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The Nexus of Technological Innovation and Institutional Quality in Shaping the Future of Islamic Finance

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Abstract

The development of Islamic finance has become increasingly important in supporting financial inclusion and economic growth in Indonesia. However, the sustainability of its growth is closely related to technological innovation and institutional quality. This study aims to examine the short-run and long-run effects of technological innovation and institutional quality on the development of Islamic finance in Indonesia. Using a quantitative approach, this study employs annual time-series data from the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC), the World Bank, and the Worldwide Governance Indicators (WGI) for the period 2011–2024. The Autoregressive Distributed Lag (ARDL) model is applied to analyze both short-term and long-term relationships among the variables. The results indicate that technological innovation has a positive and significant effect on Islamic finance development in both the short and long run, suggesting its role in improving efficiency, expanding financial access, and strengthening the digital Islamic finance ecosystem. In contrast, institutional quality significantly influences Islamic finance development only in the short run, while its long-run effect is insignificant. These findings imply that technological advancement is a key driver of sustainable Islamic finance growth, whereas institutional improvements require continuous structural reforms to generate lasting impacts. This study contributes to the literature by providing empirical evidence on the dynamic roles of technology and institutions in Indonesia's Islamic finance sector.

Keywords: *Islamic Finance, Technological Innovation, Institutional Quality.*

INTRODUCTION

The growing expansion of Islamic financial assets reflects increasing public confidence in Islamic finance and the market's significant potential, making this sector

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one of the key pillars of the nation's expanding financial system.[1] This is driven by government policies and efforts to improve Islamic financial literacy and inclusion through various educational and outreach programs. With a better understanding of the benefits and characteristics of Islamic finance, it is hoped that more people will use Islamic financial products and services. According to data from Ayub et al. (2023)[2] and Alshater et al. (2021),[3] which show that the OJK recorded Indonesia's total Islamic financial assets as of December 2024 at Rp2,883.67 trillion—a figure higher than in previous years. Although Islamic finance in Indonesia has experienced significant growth,[4] there remain several major challenges to its development, including low market penetration compared to conventional banking,[5] with a market share of less than 10%. However, this situation also indicates significant growth potential. Additionally, innovations in Islamic financial products and services are often perceived as less competitive[6] or less appealing to a broader market, particularly younger generations accustomed to fast digital services. Limited infrastructure and uneven access to Islamic financial services in Indonesia also significantly impact the difficulty faced by people in remote areas[7] or those with low technology penetration in accessing Islamic financial products. Another factor hindering the development of Islamic finance is the lack of human resources with expertise in Islamic finance[8] which impedes the industry's sustainable and high-quality growth.

One of the most critical factors influencing the development of Islamic finance is technological innovation. The rapid advancement of digital technology has transformed the global financial landscape by enabling financial institutions to provide faster, more efficient, and more accessible services. In the context of Islamic finance, technological innovation plays a crucial role in overcoming traditional barriers such as limited branch

[1] Bashir Tijjani et al., "A Bibliometric Analysis of Quality Research Papers in Islamic Finance: Evidence from Web of Science," *ISRA International Journal of Islamic Finance* 13, no. 1 (2020): 84–101, https://doi.org/10.1108/IJIF-03-2020-0056.

[2] Muhammad Ayub et al., "Revisiting the Paradigm of Sharīʿah Governance of Islamic Financial Institutions," *Journal of Islamic Accounting and Business Research*, no. July (2023), https://doi.org/10.1108/JIABR-04-2022-0110.

[3] Muneer M. Alshater et al., "Influential and Intellectual Structure of Islamic Finance: A Bibliometric Review," *International Journal of Islamic and Middle Eastern Finance and Management* 14, no. 2 (2021): 339–65, https://doi.org/10.1108/IMEFM-08-2020-0419.

[4] Burhanudin Harahap et al., "Islamic Law, Islamic Finance, and Sustainable Development Goals: A Systematic Literature Review," *Sustainability* 15, no. 8 (2023): 6626, https://doi.org/10.3390/su15086626.

[5] Junaidi Junaidi et al., "Determinants to Adopt Conventional and Islamic Banking: Evidence from Indonesia," *Journal of Islamic Marketing* 14, no. 3 (2023): 892–909, https://doi.org/10.1108/JIMA-03-2021-0067.

[6] Yusuf Dinc, "Product Development in Islamic Finance and Banking in Secular Economies," *Journal of Islamic Accounting and Business Research* 11, no. 9 (2020): 1665–76, https://doi.org/10.1108/JIABR-06-2019-0106; Nurul Shahnaz Mahdzan et al., "The Adoption of Islamic Banking Services in Malaysia," *Journal of Islamic Marketing* 8, no. 3 (2017): 496–512, https://doi.org/10.1108/JIMA-08-2015-0064.

[7] Muhammad Syauqi Bin-Armia et al., "Economical Rights versus God's Rights: Criticising of the Implementation Shariah Economic in Indonesia," *International Journal of Islamic and Middle Eastern Finance and Management* 17, no. 6 (2024): 1267–90, https://doi.org/10.1108/IMEFM-01-2024-0054.

[8] Mohammad Mahbubi Ali et al., "Islamic Financial Inclusion Determinants in Indonesia: An ANP Approach," *International Journal of Islamic and Middle Eastern Finance and Management* 13, no. 4 (2020): 727–47, https://doi.org/10.1108/IMEFM-01-2019-0007.

networks, high operational costs, and restricted access to financial services in rural and underserved areas. The emergence of Islamic financial technology, mobile banking, digital payment systems, blockchain technology, and artificial intelligence has created new opportunities for Islamic financial institutions to expand their customer base, improve operational efficiency, and enhance customer experience. Moreover, technological innovation supports financial inclusion by facilitating access to Sharia-compliant financial services for previously unbanked populations. Therefore, understanding the role of technological innovation is essential for developing effective strategies to strengthen the competitiveness and sustainability of Islamic finance in Indonesia.[9]

In addition to technological innovation, institutional quality is widely recognized as a fundamental determinant of financial sector development. Institutional quality encompasses several dimensions, including government effectiveness, regulatory quality, rule of law, political stability, and control of corruption. Strong institutions create a conducive environment for economic and financial activities by reducing uncertainty, protecting property rights, ensuring contract enforcement, and enhancing public trust. In the context of Islamic finance, institutional quality is particularly important because Sharia-compliant financial transactions rely heavily on transparency, accountability, and stakeholder confidence. Effective institutions can facilitate the implementation of Islamic financial regulations, encourage investment, support innovation, and improve the overall performance of Islamic financial institutions. Conversely, weak institutional frameworks may hinder financial development by increasing transaction costs, limiting investor confidence, and reducing the effectiveness of technological innovations.

Previous research indicates that institutional quality and technological innovation are two key factors driving the development of Islamic finance in Indonesia.[10] Institutional quality, reflected through effective regulation, good governance, strong law enforcement, and low levels of corruption, can create an environment conducive to the growth of the Islamic finance industry.[11] These conditions enhance legal certainty, reduce transaction risks, and strengthen investor and public confidence in Islamic financial products.[12] On the other hand, technological innovation through the development of

[9] Lukman Raimi et al., "Does Islamic Sustainable Finance Support Sustainable Development Goals to Avert Financial Risk in the Management of Islamic Finance Products? A Critical Literature Review," *Journal of Risk and Financial Management* 17, no. 6 (2024): 236, https://doi.org/10.3390/jrfm17060236.

[10] Imron Mawardi et al., "The Influence of Institutional Quality, Economic Freedom, and Technological Development on Islamic Financial Development in OIC Countries," *Journal of Open Innovation: Technology, Market, and Complexity* 10, no. 2 (2024): 100279, https://doi.org/10.1016/j.joitmc.2024.100279.

[11] Abdulsalam Ahmed Sawmar and Mustafa Omar Mohammed, "Enhancing Zakat Compliance through Good Governance: A Conceptual Framework," *ISRA International Journal of Islamic Finance* 13, no. 1 (2021): 136–54, https://doi.org/10.1108/IJIF-10-2018-0116; Khemaies Bougatef, "The Impact of Corruption on the Soundness of Islamic Banks," *Borsa Istanbul Review* 15, no. 4 (2015): 283–95, https://doi.org/10.1016/j.bir.2015.08.001.

[12] Zakariya Mustapha et al., "Legal and Sharīʿah Non-Compliance Risks in Nigerian Islamic Finance Industry: A Review of the Literature," *International Journal of Law and Management* 63, no. 2 (2021): 275–99, https://doi.org/10.1108/IJLMA-03-2020-0075.

digital platforms, Islamic mobile banking, and Islamic fintech has expanded access to services, improved operational efficiency, and introduced a variety of more innovative financial products and services[13] Several studies have also found that improvements in institutional quality and technological innovation, when considered individually, positively contribute to the growth and development of the Islamic finance sector.[14] However, although various studies have confirmed the importance of these two factors, the discussion in the literature is still dominated by approaches that examine the influence of institutional quality and technological innovation separately on the development of Islamic finance.[15]

These limitations highlight a research gap that warrants further investigation. Amid efforts to strengthen the competitiveness of Indonesia's Islamic finance industry—which continues to face challenges in expanding market share, broadening access to services, improving operational efficiency, and embracing digital transformation—few studies have analyzed how institutional quality and technological innovation work in tandem to drive the development of Islamic finance.[16] In fact, the effectiveness of technological innovation is likely influenced by the quality of the institutions that support it, while the benefits of strong institutions can be further optimized when supported by technological advancements. Therefore, the main research problem is the lack of clarity regarding how institutional quality and technological innovation jointly influence the development of Islamic finance in Indonesia. Therefore, this study is important to fill this gap in the literature by examining the relationship between these two factors in an integrated manner, thereby providing a more comprehensive understanding of the factors determining the development of Islamic finance in Indonesia.

The novelty of this study lies in its offering a new perspective on how the synergy between technology and strong institutions in Indonesian Islamic finance goes beyond mere Sharia compliance. Previous research has often focused solely on the growth of assets or technology in isolation[17] however, this study will further examine how technological innovation and institutional quality in Islamic finance can have a significant impact on achieving broader goals, such as increasing financial inclusion, empowering

[13] J. Beno et al., "No 主観的健康感を中心とした在宅高齢者における 健康関連指標に関する共分散構造分析 Title," *Braz Dent J.* 33, no. 1 (2022): 1–12.
[14] Firman Menne et al., "Sharia Accounting Model in the Perspective of Financial Innovation," *Journal of Open Innovation: Technology, Market, and Complexity* 10, no. 1 (2024): 100176, https://doi.org/10.1016/j.joitmc.2023.100176; Hasan Mukhibad et al., "Open Innovation in Shariah Compliance in Islamic Banks – Does Shariah Supervisory Board Attributes Matter?," *Journal of Open Innovation: Technology, Market, and Complexity* 9, no. 1 (2023): 100014, https://doi.org/10.1016/j.joitmc.2023.100014.
[15] Abhijit Sharma et al., "Determinants of Innovation Outcomes: The Role of Institutional Quality," *Technovation* 118, no. February (2022): 102562, https://doi.org/10.1016/j.technovation.2022.102562.
[16] Strongly Constrained et al., "BIROn - Birkbeck Institutional Research Online BIROn - Birkbeck Institutional Research Online," *Tip* 23 (2019): 71–84.
[17] Vaclav Novotny et al., "Review of Carnot Battery Technology Commercial Development," *Energies* 15, no. 2 (2022): 647, https://doi.org/10.3390/en15020647; Masfi Sya'fiatul Ummah, "No 主観的健康感を中心とした在宅高齢者における 健康関連指標に関する共分散構造分析 Title," *Sustainability (Switzerland)* 11, no. 1 (2019): 1–14.

MSMEs, and supporting the Sustainable Development Goals (SDGs) in Indonesia. Thus, this study seeks to link technological advancements with the crucial role of institutions in shaping the future of Islamic finance—one that not only grows numerically but also delivers positive and sustainable social and economic impacts.

This study has several implications. First, it demonstrates that there is an awareness of the crucial role of technological innovation in the development of the Islamic finance sector in Indonesia.[18] This reflects the view that the adoption of technologies such as Islamic fintech, the digitization of services, and the utilization of online platforms are believed to be key to achieving more efficient operations,[19] expanding the customer base, and providing more competitive product offerings and services within the Islamic finance sector. Therefore, the integration of technology is considered a fundamental necessity and a strong pillar for optimizing operational efficiency and productivity, significantly expanding customer reach, and offering innovative and competitive products and services in a dynamic financial market.[20]

Second, this study also highlights the significant influence of institutional quality. Previous research by Apriyana et al. (2024)[21] suggests that the progress of Islamic Financial Institutions (IFIs) is determined not only by technology adoption but also by their underlying institutional strength. This institutional quality encompasses various key elements such as good corporate governance, competent risk management, adherence to Sharia principles, the availability of skilled human resources, as well as transparency and clear accountability.

METHOD

This research investigates the relationship between technological innovation, institutional quality, and Islamic finance development in Indonesia using annual secondary data spanning the period from 2011 to 2024. Indonesia provides an appropriate setting for this analysis due to its prominent position in the global Islamic finance industry

[18] Heri Sudarsono et al., "The Intention of Muslim Customers to Adopt Mobile Banking: The Case of Islamic Banks in Indonesia," *Cogent Business & Management* 9, no. 1 (2022), https://doi.org/10.1080/23311975.2022.2154102; Adi Saifurrahman and Salina Hj Kassim, "Regulatory Issues Inhibiting the Financial Inclusion: A Case Study among Islamic Banks and MSMEs in Indonesia," *Qualitative Research in Financial Markets* 16, no. 4 (2024): 589–617, https://doi.org/10.1108/QRFM-05-2022-0086.

[19] Mahdi Ghaemi Asl and David Roubaud, "Asymmetric Interactions among Cutting-Edge Technologies and Pioneering Conventional and Islamic Cryptocurrencies: Fresh Evidence from Intra-Day-Based Good and Bad Volatilities," *Financial Innovation* 10, no. 1 (2024): 89, https://doi.org/10.1186/s40854-024-00623-5.

[20] Narinthon Imjai et al., "The Interplay of Digital and Management Accounting Competency to Competitive Performance in the Open Innovation Era: A Case of Thai Micropreneurs," *Journal of Open Innovation: Technology, Market, and Complexity* 9, no. 4 (2023): 100167, https://doi.org/10.1016/j.joitmc.2023.100167; Kai Hua Wang et al., "Is Technological Innovation Making World 'Greener'? An Evidence from Changing Growth Story of China," *Technological Forecasting and Social Change* 165, no. December 2020 (2021): 120516, https://doi.org/10.1016/j.techfore.2020.120516.

[21] Maya Apriyana et al., *MODEL FOR INCREASING THE DIGITALIZATION OF ISLAMIC MICRO FINANCE*, 10, no. 2 (2024): 185–94; Leny Nofianti et al., "Cash Waqf Innovation in Islamic Financial Institutions and Its Governance Issues, Case Studies: Indonesia, Malaysia, Türkiye," *Journal of Islamic Accounting and Business Research*, no. August (2024), https://doi.org/10.1108/JIABR-12-2023-0420.

and its large Muslim population, which creates substantial opportunities for the expansion of Sharia-compliant financial services. The analysis is based on numerical data collected from internationally recognized databases, allowing the examination of both short-term and long-term dynamics among the variables.

The study incorporates three variables. The dependent variable is Islamic finance development, represented by Islamic banking and finance indicators. Data for this variable are obtained from the Statistical, Economic and Social Research and Training Centre for Islamic Countries (SESRIC). Technological innovation is included as the first explanatory variable and is proxied by high-technology manufacturing, with data sourced from the World Bank. This indicator reflects a country's technological advancement and innovation capacity, which may contribute to the modernization and expansion of financial services. The second explanatory variable is institutional quality, measured using six governance indicators provided by the Worldwide Governance Indicators (WGI): Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. These indicators collectively capture the effectiveness of institutions in creating an environment that supports financial sector development.

Table 1: Operational Definitions and Measurement of Variables

Variable	Definition	Indicator	Unit of measurement	Data source
Development of Islamic Finance (LnIF)	Islamic Banking and Finance	Islamic banking and finance	USD million[22]	SESRIC
Innovation Technology (IT)	Development technology which advanced	High-tech manufacturing	% of manufactured export[23]	World Bank
Institutional Quality (IQ)	Institutional quality is the success of an institution in carrying out its performance.	Accountability, political stability and absence of terrorism violence, government effectiveness, quality of regulation, rule of law and corruption control	Institutional quality index	WGI

This study uses the ARDL method to determine the impact of technological innovation and institutional quality on the development of Islamic finance, especially in Indonesia. ARDL is a dynamic model that can analyze both the short and long term. Unlike the Ordinary Least Squares (OLS) method, which is limited to long-term analysis, ARDL works by regressing variables on their own historical values and the current and

[22] Harahap et al., "Islamic Law, Islamic Finance, and Sustainable Development Goals: A Systematic Literature Review."
[23] Mawardi et al., "The Influence of Institutional Quality, Economic Freedom, and Technological Development on Islamic Financial Development in OIC Countries."

historical values of several exogenous variables. A significant advantage of ARDL is its ability to be applied directly without the need to perform stationary testing (unit root tests such as ADF or PP) first. This means that ARDL can identify long-term relationships regardless of whether the variables being analyzed are stationary, whether I(0) or I(1). However, in the early stages of this study, unit root analysis was still carried out with the aim of determining the level of integration of each variable involved. The selection of the ARDL model as the main method in this study is based on its advantages in analyzing long-term relationships without the need for all variables to be stationary at the same level. In addition, ARDL is considered appropriate for application to models with limited data sample sizes.

In addition, ARDL is also effective in overcoming the problems of autocorrelation and incomplete data. The ARDL model formulation applied in this study is as follows:

$$\text{LnIF} = \beta o + \sum_{i=1}^{P} \beta_1 \, \text{LnIF}_{\text{t-i}} + \sum_{i=0}^{P} \beta_2 \, \text{IT} + \sum_{i=0}^{P} \beta_3 \text{IQ} + \in \quad (1)$$

Where:
LnIF : Natural logarithm of the Development of Islamic financial
IT : Innovation Technology in Islamic Finance
IQ : Institutional Quality in Islamic Finance

The CUSUM (Cumulative Sum of Recursive Residuals) test is also used in this study to ensure whether the estimation model is stable or not. To ensure that the cointegration results found are valid and stable, the CUSUM line on the graph must remain within the 5% critical line limit. If the CUSUM line goes outside this critical limit, then the estimation model is considered unstable and the cointegration results obtained can be doubted.

RESULTS AND DISCUSSION

Statistic Descriptive

The primary purpose of descriptive statistics is to summarize and present data concisely and clearly, making it easy to understand as a foundation for further analysis. Descriptive statistics do not aim to draw conclusions about a larger population based on a sample of data; rather, they focus on describing the characteristics and trends of the data observed over a specific period of time. Through descriptive analysis, we can examine the characteristics of the data in greater depth and identify trends or patterns that emerge during the specific time period we are observing.

Table 2. Descrptive statistic

Variables	Obs	Mean	Std. dev.	Min	Max
LnIF	12	10.0125	0.100102	9.85	10.18
IT	12	34	0.185864	33.7	34.3
IQ	12	-0.14792	0.006317	-0.159	-0.137

Unit Root Test Result

This study uses the Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) methods to test for unit roots as a preliminary test to evaluate the stationarity of the data. The results of the stationarity tests, as presented in Table 3, indicate that the variables in the model exhibit varying degrees of stationarity at that level. Given this condition, this study selected the ARDL (Autoregressive Distributed Lag) method to detect the presence of cointegration. The reason for selecting ARDL is its ability to identify long-term relationships (cointegration) even though the variables being tested have different levels of stationarity. In other words, ARDL is flexible in handling variables with different levels of stationarity.

Table 3. Unit root test results

Variables	ADF Test			
	Level		First Diff.	
	t-stat	Prob.	t-stat	Prob.
LnIF	-4.334	0.0028	-5.002	0.0075
IT	-4.415	0.0021	-4.849	0.0000
IQ	-5.481	0.0000	-4.826	0.0000

Show significance at 0.01, 0.05 and 0.1, respectively

Based on the table 3, the probability for each variable is less than 0.05. So it can be concluded that the data passes the stationarity test at the level and at the first different levels.

Lag Length Criteria

After determining the level of integration of all variables to be analyzed in the model using the unit root test, the next step is to determine the optimal number of lags for the ARDL boundary test estimation. In this study, the appropriate number of lags was selected based on the AIC criterion. Figure 1 shows the best ARDL model. The graph indicates that the ideal number of lags for the estimation is ARDL(2,1,1,0,0).

Based on the CUSUM squared graph in figure 1, it can be seen that the CUSUM line (red) is still within the tolerance limits (confidence bounds). This indicates that the ARDL regression model used in this study is structurally stable at a significance level of 5%. Thus, there is no evidence of parameter instability within the analyzed time period, so that the results long-term estimates can be considered reliable and representative to explain the relationship between technological innovation and institutional quality on the development of Islamic finance in Indonesia.

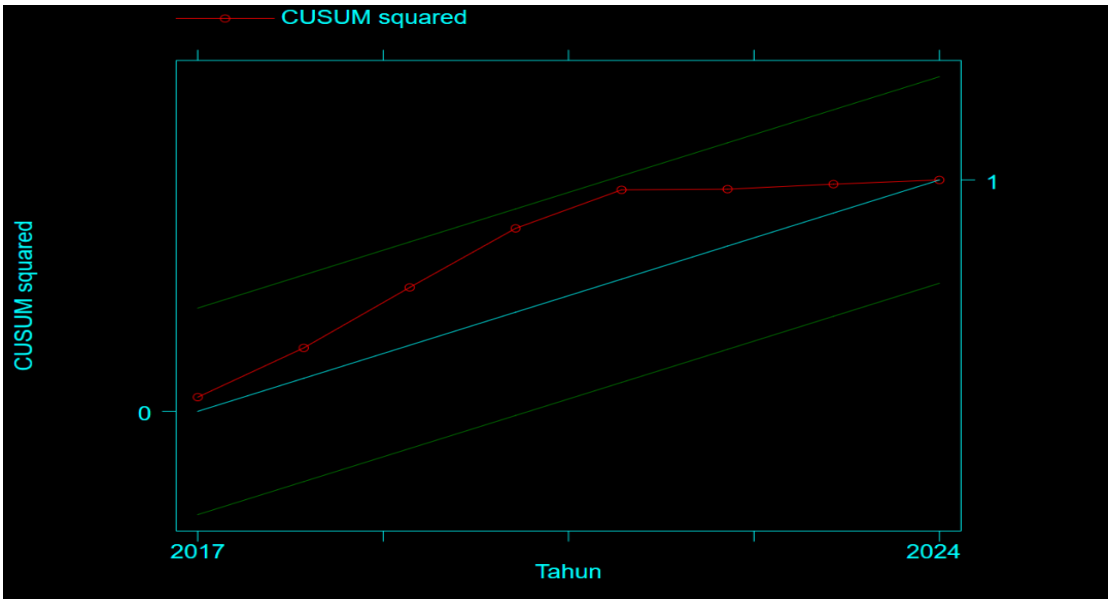

Figure 1. CUSUM Flot Result

ARDL Limit Test for Cointegration

ARDL limit test for cointegration, which was first introduced by Pesaran et al. (2001)[24] for ensure that variables in the model has order different integrations. The ARDL limit test is also used For detect whether there is connection term stable length or cointegration between variables involved in the model. In other words, this test aiming For see whether possible variables move No one way in term short, tend to move together in term long going to a balance.

Table 4. ARDL Limit Test Result for Cointegrations

K	T-Stat	Critical Value Bounds							
		10%		5%		2.50%		1%	
5	F-Stat	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	23.441	3.17	4.14	3.79	4.85	4.41	5.52	5.15	6.36

ARDL Estimation Result

After confirmed existence cointegration, which indicates existence relatedness term long between variable, stage next in analysis is analyze ARDL model estimation myself. This is done For know How variables the each other influence in term short and long term long. Research it also analyzes development Islamic finance with choose innovation technology and quality institution as an independent variable main. The AIC criterion (2, 1, 1, 0, 0) was used For knowing the long-term ARDL model length. Based on results ARDL estimates shown in Table 5, can observed that innovation technology positive and significant influence development Islamic finance in Indonesia, but in terms of quality institution No impact positive to development Islamic finance in Indonesia.

[24] M. H. Pesaran et al., "Bound Testing Approaches to the Analysis of Long Run Relationships," *Journal of Applied Econometrics* 16, no. 3 (2001): 289-326.

Positive signs reflect that in term long, innovation technology can give significant impact to development Islamic finance in Indonesia. While that, on quality institutions that do not influential significant in term long give findings new that with to increase quality institution no statistically proven can push development Islamic finance. Based on table above , obtained mark probability of each variable more small from 0.05. So that can concluded that the data passes stationary at the level and first different levels.

Table 5. Short-Run Estimation Result

Devendent Variables LnIF				
Short term				
Variables	**Coefficient**	**Std. Error**	**t-statistics**	**Prob**
IT	1.189461	0.0129554	91.81	0.0000
IQ	-5.572756	0.6513	-8.56	0.0000
Const.	5.247889	0.3258	16.11	0.0000

Table 6. Long-Run Estimation Result

Devendent Variables LnIF				
Long term				
Variables	Coefficient	Std. Error	t-statistics	Prob
IT	1.179212	0.0512246	23.02	0.0000
IQ	-6.12011	2.604594	-2.35	0.1000
Const.	5.497539	1.443411	3.81	0.032

Technological Innovation Influences the Development of Islamic Finance

The empirical findings reveal that technological innovation exerts a significant positive effect on the development of Islamic finance in Indonesia in both the short run and the long run. This result suggests that advancements in digital technology have become an important catalyst for accelerating the growth of Islamic financial institutions and expanding the accessibility of Sharia-compliant financial services. In the short run, technological innovation contributes to improvements in transaction efficiency, service accessibility, and customer engagement through the adoption of digital banking, Islamic fintech platforms, mobile financial services, and other technology-based financial innovations. These developments reduce information asymmetry and transaction costs, enabling Islamic financial institutions to serve a broader customer base and respond more effectively to changing market demands.

From a theoretical perspective, this finding is consistent with the Innovation Diffusion Theory proposed by Rogers, which argues that technological innovations enhance organizational performance and are gradually adopted when they provide clear advantages over existing practices. The result is also supported by the Technology Acceptance Model (TAM), which emphasizes that perceived usefulness and ease of use encourage the adoption of technology by both institutions and customers. In the context of Islamic finance, digital innovation facilitates faster, more transparent, and more convenient financial transactions, thereby increasing customer participation and

strengthening financial inclusion. Consequently, technology serves not merely as a supporting instrument but as a strategic driver of transformation within the Islamic financial ecosystem.

The findings are consistent with previous studies. Rabbani et al. (2021) [25] demonstrated that technological innovation significantly promotes Islamic financial development by improving efficiency and expanding financial outreach. Similarly, Islam et al. (2025) [26] and Tan and Shafi (2021) [27] found that digital transformation enhances operational performance and broadens access to Islamic financial services. Furthermore, Andrade and Tumelero (2022) [28] argued that technological innovation reduces operational costs and improves service quality, allowing financial institutions to achieve greater competitiveness in increasingly dynamic markets. The present study extends this evidence by demonstrating that the positive contribution of technological innovation remains significant not only in the short term but also in the long term within the Indonesian Islamic finance sector.

The long-run impact of technological innovation indicates that continuous investment in digital infrastructure and innovation capabilities strengthens the structural foundations of Islamic finance. This finding is in line with the endogenous growth theory, which views technological progress as a key determinant of sustainable economic and financial development. In the Islamic finance industry, technologies such as blockchain, artificial intelligence, big data analytics, and cloud computing have the potential to enhance transparency, improve risk management, and strengthen regulatory compliance. Previous studies by Ullah et al. (2022),[29] Mbaidin et al. (2023),[30] and Aman-Ullah et al. (2022)[31] highlighted the ability of blockchain technology to support more transparent and efficient Sharia-compliant financial transactions. Such technological advancements

[25] Mustafa Raza Rabbani et al., "The Response of Islamic Financial Service to the COVID-19 Pandemic: The Open Social Innovation of the Financial System," *Journal of Open Innovation: Technology, Market, and Complexity* 7, no. 1 (2021): 85, https://doi.org/10.3390/joitmc7010085.

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[28] Ivan Martins De Andrade and Cleonir Tumelero, "Increasing Customer Service Efficiency through Artificial Intelligence Chatbot," *Revista de Gestao* 29, no. 3 (2022): 238–51, https://doi.org/10.1108/REGE-07-2021-0120.

[29] Nazir Ullah et al., "Hybridizing Cost Saving with Trust for Blockchain Technology Adoption by Financial Institutions," *Telematics and Informatics Reports*, 2022, 100008, https://doi.org/10.1016/j.teler.2022.100008.

[30] Hisham O. Mbaidin et al., "International Journal of Information Blockchain Adoption for Sustainable Development in Developing Countries : Challenges and Opportunities in the Banking Sector," *International Journal of Information Management Data Insights* 3, no. 2 (2023): 100199, https://doi.org/10.1016/j.jjimei.2023.100199.

[31] Attia Aman-Ullah et al., "Human Capital and Organizational Performance: A Moderation Study through Innovative Leadership," *Journal of Innovation and Knowledge* 7, no. 4 (2022): 100261, https://doi.org/10.1016/j.jik.2022.100261.

increase public trust and attract both domestic and international investors, thereby contributing to the long-term sustainability of the Islamic financial sector.

The policy implications of these findings are particularly relevant for Indonesia. Given the significant contribution of technological innovation to Islamic finance development, policymakers should prioritize the creation of a supportive digital ecosystem through investments in digital infrastructure, fintech regulation, cybersecurity frameworks, and digital literacy programs. Regulatory authorities should also encourage collaboration between Islamic financial institutions and fintech companies to accelerate innovation and improve financial inclusion. Moreover, technological innovation creates opportunities to develop new Islamic financial instruments, including digital sukuk, tokenised assets, and blockchain-based investment products. These innovations can facilitate the mobilization of long-term funds for strategic sectors such as infrastructure development, renewable energy projects, and other sustainable investments that align with Sharia principles and the Sustainable Development Goals (SDGs).

Overall, the findings underscore that technological innovation has evolved beyond its traditional role as an operational support tool and has become a fundamental pillar of Islamic financial development. By enhancing efficiency, accessibility, transparency, and competitiveness, technological innovation contributes significantly to strengthening the resilience and sustainability of Indonesia's Islamic financial system. Therefore, fostering continuous technological advancement should be a strategic priority to achieve a more inclusive, innovative, and globally competitive Islamic finance industry.

Institutional Quality Influences the Development of Islamic Finance

The ARDL estimation results indicate that institutional quality exerts a significant positive influence on the development of Islamic finance in Indonesia in the short run, while its long-run effect appears to be statistically insignificant. This finding suggests that improvements in institutional quality contribute to the immediate expansion of Islamic financial activities by enhancing public confidence, strengthening regulatory effectiveness, and reducing uncertainty within the financial system. In the short term, better governance conditions create a more conducive environment for Islamic financial institutions to operate efficiently and attract greater participation from investors and consumers. Consequently, institutional improvements can stimulate the growth of Islamic financial assets and increase the utilization of Sharia-compliant financial products.

This result is consistent with Institutional Theory, which emphasizes that the effectiveness of economic and financial systems is strongly influenced by the quality of formal institutions, including regulatory frameworks, legal systems, and governance structures. According to North's institutional framework, institutions reduce uncertainty by establishing clear rules and enforcement mechanisms that facilitate economic transactions. Within the context of Islamic finance, institutional quality is particularly important because Sharia-compliant financial transactions rely heavily on trust, transparency, accountability, and legal certainty. Therefore, improvements in governance indicators such as regulatory quality, government effectiveness, rule of law, and control of corruption can enhance the credibility of Islamic financial institutions and encourage

wider public adoption.

The positive short-run relationship identified in this study is supported by previous empirical findings. Abaidoo and Agyapong (2026)[32] argued that stronger institutional environments promote financial sector development by increasing market confidence and reducing governance-related risks. Similarly, Srairi et al. (2022) [33] highlighted the importance of effective regulatory oversight and institutional credibility in supporting the stability and growth of Islamic financial institutions. In Indonesia, the presence of institutions such as the Financial Services Authority (OJK), the National Sharia Council (DSN-MUI), and Sharia Supervisory Boards (DPS) has strengthened regulatory compliance and improved public trust in Islamic financial services. These institutional mechanisms contribute to reducing information asymmetry and enhancing the legitimacy of Islamic financial products, thereby facilitating market expansion.

The findings can also be explained through the lens of Transaction Cost Theory. High-quality institutions reduce transaction costs by improving regulatory clarity, facilitating contract enforcement, and providing effective dispute-resolution mechanisms. Such conditions lower operational risks and increase efficiency within the Islamic financial ecosystem. As a result, Islamic financial institutions are better positioned to allocate resources efficiently, introduce innovative products, and expand their customer base. This interpretation is consistent with the findings of Utomo et al. (2021),[34] who argued that institutional effectiveness contributes to greater efficiency and operational stability within Islamic financial markets.

However, the absence of a significant long-run effect suggests that institutional quality alone may not be sufficient to sustain the long-term development of Islamic finance in Indonesia. One possible explanation is that institutional improvements have not been fully accompanied by structural reforms specifically designed to support the unique characteristics of Islamic finance. While general governance quality may improve the overall business environment, its benefits for Islamic finance can be limited if regulatory frameworks, financial infrastructure, and market development strategies remain largely oriented toward conventional financial systems. Consequently, the long-term growth trajectory of Islamic finance may depend on additional factors such as technological innovation, financial literacy, product diversification, and the development of a more integrated Sharia-compliant financial ecosystem.

[32] Rexford Abaidoo and Elvis Kwame Agyapong, "Financial Development and Institutional Quality among Emerging Economies," *Journal of Economics and Development* 24, no. 3 (2026): 198–216, https://doi.org/10.1108/JED-08-2021-0135.
[33] Samir Srairi et al., "Does Bank Governance Affect Risk and Efficiency? Evidence from Islamic Banks in GCC Countries," *International Journal of Islamic and Middle Eastern Finance and Management* 15, no. 3 (2022): 644–63, https://doi.org/10.1108/IMEFM-05-2020-0206.
[34] Setiawan Budi Utomo et al., "Promoting Islamic Financial Ecosystem to Improve Halal Industry Performance in Indonesia: A Demand and Supply Analysis," *Journal of Islamic Marketing* 12, no. 5 (2021): 992–1011, https://doi.org/10.1108/JIMA-12-2019-0259.

This finding is in line with the argument of Sevriana et al. (2024),[35] who noted that institutional arrangements in many emerging economies often remain insufficiently aligned with the specific needs of Islamic finance. Similarly, Saifurrahman and Kassim (2024)[36] emphasized that sustainable growth in Islamic finance requires not only strong governance but also institutional frameworks that actively facilitate Sharia-compliant innovation and market expansion. In the Indonesian context, the coexistence of Islamic and conventional financial systems may further explain the limited long-run impact of institutional quality. As highlighted by Kismawadi (2025),[37] regulatory and market structures within dual financial systems frequently provide stronger support for conventional financial institutions due to their larger market share, more established infrastructure, and broader range of financial products. Consequently, improvements in general institutional quality may generate greater benefits for the conventional sector than for the Islamic financial industry.

From a policy perspective, these findings imply that strengthening institutional quality remains necessary but should be complemented by reforms that specifically address the developmental needs of Islamic finance. Policymakers should focus on enhancing the integration of Sharia governance frameworks, improving regulatory support for Islamic financial innovation, and creating a more level playing field between Islamic and conventional financial institutions. Greater harmonization between financial regulations and Sharia principles may also help strengthen investor confidence and encourage broader market participation. Furthermore, the development of specialized regulatory frameworks for emerging sectors such as Islamic fintech, digital sukuk, and blockchain-based Islamic financial products could increase the long-term effectiveness of institutional quality in promoting sustainable Islamic financial development.

Overall, the results suggest that institutional quality functions as an important enabling factor for Islamic finance in the short run by fostering trust, regulatory certainty, and operational efficiency. Nevertheless, achieving sustainable long-term growth requires institutional arrangements that go beyond general governance improvements and are specifically tailored to support the evolving needs of the Islamic financial industry. Such reforms would enhance the competitiveness of Islamic finance and strengthen its contribution to Indonesia's broader economic and financial development objectives.

CONCLUSION

This study examined the role of technological innovation and institutional quality in shaping the development of Islamic finance in Indonesia during the period 2011–2024

[35] Lufthia Sevriana et al., "A Proposition to Implement Inclusive Islamic Financial Planning in Indonesia through Bibliometric Analysis," *Journal of Islamic Accounting and Business Research* 15, no. 2 (2024): 225–43, https://doi.org/10.1108/JIABR-01-2022-0022.

[36] Saifurrahman and Kassim, "Regulatory Issues Inhibiting the Financial Inclusion: A Case Study among Islamic Banks and MSMEs in Indonesia."

[37] Early Ridho Kismawadi, "Improving Islamic Bank Performance through Agency Cost and Dual Board Governance," *Journal of Islamic Accounting and Business Research* 16, no. 3 (2025): 461–83, https://doi.org/10.1108/JIABR-01-2023-0035.

using the ARDL approach. The findings reveal distinct short-run and long-run dynamics between the explanatory variables and Islamic finance development. Technological innovation was found to exert a positive and significant influence in both the short and long run, indicating that digital transformation has become a fundamental driver of Islamic financial expansion. In contrast, institutional quality demonstrated a significant effect only in the short run, suggesting that improvements in governance, regulatory effectiveness, and legal certainty can stimulate immediate growth in Islamic financial activities but may not be sufficient to sustain long-term development. These findings contribute to the growing literature on Islamic finance by providing empirical evidence that technological advancement and institutional quality play different roles across time horizons, particularly within the context of a dual financial system such as Indonesia.

The results also offer several important policy implications. Given the persistent influence of technological innovation, policymakers and industry stakeholders should prioritize the development of a comprehensive digital ecosystem that supports Islamic financial services, including Islamic fintech, digital banking, blockchain-based applications, and digital investment instruments. At the same time, institutional reforms should move beyond general governance improvements and focus on strengthening Sharia-compliant regulatory frameworks, enhancing coordination among regulatory bodies, and creating a more supportive environment for innovation within the Islamic financial sector. Such efforts are expected to improve financial inclusion, increase public confidence, and strengthen the competitiveness of Islamic finance in contributing to sustainable economic development.

Despite its contributions, this study has several limitations. The analysis is confined to Indonesia and relies on annual data, which may not fully capture short-term fluctuations and structural changes within the Islamic financial industry. Furthermore, the model focuses primarily on technological innovation and institutional quality, while other potentially relevant determinants, such as financial literacy, Islamic financial inclusion, macroeconomic stability, and human capital development, were not incorporated. Future studies may extend this research by employing broader datasets, incorporating additional explanatory variables, or conducting comparative analyses across countries to explore whether similar patterns exist in different institutional settings. The application of alternative econometric techniques may also provide deeper insights into the evolving relationship between technological progress, institutional development, and the growth of Islamic finance.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

In the preparation of this manuscript, the author utilized ChatGPT to assist with refining the linguistic structure, improving the flow of the narrative, and enhancing the academic tone of the discussion. Specifically, the AI was used to paraphrase complex conceptual definitions and ensure the manuscript adhered to standard academic English conventions. All outputs generated by the AI were critically reviewed, verified for

accuracy, and substantially revised by the author. The author assumes full responsibility for the final content of the publication, ensuring that the work remains original and free from AI-generated hallucinations or inaccuracies.

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