



Mathematical Model Analysis of the Profit-Sharing System in Islamic Banking

Nurhikmah¹, Ibnu Imam Al Ayyubi², Syed Muhammad Adib Termizi b Ahmad al-Jafari³, Fatimatul Mardiah Azzahra⁴, Nurul Afifah Azzahra⁵, Syahrul Ridwan⁶

¹ Universitas Islam Negeri Alauddin Makassar, Indonesia; e-mail. hikmahnur192@gmail.com

²⁴⁵⁶ Sekolah Tinggi Agama Islam Darul Falah, Indonesia; e-mail. ibnuimam996@staidaf.ac.id

³ Institut Ramlah Daing Abdul Kadir (IRDAK), Singapura; e-mail. md_adib1@hotmail.com

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ABSTRACT

This study examines the transformation of the profit-sharing system in Islamic banking through the application of mathematical models and digital technology. Profit sharing is a fundamental principle in Islamic finance that emphasizes justice, transparency, and blessings in financial transactions; however, its practical implementation often encounters challenges related to complex calculations and limited technological support. Therefore, this study aims to analyze how mathematical models and digital technologies can enhance the effectiveness and transparency of profit-sharing mechanisms in Islamic banking. This research employs a qualitative approach using a literature review and document analysis to examine relevant theories, previous studies, and current practices. The findings indicate that the application of mathematical models improves the accuracy of profit distribution calculations and supports more efficient decision making processes. Furthermore, the integration of digital technologies, such as blockchain and big data, significantly enhances transparency, strengthens public trust, and expands financial inclusion, particularly for communities in remote areas. Nevertheless, issues related to data security, digital literacy, and Sharia compliance remain key challenges. Overall, this study concludes that the synergy between mathematical approaches and digital technology plays a crucial role in strengthening a sustainable, transparent, and equitable Islamic financing system aligned with the objectives of Sharia (maqashid shariah).

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Corresponding Author:

Ibnu Imam Al Ayyubi

Sekolah Tinggi Agama Islam Darul Falah, Indonesia; e-mail. ibnuimam996@staidaf.ac.id

1. INTRODUCTION

Islamic banking emerges as a financial system grounded in Islamic principles, which not only seeks profit but also upholds the values of justice, transparency, and social responsibility¹. One of the key characteristics of this system is the application of profit-sharing mechanisms as an alternative to the interest-based (riba) system, which is prohibited in Islam. In contracts such as Mudarabah and Musharakah, profits and risks are fairly distributed between the bank and the client, in accordance with their respective contributions and the terms agreed upon at the outset of the contract. This approach is expected to foster a more ethical and inclusive financial system, particularly in empowering the economic well-being of the Muslim community. However, in practice, the implementation of profit-sharing schemes faces numerous challenges, ranging from fluctuations in the clients' business revenues, difficulties in verifying financial reports accurately, to information asymmetry that may disadvantage one of the parties. These challenges contribute to uncertainties in profit-sharing calculations and may undermine the credibility of the Islamic financial system itself.

In this context, a scientific approach is required to more accurately measure and predict the dynamics of profit-sharing systems. One promising approach is the application of mathematical models, which can represent the interrelationships among variables in the profit-sharing system in a logical and systematic manner². Mathematical modeling is not only useful for understanding economic behavior in Islamic contracts³, but also plays a crucial role in enhancing decision-making efficiency, estimating potential profits or losses, and determining profit-sharing proportions in a fair and transparent way. Moreover, with the aid of appropriate models, Islamic banks can develop financing schemes that are more responsive to risk and market conditions. Unfortunately, the development of such models in the context of Islamic banking remains limited, both in terms of the quantity of research and the integration of Sharia principles with quantitative methods⁴. Therefore, an in-depth analysis of the mathematical models used in profit-sharing systems is essential to

¹ Andri Soemitra, Awaluddin A, and Aqwa Naser Daulay, "Studi Literatur Tujuan Ideal Lembaga Keuangan Dan Perbankan Islam," *HUMAN FALAH: Jurnal Studi Ekonomi Dan Bisnis Islam* 8, no. 2 (2021): 1–19, <https://doi.org/10.30829/hf.v8i2.10050>.

² Also Ona Sabat, Mardiyana, and Ikrar Pramudya, "Gender Difference: Students' Mathematical Literacy in Problem Solving," *Proceedings of the International Conference of Mathematics and Mathematics Education (I-CMME 2021)* 597 (2021): 25–30, <https://doi.org/10.2991/assehr.k.211122.004>; Hardika Saputra, "The Effect of Using Geogebra Assisted STAD Type Learning Model on Problem Solving Ability and Mathematical Disposition," *Al-Madrasah: Jurnal Pendidikan Madrasah Ibtidaiyah* 6, no. 3 (2022): 574–83, <https://doi.org/http://dx.doi.org/10.35931/am.v6i3.1028>; A Septian and S Prabawanto, "Mathematical Representation Ability through Geogebra-Assisted Project-Based Learning Models," *Journal of Physics: Conference ...*, 2020, <https://doi.org/10.1088/1742-6596/1657/1/012019>; Anisa Rima Auliya, Iwan Junaedi, and Bambang Eko Susilo, "Students' Mathematical Problem Solving Ability in Terms of Independent Learning in the Eliciting Activities Model (MEAs)," *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang* 6, no. 2 (2022): 58–64, <https://doi.org/https://doi.org/10.31331/medivesveteran.v6i2.2140>; Ilham Muhammad and Dadang Juandi, "Model Discovery Learning Pada Pembelajaran Matematika Sekolah Menengah Pertama: A Bibliometric Review," *Euler: Jurnal Ilmiah Matematika, Sains Dan Teknologi* 11, no. 1 (2023): 74–88, <https://doi.org/10.34312/euler.v11i1.20042>.

³ Suci Hartati, Ratu Ayu Bilqis, and Achi Rinaldi, "Mathematical Problem-Solving Abilities and Reflective Thinking Abilities: The Impact of the Influence of Eliciting Activities Models," *Al-Jabar: Jurnal Pendidikan Matematika* 11, no. 1 (2020): 167–78, <https://doi.org/http://dx.doi.org/10.24042/ajpm.v11i1.6709>; Zaenuri Zaenuri et al., "The Effectiveness of Model Eliciting Activities with Ethnomathematics on Students' Mathematical Communication Capabilities," in *Proceedings of the 5th International Conference on Science, Education and Technology, ISET 2019, 29th June 2019, Semarang, Central Java, Indonesia, 2020*, <https://doi.org/http://dx.doi.org/10.4108/eai.29-6-2019.2290332>; G Greefrath and H S Siller, "GeoGebra as a Tool in Modelling Processes," *Uses of Technology in Primary and Secondary ...*, 2018, https://doi.org/10.1007/978-3-319-76575-4_21; S Meisya and I M Arnawa, "The Development of Mathematical Learning Devices Based on Model-Eliciting Activities and Geogebra," in *Journal of Physics: Conference Series*, vol. 1742 (IOP Publishing, 2021), 12034, <https://doi.org/10.1088/1742-6596/1742/1/012034>; Nur Rusliah et al., "Mathematical Problem-Solving Skills on Relation and Function through Model-Eliciting Activities (MEAs)," in *Journal of Physics: Conference Series*, vol. 1778 (IOP Publishing, 2021), 12016, <https://doi.org/10.1088/1742-6596/1778/1/012016>.

⁴ Asep Saepul Hamdi and Abdul Rahmat, *Metode Penelitian Kuantitatif Ekonomi Syariah* (Ideas Publishing, 2023).

promote innovation, accountability, and the competitiveness of Islamic banking in today's digital economy.

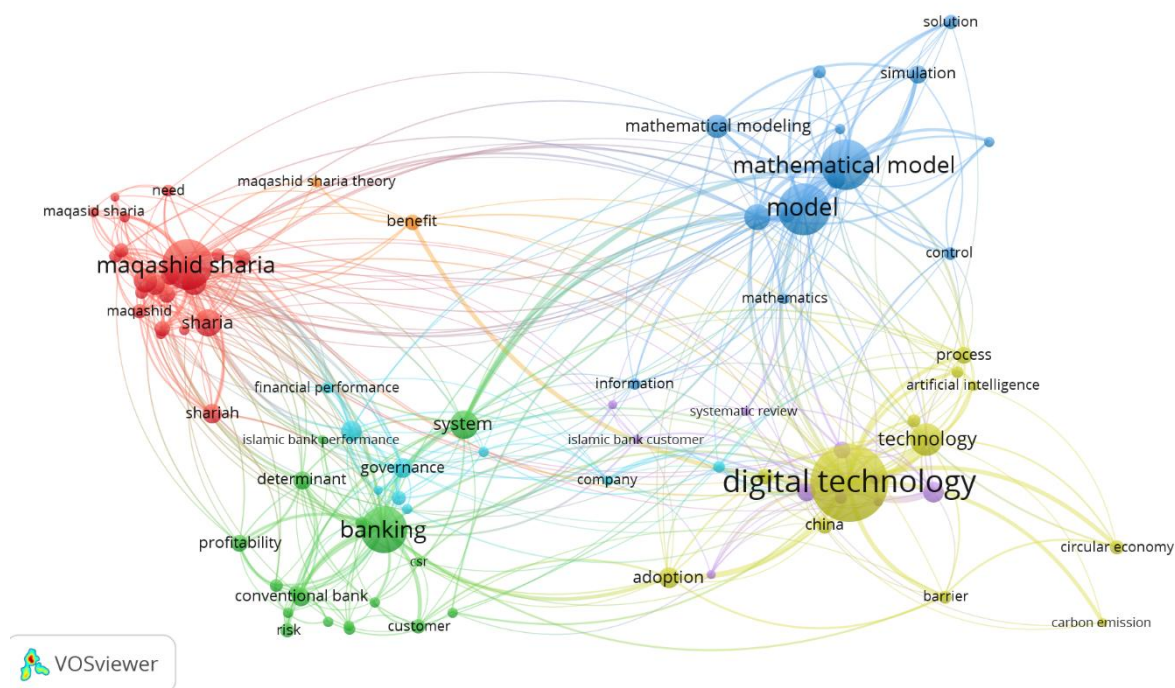


Figure 1. VOSviewer Analysis Result

Based on the visualization results generated using VOSviewer, it is evident that the most dominant topics in the related literature are Islamic banking and profit-sharing, which serve as the central nodes connected to various other terms such as mathematical models, Sharia theory, and risk. The presence of clusters in different colors illustrates the diversity of approaches in discussing profit-sharing systems within Islamic banking, ranging from theoretical and empirical to mathematical perspectives. This indicates that while research in this area has grown considerably, it remains primarily concentrated on normative and implementation-based aspects. On the other hand, terms like mathematical model and profit-sharing principles exhibit relatively limited connectivity compared to the main terms, suggesting a lack of in-depth exploration into profit-sharing systems from a mathematical modeling perspective. This highlights a research gap, particularly in the quantitative analysis of Islamic financial systems, specifically regarding the mechanisms of profit-sharing.

From this mapping, it can be concluded that there exists a notable research gap in the development of mathematical models that specifically represent the profit-sharing mechanism in Islamic banking. Most existing studies tend to focus on theoretical foundations or empirical findings without incorporating mathematical formulations that could facilitate predictions or simulations of the system. Yet, in the context of financial decision-making, the availability of measurable models is crucial for enhancing the system's accuracy and efficiency. The novelty of this study lies in its attempt to formulate or analyze mathematical models within profit-sharing systems by considering specific variables aligned with Sharia principles an area that has yet to receive sufficient attention in the majority of the literature. This study aims to contribute both

theoretically and practically by optimizing profit-sharing mechanisms in Islamic banks through a more structured and objectively testable quantitative approach.

Given the urgency of the issues outlined, the main objective of this research is to analyze applicable mathematical models in the profit-sharing system of Islamic banking to enhance efficiency, transparency, and fairness in financing practices. The study aims to map the trends and developments in scholarly work related to the application of mathematical models in profit-sharing systems using a bibliometric approach facilitated by the VOSviewer software. Furthermore, the research seeks to identify the limitations inherent in previously developed models, particularly regarding the integration of Sharia values and quantitative methodologies. By examining these findings, the study hopes to provide recommendations for developing more adaptive and relevant mathematical models tailored to the contemporary needs of the Islamic financial industry. Through this approach, the research aspires to contribute not only to the theoretical enrichment of Islamic economics but also to the practical development of more accountable, data-driven financing strategies. This research also opens the door to interdisciplinary collaboration between the fields of exact sciences and Islamic studies, thereby fostering innovation in Islamic finance that is modern, sustainable, and globally competitive.

2. METODEDES

This study employs a qualitative descriptive approach aimed at providing an in-depth depiction of the role of mathematical models and technological innovation in supporting the profit-sharing system in Islamic banking⁵. This approach was chosen because it enables the researcher to explore phenomena contextually and thoroughly, particularly in relation to the application of scientific concepts within the practice of Islamic economics⁶. The study also examines the integration of Sharia values with rapidly evolving modern financial technology. The main focus is directed toward analyzing conceptual frameworks, technological utilization, and the perspectives of practitioners and academics on the influence of mathematical models and digitalization in enhancing transparency, efficiency, and fairness within profit-sharing mechanisms. The primary data sources in this research consist of literature reviews and in-depth interviews. The literature review involves the analysis of various scholarly journals, books, and research reports concerning Islamic economics, financial technology, and the application of mathematical models in Islamic finance. In addition, the researcher conducted interviews with several key informants, including economic mathematics lecturers, Islamic fintech analysts, and Islamic banking practitioners. Informants were selected purposively based on their expertise and involvement in the research domain.

Data obtained from these interviews serve to reinforce the literature findings and offer practical insights into the studied topic. Data collection was carried out through documentation and semi-structured interviews, conducted both in person and online. The main instrument in the interviews was an open-ended question guide, allowing informants to freely articulate their views and experiences. All collected data were analyzed using thematic analysis, which involves identifying key themes emerging from the data and interpreting them in depth. The purpose of this analysis is to explore the relationship between mathematical models, technological innovation, and Sharia

⁵ Adriani Susanty et al., *Metode Penelitian Kualitatif* (Malang: CV. Future Science, 2023).

⁶ John W Creswell, "Research Design: Pendekatan Kualitatif, Kuantitatif, Dan Metode Campuran," *Diterjemahkan Oleh Achmad Fawaid, Edisi Ke-3. Cet. Ke-1. Yogyakarta: Pustaka Setia*, 2010.

values in forming a more just and efficient Islamic financing system. To ensure data validity, source triangulation was conducted by comparing interview results with literature findings and relevant documents. Validation was also performed by asking informants to review interview summaries to ensure accurate interpretation. This study is expected to contribute to the development of technology-based Islamic financing concepts that are aligned with Islamic principles, while also enriching the body of knowledge in the fields of Islamic economics and Sharia-compliant financial technology.

3. FINDINGS AND DISCUSSION

The findings of this study, derived from an extensive literature review and in-depth interviews with lecturers of economic mathematics, Islamic fintech analysts, and Islamic banking practitioners, indicate that mathematical models and technological innovation play a crucial role in strengthening the profit-sharing system in Islamic banking. Overall, the results converge on several key aspects, namely the role of mathematical models in designing and evaluating profit-sharing schemes, the contribution of digitalization to transparency and efficiency, the integration of Sharia values in the development of models and digital systems, and the practical challenges of implementation. In terms of application, mathematical models are used to simulate various business scenarios, project fair profit-sharing ratios (*nisbah*), and analyze the sensitivity of profit-sharing outcomes to changes in key variables, so that schemes for contracts such as *mudharabah* and *musyarakah* can be designed in a more measurable way. The interviewed lecturers emphasized that the models employed do not need to be overly complex, as long as they are conceptually clear, can be explained easily to practitioners, and remain grounded in the principle of risk sharing in Islamic economics. Banking practitioners confirmed that profit-sharing formulas are already applied operationally, but acknowledged that there is still room to develop more systematic and comprehensive models, particularly for more complex financing products. Another important finding is that mathematical models function not only as technical tools for calculation, but also as instruments of transparency and accountability, since documented formulas embedded in digital systems enable banks to explain profit-sharing mechanisms to customers in an open and consistent manner. This is reinforced by the use of digital technology and Islamic fintech, including automated profit-sharing calculations, more detailed digital reporting, access to information via mobile and internet banking, and the potential integration with big data and advanced analytics. Thus, the combination of mathematical models and modern technology is perceived as capable of enhancing service speed, operational efficiency, and ease of access to information, as long as it remains within the boundaries of Sharia.

Nevertheless, all informants stressed that mathematical models and digital technology must be developed within the framework of Sharia values, such as justice (*al-'adl*), public interest (*al-maslahah*), and balanced risk sharing, and must not conflict with the prohibitions of *riba*, *gharar*, and *maisir*. In this context, models and digital systems are viewed as means (*wasilah*) to uphold the objectives of Sharia (*maqashid al-shariah*), rather than merely instruments for profit maximization. The study also identifies several challenges, including the limited number of human resources who simultaneously master financial mathematics, *fiqh muamalah*, and information technology; varying levels of financial and mathematical literacy among customers; the lack of uniform standardization of profit-sharing models across institutions; and technological infrastructure constraints in some Islamic financial institutions. These findings imply that the development of a more just and efficient profit-sharing system requires capacity-building for human resources, improved public financial literacy, and the formulation of proportionate

standardization, alongside continuous innovation in mathematical modeling and technology. Overall, this study affirms that the integration of scientific knowledge (particularly mathematics), financial technology innovation, and Sharia values is key to building an Islamic financing system that is more robust, transparent, and competitive, while remaining consistent with Islamic principles.

3.1 The Fundamental Concept of Profit-Sharing in Islamic Banking

The Islamic banking system is a financial framework based on Islamic principles, aiming to establish justice, balance, and public welfare in economic activities⁷. A key distinction between Islamic and conventional banking lies in the prohibition of *riba* any unjust gain or interest charged on loans. The prohibition of *riba* is explicitly outlined in the Qur'an, particularly in Surah Al-Baqarah (2:275–279), which declares that Allah has permitted trade but forbidden *riba*⁸. The hadiths of the Prophet Muhammad (peace be upon him) also classify *riba* as a major sin that Muslims must avoid. Consequently, Islamic finance replaces *riba*-based transactions with fair and transparent contracts. One such alternative is the profit-sharing system, which requires both parties to share in the risks and returns⁹. This ensures that neither party is exploited or disadvantaged in financial contracts and aligns with the principles of distributive justice in Islamic economic theory. In this context, Islamic finance emerges as an ethical alternative to conventional systems, which are often perceived as exploitative. The prohibition of *riba* is not only theological in nature but also has significant social and economic implications.

Beyond its theological basis, the prohibition of *riba* and the advocacy for profit-sharing reflect a deeper commitment to economic justice and social balance. In conventional systems, interest rates are often detached from real economic productivity, leading to wealth accumulation by capital holders and increased burdens on borrowers especially in times of crisis. Islamic profit-sharing contracts, in contrast, create a dynamic where both parties are equally invested in the success of the venture. This shared responsibility not only fosters cooperation but also prevents the exploitation of the weaker party, aligning financial practices with the Islamic mandate to promote equitable wealth distribution (*taqsim al-tharwah*)¹⁰. From this perspective, Islamic finance functions not merely as an alternative model, but as a transformative economic paradigm addressing structural inequalities.

Furthermore, the operationalization of profit-sharing contracts in the digital economy demands renewed attention to contract design, risk allocation, and information asymmetry. While *Mudarabah* and *Musharakah* offer frameworks grounded in Sharia, their effective implementation requires measurable tools to detect early signs of moral hazard and adverse selection. This is where the integration of predictive modeling and financial technology becomes pivotal. Studies have shown that the application of statistical models and financial

⁷ Nurul Aulia Herlina Angganita and Evi Fitria Novitasari, "Analysis of Sharia Economic Development in the Era of Globalization in Indonesia: Opportunities & Challenges," *Gorontalo Development Review*, 2024, 104–17, <https://doi.org/https://doi.org/10.32662/golder.v0i0.3383>.

⁸ Nurhikmah Nurhikmah, "Character Education Islam From the Views of Imam Al-Ghazali," *Jurnal Al Burhan* 4, no. 1 (2024): 53–66, <https://doi.org/10.58988/jab.v4i1.300>.

⁹ Daniel Farhan, "Sistem Ekonomi Islam Dan Pelarangan Riba," *ANTARADHIN: Jurnal Ekonomi Syariah Kontemporer* 5, no. 2 (2024): 120–32.

¹⁰ Hasan Bakti Nasution, M Fajri Syahroni Siregar, and Imron Bima Saputra, "The Distribution of Science According to Muslim Philosophers," *Ta Dib Jurnal Pendidikan Islam* 11, no. 1 (2022): 53–64, <https://doi.org/https://doi.org/10.29313/tjpi.v11i1.9045>.

algorithms enhances banks' ability to set optimal nisbah based on transaction patterns and market volatility¹¹. Meanwhile, blockchain technology is being adopted in several Islamic banks to increase contract transparency and ensure real-time profit monitoring without violating Shariah rules¹². These innovations, when aligned with ethical standards, reinforce the Maqashid Shariah in modern financial operations.

Finally, the spiritual dimension of profit-sharing cannot be separated from its economic rationale. In Islamic thought, the concept of barakah (divine blessing) plays a central role in financial ethics. Wealth earned through lawful, just, and mutually beneficial means is believed to carry long-term blessings and sustainability¹³. As such, profit-sharing is not only a mechanism to replace interest but a spiritual practice that reinforces moral accountability in business transactions. Clients and bankers are encouraged to act with amanah (trustworthiness) and ihsan (excellence), values that elevate Islamic finance beyond technical compliance. Research by¹⁴ supports this view, suggesting that ethical alignment between bank operations and clients' faith values significantly increases trust and customer loyalty. Thus, the integration of financial rationality with spiritual consciousness defines the distinctive identity of Islamic banking in the global financial system.

The concept of the profit-sharing system in Islamic banking is firmly rooted in the principles of justice and the prohibition of riba (usury). This is in accordance with the word of Allah SWT in the Qur'an: "O you who have believed, do not consume usury, doubled and multiplied, but fear Allah that you may be successful" (QS. Ali 'Imran: 130). This verse clearly illustrates that Islamic financial systems forbid riba because it entails elements of injustice and exploitation. Instead, Islam offers fair and transparent mechanisms such as profit-sharing, which allow both parties to share risks and returns based on mutual agreement. This principle is also emphasized in a hadith: From Jabir (may Allah be pleased with him), the Messenger of Allah (peace and blessings be upon him) said: "The Messenger of Allah cursed the one who consumes riba, the one who gives it, the one who records it, and the two witnesses to it" (HR. Muslim no. 1598). This hadith further reinforces the prohibition of riba and highlights the urgency of implementing justice-based financial transaction models such as mudharabah and musharakah. Therefore, the profit-sharing system is not only an economic solution but also a means of preserving spiritual integrity and attaining blessings in financial activities.

Profit-sharing contracts in Islamic banking are primarily implemented through two key mechanisms: Mudarabah and Musharakah¹⁵. In a Mudarabah contract, cooperation occurs

¹¹ Erika De Keyser et al., "An Optimization Model Minimizing Costs of Fertilizer Application in Flemish Horticulture," *International Journal of Agricultural Sustainability* 21, no. 1 (2023), <https://doi.org/10.1080/14735903.2023.2184572>.

¹² Dhiyah Eloise Rose, John Van Der Merwe, and Jack Jones, "Digital Marketing Strategy in Enhancing Brand Awareness and Profitability of E-Commerce Companies," *APTISI Transactions on Management* 8, no. 2 (2024): 160–66, <https://doi.org/https://doi.org/10.33050/atm.v8i2.2277>; Thomas A Hieronymus, *Economics of Futures Trading: For Commercial and Personal Profit* (Ceres Books LLC, 2023); George Serafeim, *Purpose and Profit: How Business Can Lift Up the World* (HarperCollins Leadership, 2022); Aswath Damodaran, *The Little Book of Valuation: How to Value a Company, Pick a Stock, and Profit* (John Wiley & Sons, 2024).

¹³ Muhammad Hanafi, "Konsep Pendidikan Islam Ibn Thufail," *As-Sabiqun* 1, no. 2 (2019): 41–52, <https://doi.org/10.36088/assabiqun.v1i2.353>.

¹⁴ Chan & Hedden (2023)

¹⁵ Achraf Haddad and Mohamed Naceur Souissi, "The Impact of Shariah Advisory Board Characteristics on the Financial Performance of Islamic Banks," *Cogent Economics & Finance* 10, no. 1 (2022): 2062911, <https://doi.org/https://doi.org/10.1080/23322039.2022.2062911>; Nani Suhartini, Radhya Arsy Tamika, and Azhar Nor, "Investment Risk Management in Sharia Banking: A Literature Study," *Journal of Islamic Economics and Philanthropy* 6, no. 4 (2024): 311–24, <https://doi.org/https://doi.org/10.21111/jiep.v6i4.11091>; Aida Hanic and Edib Smolo, "Islamic Approach to Corporate

between a capital provider (shahibul maal) and an entrepreneur or fund manager (mudharib), with profits distributed according to a pre-agreed ratio (nisbah). Any financial loss is borne entirely by the capital provider, unless it results from negligence or misconduct by the mudharib. In contrast, a Musharakah contract involves both parties contributing capital and actively participating in business management. Profits and losses are shared based on the proportion of capital invested. Both contracts reflect the principle of justice in Islamic economics, as they do not guarantee fixed returns like conventional interest rates¹⁶. From a financial theory perspective, this system aligns with the concept of shared risk, wherein both parties bear the potential risks and benefits. It also corresponds to the idea of mutualistic symbiosis, fostering reciprocal, non-exploitative economic relationships. Therefore, these Sharia-compliant contracts are not only religiously sound but also economically rational.

In terms of advantages, the profit-sharing system is widely regarded as more ethical and equitable, as it does not impose predetermined returns like interest in conventional systems. In conventional banking, clients are obligated to pay interest even if their business incurs losses. In contrast, under a profit-sharing arrangement, returns are contingent upon actual business performance¹⁷. This offers clients greater financial flexibility and reduces the risk of business failure due to the burden of fixed installments. In an interview with an MSME entrepreneur who is a client of an Islamic bank, the respondent stated: "I do not feel burdened by fixed installments because the payments depend on whether I make a profit or not." This reflects higher customer satisfaction with a more humane economic approach. The Principal-Agent theory may also be applied to explain the relationship between the bank and its clients, where transparency and trust are key to success. If clients act with integrity and banks conduct effective supervision, the relationship can yield mutually beneficial outcomes. Thus, this system not only fulfills Sharia requirements but is also managerially relevant.

However, the implementation of the profit-sharing system is not without its challenges, particularly in terms of transparency and monitoring of clients' business activities. A practitioner in Islamic banking interviewed during field research revealed that one of the primary obstacles is the limited availability of accurate financial reports from clients. "Clients often fail to provide comprehensive business data, making it difficult for us to assess the actual profits," stated a financing manager at a Sharia Rural Bank (BPRS) in Bandung. This issue results in a discrepancy between the theoretical ideals and the practical realities of the profit-sharing system. To address this gap, a supervisory mechanism that is both accountable and capable of objectively verifying business performance is essential. In this context, a mathematical modeling approach becomes particularly important. With appropriate models,

Social Responsibility: An International Model for Islamic Banks," *International Journal of Islamic and Middle Eastern Finance and Management* 16, no. 1 (2023): 175–91, <https://doi.org/https://doi.org/10.1108/IMEFM-07-2021-0284>; Muhammad Bilal Zafar, Ahmad Azam Sulaiman, and Muhammad Nawaz, "Does Corporate Social Responsibility Yield Financial Returns in Islamic Banking?," *Social Responsibility Journal* 18, no. 7 (2022): 1285–1310, <https://doi.org/https://doi.org/10.3390/su14095433>; Muhammad Ali et al., "Does Stakeholder Pressure Matter in Islamic Banks' Corporate Social Responsibility and Financial Performance?," *International Journal of Ethics and Systems* 39, no. 2 (2023): 236–63, <https://doi.org/https://doi.org/10.1108/IJOES-10-2021-0183>.

¹⁶ Sainee Tamphu et al., "Building Bridges to the Future of Learning : Exploring Artificial Intelligence Research Using R-Studio Assisted Bibliometrics," *Cogent Education* 11, no. 1 (2024), <https://doi.org/10.1080/2331186X.2024.2417623>.

¹⁷ Intan Malika Nuraini and Zulfa Izzati Hasanah, "Etika Manajemen Perusahaan Dalam Perspektif Islam Berbasis Syariah," *Jurnal Religion: Jurnal Agama, Sosial, Dan Budaya* 1, no. 6 (2023): 207–16, <https://doi.org/https://doi.org/10.55606/religion.v1i6.732>; Stefano Amato et al., "Family Firms amidst the Global Financial Crisis: A Territorial Embeddedness Perspective on Downsizing," *Journal of Business Ethics* 183, no. 1 (2023): 213–36, <https://doi.org/https://doi.org/10.1007/s10551-021-04930-0>; De Keyser et al., "An Optimization Model Minimizing Costs of Fertilizer Application in Flemish Horticulture."

banks can estimate the potential profitability and risk associated with a financing project more accurately. Such models also help uphold the principle of fairness in profit distribution without requiring excessive direct intervention. This scientific approach aligns with the spirit of *ijtihad* in Islam, which emphasizes the continuous development of new methods grounded in Sharia principles. Therefore, the integration of religious and scientific approaches becomes a key solution for overcoming the implementation challenges of the profit-sharing system.

3.2 Implementation Challenges in the Profit-Sharing System

Although the profit-sharing system in Islamic banking offers a more equitable and ethical financing alternative, its implementation in practice is not without challenges. One of the primary obstacles is the fluctuation of clients' business income, which renders profit calculation uncertain¹⁸. In a *mudharabah* contract, for instance, business revenue is highly dependent on managerial capabilities and volatile market conditions. This uncertainty complicates the bank's ability to project income and determine a realistic profit-sharing ratio (*nisbah*). In the event of a loss, the bank receives no return despite having allocated funds. Moreover, small-scale entrepreneurs or micro, small, and medium enterprises (MSMEs), who often partner with Islamic banks, frequently lack well-organized financial records, making the evaluation process difficult. As noted in an interview with a financing officer at a Sharia Rural Bank (BPRS) in Bandung, "Our clients often do not have proper financial statements, making it hard for us to assess the true potential of their businesses." This situation underscores the significant challenge of maintaining the credibility of the profit-sharing system in the absence of adequate financial information systems.

One of the most effective strategies to overcome uncertainty in profit-sharing schemes is the integration of real-time financial data systems. As small and micro-enterprises often struggle with structured bookkeeping, digital financial recording tools tailored to MSMEs can significantly enhance data accuracy and transparency. A study by¹⁹ highlights the success of mobile-based accounting apps in rural Islamic microfinance institutions, which not only improve report consistency but also empower clients with better financial literacy. With digital dashboards and cloud-based accounting systems, both banks and clients can monitor revenue streams and cost structures, making profit-sharing more transparent and equitable. These tools also enable periodic financial updates and faster contract reviews, reducing the dependence on post-period reconciliations which are often the source of disputes and delays.

Moreover, predictive analytics using artificial intelligence (AI) and machine learning (ML) presents a transformative opportunity for Islamic banks to estimate business viability and potential returns with greater accuracy. According to²⁰ supervised machine learning models can analyze clients' historical financial patterns and macroeconomic indicators to determine risk levels and recommend optimal *nisbah* ratios. These technologies can simulate various income scenarios and provide banks with forward-looking insights into expected performance, thus minimizing the adverse effects of income volatility. In the context of *mudharabah* and *musyarakah*, this approach enhances fairness by ensuring that risk is shared based on informed

¹⁸ Yildiray Idhar El Natsir, "Modal Ventura Syariah Sebagai Alternatif Permodalan Bagi UKM Di Indonesia: Studi Kasus Di PT. PBMT Syariah" (Universitas Islam Indonesia, 2024).

¹⁹ Rytilä (2021)

²⁰ Bostrom (2020)

and data-driven assessments. When integrated with Sharia-compliant frameworks, AI-assisted evaluation respects ethical boundaries while promoting financial efficiency and sustainability.

At the regulatory level, harmonizing internal governance standards with digital compliance frameworks is vital to strengthen trust in profit-sharing contracts. Regulatory institutions and Islamic financial standard-setting bodies such as AAOIFI and IFSB have emphasized the importance of incorporating risk-based audit mechanisms and Sharia review protocols in technology-driven contracts²¹. These protocols should include digital audit trails, automated flagging of anomalies, and real-time alerts for breach of terms. Furthermore, banks need to invest in training Shariah compliance officers and financial analysts to interpret model outputs within an ethical decision-making framework. In this sense, technology is not seen as a substitute for human judgment, but as a complementary tool to reinforce amanah (trust) and uphold the principles of justice in every financial transaction. Ultimately, such an integrated system reinforces public trust and enhances the credibility of Islamic profit-sharing schemes across different market segments.

In addition to income uncertainty, data limitations pose a major barrier in implementing profit-sharing contracts. Many clients lack standardized accounting systems and continue to rely on manual records or even memory-based tracking. This impedes banks from conducting accurate risk analysis and financial projections. Invalid or incomplete data can lead to inaccurate nisbah determinations or even unwarranted financial losses. These issues not only elevate financial risk but also erode mutual trust between contracting parties. A staff member from a Baitul Maal wa Tamwil (BMT) institution shared during field research: "We don't have tools to measure whether a business is truly profitable because there are no written reports everything is conveyed orally." This emphasizes the need to integrate digital financial reporting systems or simplified accounting technologies for micro-clients to ensure that profit-sharing arrangements operate more accurately and fairly.

Moral hazard, or dishonest behavior by one of the contracting parties, is another serious issue within the profit-sharing system. In a mudharabah agreement, for instance, the entrepreneur (client) typically possesses more information than the bank, making it possible to manipulate profit reports or conceal income. This informational imbalance opens opportunities for exploitation by the more dominant party. Islamic banks are in a vulnerable position, as they are not authorized to intervene directly in the client's business operations. As explained by a financing analyst at a private Islamic bank, "We often suspect that financial reports are fabricated, but we cannot prove it because it lies outside our operational domain." Such cases indicate that the profit-sharing system requires robust internal control mechanisms and audit procedures tailored to the capacity of micro-enterprises. Without proper safeguards, moral hazard could undermine the principle of justice that underpins Islamic finance.

In its implementation, profit-sharing systems such as mudharabah and musyarakah face a number of complex challenges. One of these is moral hazard, which occurs when the fund

²¹ Jop Koopman, "Subawe, Traditional Knowledge, and Faith-Based Organisations Promoting Social Capital and Disaster Preparedness: A Lombok, Indonesia Case Study," *International Journal of Disaster Risk Reduction* 94 (2023): 103837, <https://doi.org/https://doi.org/10.1016/j.ijdrr.2023.103837>; Sandra Featherman, *Higher Education at Risk: Strategies to Improve Outcomes, Reduce Tuition, and Stay Competitive in a Disruptive Environment* (Taylor & Francis, 2023); Sugianto Sugianto and Sibril Malasyi, "The Implementation of Investment Risk Management in Sharia Capital Market," *Economit Journal: Scientific Journal of Accountancy, Management and Finance* 4, no. 1 (2024): 7–12, <https://doi.org/https://doi.org/10.33258/economit.v4i1.1058>; Suhartini, Tamika, and Nor, "Investment Risk Management in Sharia Banking: A Literature Study."

manager (mudharib) is not fully honest in reporting the actual business outcomes, thereby reducing the portion of profit that should rightfully go to the capital owner (shahibul maal). Additionally, the lack of transparency in financial reporting increases the risk of information asymmetry between the involved parties. In this context, the Qur'an delivers a firm warning: "...And do not consume one another's wealth unjustly..." (Surah Al-Baqarah: 188). This verse emphasizes the importance of maintaining integrity and honesty in all economic transactions, including within profit-sharing schemes. Gaining unlawful benefits or doing so in a hidden manner is a reprehensible act and goes against the principles of justice in Islamic commercial ethics (muamalah). This relevance is further reinforced by the saying of the Prophet Muhammad (peace be upon him): "Whoever cheats is not one of us" (Narrated by Muslim). This Hadith explicitly highlights the importance of honesty and ethics in business. Fraud or manipulation of financial reports not only leads to material loss but also threatens the spiritual values of the business actors. Therefore, it is essential for Islamic financial institutions to strengthen monitoring and accountability systems to ensure that the profit-sharing scheme runs fairly and with trustworthiness (amanah).

Another equally important challenge is information asymmetry the unequal distribution of information between the bank and the client regarding the actual condition of the business. In many instances, clients possess more detailed knowledge about their businesses, while banks must rely solely on the reports provided. This imbalance hinders the bank's ability to make informed decisions regarding business feasibility or nisbah adjustments. Unlike conventional systems, where such risks may be mitigated through collateral or fixed interest rates, Islamic profit-sharing models require proportional risk-sharing. This condition demands a strong relationship between trust and control. Field observations reveal that not all banks are equipped with human resources capable of conducting intensive monitoring of their business partners. This limitation may compromise the accuracy of a profit-sharing system that ideally relies on transparency and mutual trust. Consequently, the development of information technology-based systems or big data solutions is critical in mitigating the effects of information asymmetry.

To address these multifaceted challenges, a systematic and scientific approach is necessary to strengthen the practical implementation of profit-sharing models²². Mathematical modeling can offer a rational solution to uncertainty and enhance the objectivity of decision-making processes. By incorporating variables such as transaction volume, income fluctuations, and business success probabilities, Islamic banks can generate more accurate business outcome projections. These models can also be calibrated based on business type, economic sector, and client performance history, thus making the financing system more adaptive. Furthermore, models developed in alignment with Sharia principles continue to uphold the values of fairness and risk-sharing. Implementing such models requires cross-disciplinary collaboration among Islamic economists, mathematicians, and banking practitioners. In the long term, this approach may reduce reliance on subjective judgments and bolster public trust in the Islamic financial system.

²² M Radiansyah and Munawaroh Munawaroh, "Analisis Literatur Tentang Efektivitas Sistem Bagi Hasil Dalam Pembiayaan Mudharabah Pada Perbankan Syariah," *Al-Sharf: Jurnal Ekonomi Islam* 6, no. 1 (2025): 90–103; Naelul Azmi, "Problematisasi Sistem Ekonomi Islam Di Indonesia," *Mutawasith: Jurnal Hukum Islam* 3, no. 1 (2020): 44–64, <https://doi.org/https://doi.org/10.47971/mjhi.v3i1.186>.

3.3 The Role of Mathematical Models in Supporting the Profit-Sharing System

Mathematical models play a strategic role in supporting the profit-sharing system in Islamic banking, particularly in addressing practical challenges such as uncertainty, risk, and information asymmetry. Broadly speaking, a mathematical model can be defined as a symbolic and logical representation of real-world phenomena, constructed to understand relationships between variables, make predictions, and support decision-making. In the context of profit-sharing, these models can be used to formulate relationships between capital, business income, profit-sharing ratios, and risk factors. Through a quantitative approach, Islamic banks can design simulations to project potential profit and loss scenarios based on specific business conditions. This approach is particularly valuable in reducing dependence on subjective assessments of clients' businesses an inherent weakness in the current profit-sharing system. Furthermore, mathematical models can serve as tools for periodic monitoring and evaluation of Islamic financing performance, thereby reinforcing the principles of transparency and accountability upheld in Islamic finance²³.

In order to address the challenges of uncertainty and strengthen fairness within the profit-sharing system, the use of mathematical models becomes highly essential. These models assist in estimating risks, projecting income, and formulating profit distribution schemes in a proportional and transparent manner. Sharia contracts such as *mudharabah* and *musyarakah* involve elements of joint risk-sharing, which require mutual trust and commitment from both parties. In this regard, the principle of *tawakkul* (trust in Allah SWT) serves as a spiritual foundation that reinforces sincerity in accepting the uncertainty of outcomes. "Indeed, Allah loves those who put their trust in Him" (Surah Ali 'Imran: 159). This verse reminds us that in carrying out economic activities particularly those based on partnership and profit-sharing an attitude of optimism and trust in Allah is necessary. Business risk is inevitable, yet placing faith in Allah's decree while striving through sound analysis and predictive models offers an Islamic and strategic middle path.

One application of mathematical modeling in profit-sharing systems is the use of probability and statistical functions to estimate fluctuations in business income. By utilizing historical data from clients' businesses and external variables such as market conditions or inflation rates, Islamic banks can build predictive models that estimate potential profits. For instance, the Monte Carlo Simulation approach can be employed to simulate various income scenarios and determine a fair profit sharing distribution. Such models assist banks in setting more accurate and realistic profit-sharing ratios (*nisbah*). Additionally, with clearly defined upper and lower income projections, banks and clients can draft contracts that incorporate pre-calculated risk scenarios. This enhances the sense of fairness and helps prevent future conflicts. In an interview with a professor of mathematical economics from an Islamic university, it was stated that "probabilistic models are very helpful in explaining business risks without violating the sharia principle of avoiding speculative uncertainty."

Beyond probability functions, mathematical models can also be developed using optimization functions, where the primary objective is to maximize mutual profits within the framework of Islamic principles. These functions can consider variables such as the amount of allocated capital, average returns from specific types of businesses, and the risk preferences of

²³ Nurul Apriani, "'Analisis Faktor Internal Dan Variabel Makro Terhadap Pembiayaan Bermasalah (Studi: Bank Pembiayaan Rakyat Syariah) Periode 2019-2023'." (FEB UIN JAKARTA, 2024).

each party. Using optimization methods, Islamic banks can construct financing portfolios that balance risk and return, in line with the prudential principle²⁴. On the other hand, such models are also beneficial to clients, as they provide clarity on the minimum and maximum income targets needed to avoid losses. As a result, communication and transparency between both parties can be significantly improved. A practitioner from an Islamic bank noted in an interview, “with a mathematical approach, we feel more confident when determining the profit-sharing ratio, because it’s based on objective calculations, not just gut feelings or intuition.” This indicates that mathematical models can bridge the gap between economic rationality and normative Islamic values.

The application of mathematical models is also highly relevant in risk management for profit-sharing systems. Since contracts such as Mudarabah and Musharakah carry higher risks compared to Murabaha (cost-plus sale) financing, there is a need for methods that can efficiently measure and manage these risks. One approach involves developing a modified Value at Risk (VaR) model that aligns with sharia principles. Through this model, banks can estimate the maximum potential loss within a specific time frame and confidence level, enabling more cautious financing decisions. Furthermore, integrating risk models into sharia-compliant management accounting systems allows banks to allocate loss reserves and formulate appropriate mitigation strategies. Over the long term, this strengthens the resilience of Islamic financial institutions in the face of economic crises. It also serves as evidence that religious values do not conflict with modern scientific approaches; rather, they can complement each other in building a more equitable and stable financial system.

Lastly, the role of mathematical models in profit-sharing systems extends to educational initiatives and the development of Islamic financial technology (Islamic FinTech). With ongoing technological advancement, mathematical models can now be integrated into digital platforms that allow for real-time automated profit-sharing calculations. This facilitates easier monitoring of business performance, data updates, and profit ratio adjustments in a transparent manner for both banks and clients. Such platforms can also serve to disseminate the principles of Islamic finance to the broader public through a rational and easily understandable approach. In the future, the development of machine learning-based models may enable even more sophisticated predictions for efficient Islamic financing. This opens up vast opportunities for collaboration between mathematicians, sharia scholars, and technology developers to create innovative solutions in Islamic finance. Hence, mathematical models not only serve as analytical tools, but also as integrative bridges between knowledge, values, and technology within the Islamic economic system.

3.4 Digitalization and Technological Innovation in Sharia Financing

Digital transformation has brought significant changes to the global financial landscape, including in the Islamic banking sector. Alongside the growth of financial technology (fintech), various innovation potentials have been implemented to address long-standing challenges in profit-and-loss sharing (PLS) systems. A recurring issue in Mudarabah and Musharakah contracts is the lack of real-time access to information regarding the performance of customers’

²⁴ Johan Tri Noval Hendrian Tombi, “Penerapan Kebijakan Restrukturisasi Kredit Oleh Pt Bank Tabungan Negara (Persero), Tbk Cabang Makassar Terhadap Debitur Yang Terdampak Covid-19= Implementation Of Credit Restructuring Policies By Pt Bank Tabungan Negara (Persero), Tbk Makassar Branch Agai” (Universitas Hasanuddin, 2022).

businesses, which affects the accuracy of profit distribution. Through digitalization, Islamic banks can establish integrated information systems that allow for more transparent and efficient business monitoring. Digital financial applications, interactive dashboards, and cloud-based platforms serve as tools enabling both banks and customers to monitor financial reports and cash flows more quickly and accurately. This not only accelerates decision-making processes but also minimizes the potential for moral hazard, as all parties gain access to the same data. Ultimately, this initiative strengthens the principles of justice and transparency that underlie Sharia financing²⁵.

The development of digital technology has brought significant impact to the transformation of Islamic financial services. Digitalization enables financing, reporting, and supervision processes to be carried out more efficiently and transparently. This opens up great opportunities to expand access to Islamic finance for communities that have not yet been reached by conventional services. From an Islamic perspective, technological innovation should not only pursue efficiency, but also bring broad and equitable social benefits, as emphasized in the words of Allah: "And We have not sent you, [O Muhammad], except as a mercy to the worlds" (Surah Al-Anbiya: 107). This verse contains the principle that every form of development—including in the field of financial technology must bring about *maslahah* (benefit) and be a mercy for all. In other words, Islamic fintech should be directed toward enhancing financial inclusion, reducing social inequality, and providing real solutions to the needs of the *ummah*. This is in line with the saying of the Prophet Muhammad (peace be upon him): "The best of people are those who are most beneficial to others" (Narrated by Ahmad, Thabrani, and Daruquthni). This hadith serves as a moral foundation for developers and practitioners in the Islamic fintech industry to create products and services that are not solely profit-oriented, but also deliver broad social benefits. Through this principle, digitalization in Islamic finance can truly reflect the inclusive, just, and solution-oriented values of Islam.

Machine learning technology offers a promising approach to PLS-based financing systems. With the ability to identify patterns in historical data, machine learning algorithms can be used to predict the potential profitability of a customer's business based on indicators such as sales trends, business location, industrial sector, and financial behavior. These predictions can assist banks in setting appropriate *nisbah* (profit-sharing ratios) and in identifying customers with high-risk profiles. In an interview with a Sharia fintech analyst, it was noted that "machine learning algorithms can provide more precise insights when assessing business feasibility, even under dynamic market conditions." This capability is especially useful in addressing income fluctuations that are difficult to manage manually. Therefore, machine learning not only enhances the efficiency of analytical processes but also strengthens the objectivity and accuracy principles in Sharia-compliant financing.

Beyond machine learning, big data presents vast opportunities for improving PLS systems. Big data enables the collection and analysis of massive datasets from various sources, including financial transactions, customer behavior, e-commerce data, and social media activity. From this wealth of information, Islamic banks can gain deeper insights into market behavior and customers' business patterns, which were previously difficult to access. For instance, systems can detect anomalies in financial reports or identify early signs of declining business

²⁵ Dewi Putri Mandiri, "Analysis of the Implementation of Sharia Governance and Reputation of the Behavior of Investment on Fintech Sharia," *Jurnal Ilmiah Ekonomi Islam* 8, no. 2 (2022): 1610–16, <https://doi.org/http://dx.doi.org/10.29040/jiei.v8i2.4747>.

performance. This enables quicker and more targeted interventions, minimizing potential losses for both parties. Big data analytics also play a crucial role in the personalization of Sharia financing products, allowing financing schemes to be tailored to each customer's specific needs and potential. Such innovations affirm that technological development can align with Sharia principles, as long as ethical and just considerations are preserved.

Meanwhile, blockchain offers a solution to the classical challenges of information asymmetry and data transparency in PLS systems. Blockchain is a distributed ledger technology that records all transactions permanently and in a tamper-proof manner. Its implementation in Islamic banking enables every financing process from contract initiation, capital disbursement, profit realization, to distribution to be monitored transparently by all involved parties. This minimizes the risk of data manipulation or fund misuse, and strengthens the trust between banks and customers. Moreover, blockchain-based smart contracts can be used to automate the execution of Mudarabah or Musharakah agreements when certain parameters are met for example, when profits reach a predefined threshold. This innovation speeds up profit distribution, minimizes conflict, and reinforces compliance with initial agreements. In the context of digitalization, blockchain serves as an ethical safeguard in Sharia financing practices grounded in values.

However, the application of technology in Sharia financing must still adhere to its foundational principles. While technology offers efficiency and precision, its use must not violate Islamic legal prohibitions such as *gharar* (uncertainty), *maysir* (speculation), and *riba* (usury). Thus, the development of Sharia-compliant digital systems must involve collaboration between technology experts, Islamic economists, and scholars to ensure innovations remain within the boundaries of Sharia. This represents both a significant opportunity and a major challenge for the Islamic finance industry in the digital transformation era²⁶. In an interview with a Sharia economic law expert, it was stated that "digital transformation will succeed not only by relying on efficiency but also by upholding the values of justice embodied in Sharia." Hence, technologies such as machine learning, big data, and blockchain must not merely be seen as technical tools but as instruments for reinforcing the spiritual and social values in Sharia financing. Through this approach, Islamic banking can respond to contemporary challenges while remaining faithful to its identity and mission.

Theoretically, digitalization in Islamic banking can be analyzed through the Technology Acceptance Model (TAM) developed by²⁷ which posits that technology adoption is significantly influenced by perceived ease of use and perceived usefulness. In the context of Islamic banking, the application of technologies such as big data and machine learning depends largely on the extent to which industry players understand both their benefits and the ease of integrating them into Sharia business practices. This theory is particularly relevant when examining initial resistance to technology in Islamic financial institutions, which often arises from a perceived mismatch between digital systems and strict Sharia principles. Therefore, technological adaptation must be accompanied by educational efforts and the development of operational standards rooted in Islamic values.

²⁶ Nurhikmah, "Maqashid Al-Shariah : Kerangka Adaptif Hukum Islam Untuk Menjawab Tantangan Kontemporer," *Journal of Dual Legal System* 1, no. 2 (2024): 103–17, <https://doi.org/10.58824/jdls.v1i2.226>.

²⁷ Prokopiv & Stynska (2023)

From an interview with the head of the IT division at a national Islamic bank, it was noted that “the main challenge lies not only in the technology itself but also in the mindset of human resources who still perceive digitalization as a threat to Sharia principles.” This view suggests that change must extend beyond systems and devices to collective mindset and understanding within institutions. It reinforces the notion that technological innovation in Islamic banking must be accompanied by training, fatwas, and strong regulatory support to foster technology adoption that is both comprehensive and Sharia-compliant. In addition, the theory of information asymmetry (Stiglitz & Weiss, 1981) is also highly relevant in explaining how technology can reduce information gaps between banks and customers²⁸. When banks lack sufficient information about customers’ businesses, it can lead to adverse selection or moral hazard. However, with the use of technologies such as blockchain and big data analytics, banks can access real-time, objective data on business performance and customers’ transaction histories. According to a Sharia fintech consultant interviewed, “the use of biometric data, GPS tracking, and digital transaction footprints has proven effective in helping banks understand their customers more deeply without the need for time-consuming manual investigations.”

On the other hand, the literature addressing the integration of Sharia and technology, as discussed by Zulkhibri, emphasizes that Islamic financial innovation must be value-based. This means that technological development should not solely aim for efficiency, but also enhance the objectives of Sharia (maqashid al-shariah)²⁹. Thus, the use of machine learning to predict business profitability must uphold justice, avoid discrimination, and preserve the principle of mutual consultation (shura). This was echoed in an interview with an Islamic economics lecturer from a public university, who stated, “algorithms must be developed under Sharia ethical supervision so that they are not merely driven by big data but also consider the contextual uniqueness of the Muslim community.”. In conclusion, the combination of theoretical frameworks and field findings suggests that digitalization holds immense potential in supporting Sharia-compliant PLS systems—provided it is conducted within a well-defined value framework. This study underscores the importance of building synergy between technology, Sharia principles, and human resource readiness so that Sharia-based financing systems are not only ethical alternatives but also efficient, adaptive, and competitive on a global scale

4. CONCLUSION

This study demonstrates that the application of mathematical models in the profit-sharing system of Islamic banking plays a crucial role in ensuring justice, transparency, and accountability. Through mathematical approaches such as predictive algorithms, risk simulations, and proportional profit-sharing formulas Islamic financial institutions can develop more accurate and Sharia-compliant financing schemes. These models help minimize information asymmetry between banks and customers and reduce the potential for manipulation or ambiguity in profit-sharing calculations. Moreover, the integration of digital technologies in Islamic banking has become a

²⁸ Helmi Al Hafid Fauzi et al., “Work Stress Levels At Madrasah Tsanawiyah Arrukhshatul’ulum: The Challenges of Digitalization in Developing Islamic Educational Institutions,” *Mudir: Jurnal Manajemen Pendidikan* 7, no. 1 (2025): 19–27, <https://doi.org/https://doi.org/10.55352/mudir.v7i1.1469>.

²⁹ Dhea Usmany Elfina, “Analisis Sektor Basis Dan Non Basis Terhadap Pertumbuhan Ekonomi Di Kota Bandar Lampung Tahun 2012-2019” (UIN RADEN INTAN LAMPUNG, 2022).

catalyst for the transformation of the Islamic financial system. The adoption of technologies such as blockchain, big data, and mobile banking applications facilitates real time recording, monitoring, and reporting of profit-sharing transactions. These innovations not only enhance operational efficiency but also reinforce public trust in Islamic banking as a trustworthy and professional financial system. Digital technology also promotes financial inclusion, particularly for communities that previously had limited access to banking services. Nevertheless, the digitalization of profit-sharing systems also introduces new challenges, particularly regarding compliance with Sharia principles, data security, and consumer protection. Therefore, synergy between scholars, academics, and technology practitioners is essential to ensure that every innovation remains aligned with the objectives of maqāṣid al-sharī'ah. Regulatory adjustments and human resource capacity building are also critical so that Islamic financial institutions can adapt to technological developments without compromising Islamic values. Overall, the combination of mathematical modeling and digital technology presents significant opportunities to strengthen profit-sharing-based Islamic financing systems. These innovations are not only relevant in terms of economic efficiency but also serve to enhance the spiritual and ethical dimensions of Islamic finance. In the future, the development of such systems is expected to offer an alternative solution that is not only globally competitive but also contributes to sustainable and equitable economic development for the Muslim community.

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