales involving uncertainty (gharar) (Muslim, No. 1513).

Nonetheless, many scholars and researchers argue that while Bitcoin may not fully comply with Shariah, the underlying **blockchain technology** can still be utilized to build financial systems that better reflect Islamic values. This is supported by the statements and opinions of various scholars and institutions:

1. **Sheikh Haitham al-Haddad – Islamic Council of Europe**

Sheikh Haitham states that Bitcoin cannot be deemed completely halal. However, he acknowledges that blockchain technology can play a vital role in developing financial systems that are more transparent, just, and efficient—qualities that align with the objectives of Shariah (maqasid al-shariah).

2. **Majma' al-Fiqh al-Islami (Islamic Fiqh Academy – OKI)**

This institution has not issued a definitive fatwa permitting Bitcoin. In its scholarly meetings, it stressed that the use of cryptocurrency requires cautious analysis. However, it does not reject blockchain technology outright and recommends its development for use in Shariah-compliant financial systems.

3. **Dr. Oni Sahroni (Islamic economics expert)**

He has expressed in various forums that:

a. Bitcoin potentially contains elements of gharar and maysir, thus requiring careful consideration.
b. Blockchain technology, however, could support the creation of trustworthy and accountable financial systems, especially in managing zakat, waqf, and halal crowdfunding initiatives.

Islamic financial institutions, Shariah regulators, technology developers, academics, and the global Muslim community are the key actors in promoting the Shariah-compliant use of blockchain. Support from governments and fintech institutions also plays a crucial role in building an ecosystem that facilitates the adoption of this technology. In regions such as Southeast Asia, the Middle East, and parts of Europe, initiatives to integrate blockchain into Shariah-compliant financial systems have shown significant progress. In Indonesia and Malaysia, for example, there is strong support from the government and Islamic financial authorities in developing digital payment systems and blockchain-based financial instruments that align with Islamic law. In the Middle East, several financial institutions have begun developing alternative digital currencies that are more in line with Shariah principles.

This development has been particularly evident since the early 2020s, alongside growing global interest in digital finance following the COVID-19 pandemic and the push for more inclusive and ethical financial systems. At the same time, Muslim communities are increasingly drawn to digital financial solutions that are not only efficient but also consistent with their religious beliefs.

The application of Islamic economic principles within blockchain is being carried out through various approaches. One of them is the development of Shariah-based smart contracts, which enable the execution of contracts such as murabahah, ijarah, and mudarabah in an automated and transparent manner. In addition, the creation of asset-backed stablecoins serves as an important alternative to replace the speculative nature of Bitcoin. Blockchain technology can also be utilized to conduct Shariah audits digitally and in real-time, thereby enhancing the transparency and accountability of Islamic financial institutions. Collaboration between Shariah authorities, financial institutions, and technology developers is essential to ensure that digital innovations remain within the bounds of Islamic law.

The greatest potential for innovation in supporting a Shariah-compliant financial system lies in the ability of blockchain technology to build a transparent, efficient, and tamper-proof digital financial infrastructure that avoids prohibited elements such as riba (interest), gharar (uncertainty), and maysir (speculation). Key innovations include the use of smart contracts to automate and enforce Shariah-based contracts, the development of asset-backed stablecoins as halal alternatives to speculative cryptocurrencies, and blockchain-based Shariah audit systems to ensure real-time compliance. Furthermore, blockchain enables the digital integration of zakat, waqf, and halal crowdfunding platforms with high levels of accountability. These innovations pave the way for a more inclusive, ethical, and globally competitive Islamic financial ecosystem—provided they are developed in alignment with the objectives of Shariah (maqasid al-shariah) and supported by appropriate regulation and collaboration among financial institutions and Shariah authorities.

Literature from books and articles reveals both alignment and misalignment between Bitcoin/blockchain and Islamic economic principles. However, blockchain built on decentralization can enhance transparency and reduce *gharar*, in addition to lowering transaction costs.

Comparison with Previous Studies

The findings of this study are consistent with Abidin et al. (2021), who concluded that Bitcoin and blockchain are not entirely Shariah-compliant due to speculative nature and price instability. However, this differs from Ibrahim et al. (2020), who emphasized blockchain's potential to support Islamic finance through increased transparency and reduced *gharar* and *maysir*. This discrepancy may be explained by differences in geographic and regulatory contexts—Ibrahim's study focuses on Europe and Asia, while this study emphasizes Indonesia and the Middle East.

Furthermore, our findings align with Kamil & Rahman (2022), who asserted blockchain's potential to reduce transaction costs and enhance inclusivity. Our study, however, places more emphasis on transparency in Shariah-based digital finance, echoing Ahmad & Zainuddin (2023)'s conclusion about blockchain enabling more accountable systems.

CONCLUSION

This study concludes that while Bitcoin, due to its high volatility, lack of intrinsic asset-backing, and speculative tendencies, presents significant incompatibilities with Islamic economic principles—particularly concerning elements of *riba*, *gharar*, and *maysir*—the underlying blockchain technology offers significant potential for innovation in building a Shariah-compliant digital financial system. Blockchain's features of decentralization, transparency, and immutability align closely with Islamic values such as justice (*ʿadl*), trustworthiness (*amanah*), and the prohibition of harm (*la darar wa la dirar*). When applied within a Shariah framework, blockchain can facilitate smart contracts for Islamic financial transactions (e.g., *murabahah*, *ijarah*, *mudarabah*), support real-time Shariah auditing, and enable the development of stable, asset-backed digital currencies that avoid speculative risk.

Despite these strengths, the study acknowledges key limitations. The reliance on secondary literature restricts the ability to form causal conclusions, and the geographic focus on Southeast Asia and the Middle East may limit the generalizability of findings to other regions. Furthermore, the absence of primary empirical data presents a potential gap in validating practical blockchain implementations under Islamic law.

Given these limitations, future research should adopt longitudinal and empirical approaches to examine how blockchain solutions affect Shariah-compliant financial performance over time. Scholars and practitioners should also further explore the integration of Islamic contracts and ethical guidelines into blockchain-based platforms to ensure both innovation and compliance.

In conclusion, the success of blockchain as a tool for Islamic finance lies in its ethical deployment. With the active involvement of Islamic financial institutions, Shariah scholars, regulators, and technology developers, blockchain can serve as a cornerstone for a more inclusive, just, and sustainable Islamic financial system that fulfills both technological promise and spiritual responsibility.

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