

Artificial Intelligence Readiness and Digital Infrastructure on Profitability: The Mediating Role of Sustainability Performance in Islamic Commercial Banks in Indonesia

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ABSTRACT

The rapid advancement of Artificial Intelligence (AI) and digital transformation has significantly reshaped the Islamic banking industry, requiring financial institutions to strengthen technological capabilities while maintaining sustainable performance. This study aims to examine the effects of Artificial Intelligence Readiness and Digital Infrastructure on the Profitability of Islamic Commercial Banks in Indonesia, with Sustainability Performance serving as a mediating variable. This study employs a quantitative explanatory research design using secondary panel data collected from the Annual Reports, Sustainability Reports, and audited financial statements of Islamic Commercial Banks in Indonesia during the 2020–2025 period. Artificial Intelligence Readiness, Digital Infrastructure, and Sustainability Performance are measured using disclosure indices developed through content analysis, while Profitability is measured using Return on Assets (ROA). The data are analyzed using panel regression and mediation analysis. The findings indicate that Artificial Intelligence Readiness and Digital Infrastructure positively influence Sustainability Performance. Furthermore, Artificial Intelligence Readiness, Digital Infrastructure, and Sustainability Performance have positive and significant effects on profitability, indicating that sustainability performance partially mediates the relationship between digital capabilities and financial performance. These findings demonstrate that technological readiness and digital infrastructure contribute to improving operational efficiency, governance quality, and the long-term financial performance of Islamic Commercial Banks. The study concludes that integrating AI readiness with robust digital infrastructure supports sustainable profitability through improved sustainability performance. Islamic Commercial Banks are therefore encouraged to strengthen investments in AI technologies, digital infrastructure, and sustainability initiatives as integrated strategic priorities. Future research is recommended to expand the observation period, include cross-country Islamic banking data, and incorporate additional variables such as digital innovation capability, cybersecurity readiness, and corporate governance to provide a broader understanding of sustainable digital transformation in the Islamic banking sector.

1. Introduction

The rapid advancement of Artificial Intelligence (AI) and digital technologies has fundamentally transformed the banking industry, including Islamic banking. AI enables financial institutions to automate operational processes, improve customer services, strengthen fraud detection, enhance risk assessment, and support data-driven decision-making through machine learning and predictive analytics. At the same time, digital infrastructure, including core banking systems, cloud computing, integrated databases, cybersecurity, and digital payment platforms, has become an important organizational resource for improving operational efficiency and maintaining competitiveness in an increasingly digital financial ecosystem ((Atieh et al., 2026); (Maspul & Putri, 2025)). For Islamic banks, however, technological transformation involves a broader challenge because technological innovation must operate within the principles of Sharia compliance, ethical finance, risk governance, and sustainable value creation.

The digital transformation of Islamic banking in Indonesia has received increasing regulatory attention. The Financial Services Authority (Otoritas Jasa Keuangan/OJK) has established a regulatory framework to support digital transformation while maintaining risk management, information technology governance, cybersecurity, and consumer protection. OJK Regulation No. 11/POJK.03/2022 concerning the Implementation of Information Technology by Commercial Banks establishes the foundation for information technology governance, risk management, cyber resilience, and data protection. This framework was complemented by OJK Regulation No. 21/POJK.03/2023 concerning Digital Services by Commercial Banks, which provides greater opportunities for banks to develop and innovate digital services while emphasizing information technology infrastructure, risk management, data security, and consumer protection. OJK also issued OJK Circular Letter No. 24/SEOJK.03/2023 concerning the Digital Maturity Assessment for Commercial Banks, which provides a framework for assessing digital maturity and the readiness of banks to support digital transformation. Importantly, these provisions explicitly apply to Islamic Commercial Banks as part of the commercial banking sector.

For Islamic banking specifically, digital transformation is also embedded in the OJK Roadmap for the Development and Strengthening of Indonesian Islamic Banking 2023–2027. The roadmap identifies the acceleration of Islamic banking digitalization as one of its five major policy pillars while simultaneously emphasizing the strengthening of the distinctive characteristics of Islamic banking. This dual emphasis illustrates that digital transformation in Islamic banking cannot be separated from the preservation of its Sharia identity, social function, governance, and contribution to the national economy. Consequently, the adoption of AI by Islamic banks presents a distinctive challenge: AI systems must not only be technologically reliable and economically beneficial but must also support transparency, fairness, responsible decision-making, data protection, and compliance with Sharia principles. This consideration differentiates Islamic banking from conventional banking and makes AI readiness an important organizational capability that extends beyond technological availability.

Within this context, Artificial Intelligence Readiness refers to the organizational preparedness of banks to adopt, implement, govern, and utilize AI technologies. AI readiness encompasses technological capability, human resources, organizational preparedness, governance, data availability, and strategic commitment. Recent studies demonstrate that AI can improve banking operations through automation, intelligent customer services, predictive analytics, and enhanced risk management. Emmanuel et al., (2024) found that AI technology innovation contributes to improved financial performance in banking through efficiency and better decision-making. Hamadou et al., (2024) demonstrated that AI implementation in Bank Syariah Indonesia supports customer service, operational efficiency, and automation. Similarly, Syakirunni'am et al., (2025) reported that AI-based digital services have transformed customer-facing activities in

Islamic banking, particularly through digital onboarding, chatbots, and automated transaction services. However, AI implementation remains constrained by organizational resistance, limited digital capabilities, customer digital literacy, and trust and security concerns ((Ikhsan et al., 2024); (Maspul & Putri, 2025)).

The effectiveness of AI adoption is closely associated with the availability and quality of digital infrastructure. Digital infrastructure provides the technological foundation through which AI applications can operate effectively. Cloud computing, core banking systems, databases, cybersecurity, digital payment platforms, and integrated information systems enable banks to process large volumes of data and deliver digital services efficiently. Alqahtani et al., (2024) found that cloud computing, AI, digital capabilities, digital innovation, and IT flexibility contribute to firm performance in Islamic banking. Similarly, Tjahyono et al., (2025a) demonstrated that digital banking transformation platforms can improve profitability and efficiency in Islamic banking. Shanti et al., (2023) further emphasized the role of digital transformation in supporting the development of digital business models in the banking sector. Nevertheless, the digital transformation of Islamic banks is not without challenges. Islamic banks must manage legacy systems, technological integration, cybersecurity risks, human resource limitations, and the complexity of integrating new technologies with existing banking architectures ((Desky & Maulina, 2022a); (Maspul & Putri, 2025)). In addition, Islamic banks face the distinctive requirement of ensuring that technology-supported products, services, and decision-making processes remain consistent with Sharia principles. AI-based financing decisions, customer profiling, automated recommendations, and risk assessments may involve algorithmic bias, data quality issues, explainability concerns, and ethical considerations. Therefore, technological capability alone does not guarantee successful digital transformation. It must be accompanied by effective governance, risk management, human oversight, and mechanisms that ensure the continued integrity of Sharia-based banking operations.

The relationship between technological capability and financial performance has also received increasing scholarly attention. AI and digital transformation may enhance profitability through cost reduction, process automation, revenue growth, improved customer retention, and more effective risk management ((Emmanuel et al., 2024); Öner & Lökçe, 2024). Putri et al., (2025) demonstrated that AI, organizational databases, and risk management are interconnected in improving banking profitability. Tjahyono et al., (2025) further showed that AI integration can support sustainable banking performance through stronger risk management and governance. However, the financial benefits of technological investment are not necessarily immediate. Digital transformation requires substantial investments in technology, infrastructure, employee development, cybersecurity, and organizational restructuring. Meero (2025) and Lui (2026) indicate that digital adoption may initially increase operating costs before efficiency gains are realized. Thus, the relationship between digital capabilities and profitability should be examined within a broader framework that considers sustainability and organizational capability.

Sustainability Performance is particularly relevant in this context because Islamic banking has a dual orientation toward financial performance and broader social and ethical objectives. Sustainability performance encompasses economic, environmental, social, and governance dimensions, including financial inclusion, responsible financing, environmental responsibility, employee development, customer protection, ethical governance, and effective risk management. AI and digital technologies may strengthen sustainability performance by improving resource efficiency, expanding financial access, strengthening risk monitoring, and supporting more transparent decision-making. Tjahyono et al., (2025) found that the integration of AI and risk management contributes to sustainable banking performance, while Alsoukuni et al., (2025)

demonstrated that AI applications and organizational learning support sustainable innovation performance in the banking sector.

Despite the growing literature on AI, digital transformation, and banking performance, several research gaps remain. First, previous studies tend to examine AI adoption, digital transformation, sustainability, or profitability as separate research streams rather than integrating these variables into a single empirical framework. Second, much of the existing evidence is based on survey data, case studies, or conceptual analysis, which limits the ability to evaluate technological readiness using objectively observable corporate information. Third, empirical evidence concerning the simultaneous relationship between AI readiness, digital infrastructure, sustainability performance, and profitability in Indonesian Islamic Commercial Banks remains limited. Existing studies focusing on Bank Syariah Indonesia provide valuable case-based evidence ((Hamadou et al., 2024); (Syakirunni'am et al., 2025)), but they do not sufficiently explain whether the observed relationships are applicable across the broader population of Islamic Commercial Banks in Indonesia. Fourth, the measurement of AI readiness and digital infrastructure remains an important methodological gap. Previous studies frequently measure digital transformation through perceptions, technology adoption surveys, or broad digitalization indicators. In contrast, this study constructs disclosure-based indices from Annual Reports and Sustainability Reports, allowing technological capabilities to be measured using publicly observable corporate disclosures. This approach provides a more systematic basis for comparing Islamic Commercial Banks across different years. Furthermore, the role of Sustainability Performance as a mediating mechanism between technological capabilities and profitability has received limited attention in Islamic banking research.

To address these gaps, this study develops an integrated empirical framework examining the influence of Artificial Intelligence Readiness and Digital Infrastructure on Profitability, with Sustainability Performance serving as a mediating variable. The study focuses on Islamic Commercial Banks in Indonesia during the 2020–2025 period and utilizes secondary data obtained from Annual Reports, Sustainability Reports, and audited financial statements. Artificial Intelligence Readiness is measured using an Artificial Intelligence Readiness Disclosure Index, Digital Infrastructure is measured using a Digital Infrastructure Disclosure Index, Sustainability Performance is measured through a Sustainability Performance Disclosure Index, and Profitability is primarily measured using Return on Assets (ROA).

The novelty of this study lies in three aspects. First, it develops a disclosure-based measurement of Artificial Intelligence Readiness that captures the extent to which Islamic Commercial Banks disclose their AI-related strategies, applications, investments, governance, and human resource capabilities. Second, it integrates Artificial Intelligence Readiness and Digital Infrastructure with Sustainability Performance and Profitability within a single empirical model, thereby extending the application of the Resource-Based View and Dynamic Capabilities Theory to the digital transformation of Islamic banking. Third, the study moves beyond a single-bank case perspective by examining Islamic Commercial Banks in Indonesia as a broader empirical setting, providing evidence that is potentially more generalizable across the Indonesian Islamic banking industry. Accordingly, this study aims to examine the effects of Artificial Intelligence Readiness and Digital Infrastructure on the Profitability of Islamic Commercial Banks in Indonesia and to investigate the mediating role of Sustainability Performance in these relationships. The study is expected to contribute to the literature on Islamic banking and digital transformation by providing empirical evidence concerning how technological capabilities can be converted into sustainable financial performance. From a practical perspective, the findings may assist Islamic banking managers in designing technology and sustainability strategies that are consistent with regulatory requirements, effective risk governance, and the distinctive principles of Sharia-compliant banking.

2. Literature Review

2.1 Resource-Based View (RBV)

The Resource-Based View (RBV) posits that organizations achieve sustainable competitive advantage through valuable, rare, inimitable, and non-substitutable (VRIN) resources (Barney, 1991). In the banking industry, digital technologies, artificial intelligence (AI), organizational knowledge, and information systems have evolved into strategic resources that enable firms to improve operational efficiency, enhance customer value, and strengthen financial performance. Within Islamic banking, AI readiness and digital infrastructure represent intangible strategic assets that support innovation while maintaining compliance with Sharia principles. Consequently, banks possessing superior digital resources are expected to achieve higher levels of sustainable profitability than competitors with less developed technological capabilities (Ashraf et al., 2025)

2.2 Dynamic Capabilities Theory

Dynamic Capabilities Theory extends RBV by emphasizing an organization's ability to integrate, reconfigure, and renew internal and external resources in response to rapidly changing business environments (Teece, Pisano, & Shuen, 1997). AI adoption is not merely the acquisition of advanced technologies but also reflects an organization's capability to transform digital resources into operational excellence and sustainable competitive advantage. For Islamic banks, dynamic capabilities include developing AI competencies, strengthening digital infrastructure, improving risk management, and integrating sustainability into business strategies. These capabilities enable banks to respond effectively to technological disruption while maintaining financial resilience and Sharia compliance (Cimino et al., 2025).

2.3 Artificial Intelligence Readiness

Artificial Intelligence (AI) readiness refers to an organization's preparedness to adopt, implement, and manage AI technologies through adequate technological infrastructure, human capital, governance mechanisms, and strategic commitment. AI readiness encompasses organizational capabilities that facilitate machine learning, predictive analytics, robotic process automation, intelligent customer services, and AI-supported decision-making (Mohsen et al., 2024).

In Islamic banking, AI has become an essential driver of digital transformation by improving operational efficiency, enhancing customer experience, strengthening fraud detection, and supporting financing decisions while complying with Sharia principles (Hamadou et al., 2024). Bank Syariah Indonesia has demonstrated substantial progress through investments in AI-enabled digital banking services, robotic automation, and machine learning applications (Syakirunni'am et al., 2025). However, successful AI implementation also depends on organizational readiness, employee competencies, governance quality, and customer trust (Ikhsan et al., 2024).

Recent empirical evidence consistently demonstrates that AI readiness positively affects organizational performance. Emmanuel et al., (2024) found that AI innovation significantly enhances banks' financial performance through operational automation and improved decision quality. Similarly, Ali & Aysan (2025) reported that AI-generated information and digital intelligence positively influence financial performance in Islamic banks. Moreover, AI contributes to innovation capability and strategic alignment, thereby improving organizational competitiveness and long-term performance (Qahtanie & Baitsyam, 2025).

2.4 Digital Infrastructure

Digital infrastructure represents the technological foundation supporting digital banking operations, including cloud computing, core banking systems, cybersecurity, databases, payment platforms, mobile banking applications, and integrated digital networks. High-quality digital

infrastructure enables banks to process transactions efficiently, deliver innovative financial services, and improve operational flexibility (Alqahtani et al., 2024). The digital transformation of Islamic banking requires comprehensive infrastructure rather than isolated digital applications. Modern banking systems rely on cloud-based technologies, integrated databases, cybersecurity frameworks, and intelligent analytics to support sustainable digital operations (Tian, 2024). At Bank Syariah Indonesia, digital transformation initiatives such as the BYOND platform, digital onboarding, and cloud-based infrastructure demonstrate substantial investment in digital capabilities (Siregar et al., 2026). Nevertheless, infrastructure modernization continues to face challenges arising from legacy systems, post-merger integration, and shortages of digitally skilled personnel (Desky & Maulina, 2022). Empirical studies consistently confirm that digital infrastructure contributes positively to banking performance. Shanti et al., (2023) demonstrated that digital transformation significantly strengthens digital business models and organizational competitiveness. Similarly, Al-Haija et al., (2025) found that digital banking transformation platforms improve profitability and operational efficiency in Islamic banks. Furthermore, Alqahtani et al., (2024) reported that cloud computing, AI, digital capabilities, and IT flexibility significantly enhance organizational performance within Islamic banking institutions.

2.5 Sustainability Performance

Sustainability performance reflects an organization's ability to generate long-term economic value while maintaining environmental responsibility, social commitment, and sound corporate governance. In Islamic banking, sustainability extends beyond ESG principles by incorporating Sharia values such as justice, transparency, accountability, and social welfare.

Digital transformation has increasingly become a key enabler of sustainable banking practices. AI supports sustainability by improving operational efficiency, reducing resource consumption, strengthening governance, and enhancing enterprise risk management (Tjahyono et al., 2025). Likewise, Alsoukini et al., (2025) found that AI applications and organizational learning significantly improve sustainable innovation performance within banking institutions. Sustainable banking therefore depends not only on technological adoption but also on integrating innovation, governance, and responsible business practices.

2.6 Profitability

Profitability represents a bank's ability to generate earnings from its financial resources and operational activities. In banking studies, profitability is commonly measured using Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM). Among these indicators, ROA is widely regarded as the most appropriate measure because it evaluates management efficiency in utilizing total assets to generate income. The relationship between AI, digital transformation, and profitability has attracted increasing scholarly attention. AI technologies contribute to profitability by reducing operational costs, improving service quality, enhancing customer retention, and strengthening risk management (Emmanuel et al., 2024). Meero (2025) argued that Islamic banks adopting AI and financial technologies generally achieve greater operational stability and long-term efficiency than less technologically advanced institutions. Likewise, Öner & Lökçe (2024) found that AI-based digitalization significantly improves bank profitability through automation and data-driven decision-making. However, technology investments often involve substantial implementation costs that may temporarily reduce financial performance before long-term efficiency gains are realized (Lui, 2026).

2.7 Literature Synthesis and Research Framework

The existing literature demonstrates that AI readiness enhances organizational capabilities, while digital infrastructure provides the technological foundation necessary for effective AI

implementation. Together, these capabilities strengthen sustainability performance by improving governance, operational efficiency, and risk management. Sustainable organizational practices subsequently contribute to higher profitability through efficient resource utilization and long-term value creation. Despite growing interest in AI adoption and digital transformation, previous studies generally examine these constructs separately. Limited empirical research has integrated AI readiness, digital infrastructure, sustainability performance, and profitability within a single analytical framework, particularly in the context of Islamic banking. Furthermore, existing studies predominantly employ survey-based approaches, whereas objective disclosure indices derived from Annual Reports and Sustainability Reports remain largely unexplored.

Accordingly, this study develops an integrated research framework in which Artificial Intelligence Readiness and Digital Infrastructure function as strategic organizational capabilities, Sustainability Performance serves as the mediating mechanism, and Profitability represents the ultimate organizational outcome. Grounded in the Resource-Based View and Dynamic Capabilities Theory, this framework explains how digital capabilities create sustainable competitive advantages and improve financial performance in Islamic banking.

3. Methodology

This study employed a quantitative research design using secondary panel data to examine the relationships among Artificial Intelligence Readiness, Digital Infrastructure, Sustainability Performance, and Profitability in the Indonesian Islamic banking industry. The research adopted an explanatory approach to test the causal relationships among variables based on the Resource-Based View (RBV) and Dynamic Capabilities Theory (Barney, 1991; Teece, Pisano, & Shuen, 1997). The population consisted of all Islamic Commercial Banks (Bank Umum Syariah/BUS) operating in Indonesia and supervised by the Financial Services Authority (OJK) during the 2020–2025 period. The study applied purposive sampling with the following criteria: (1) Islamic Commercial Banks continuously operating during 2020–2025; (2) banks publishing complete Annual Reports and Sustainability Reports throughout the observation period; (3) banks providing complete financial statements required for profitability measurement; and (4) banks disclosing information regarding digital transformation, artificial intelligence, or information technology initiatives in their Annual Reports. Based on these criteria, the final sample comprised Islamic Commercial Banks that met all data availability requirements over the six-year observation period, generating balanced panel data.

The study utilized secondary data collected from Annual Reports, Sustainability Reports, and audited financial statements published on the official websites of each Islamic Commercial Bank and the Financial Services Authority (OJK). Annual Reports were used to construct the Artificial Intelligence Readiness Index and Digital Infrastructure Index through content analysis, while Sustainability Reports were used to develop the Sustainability Performance Index. Financial statements provided accounting information for profitability measurement. Content analysis was conducted by coding each disclosure item using a dichotomous scoring method, where a disclosed item received a score of one (1) and an undisclosed item received a score of zero (0). Disclosure indices were subsequently calculated by dividing the total disclosed items by the total applicable disclosure items, following previous disclosure index studies in sustainability and corporate reporting (Michelon, Pilonato, & Ricceri, 2015).

Artificial Intelligence Readiness (AIR) was measured using the Artificial Intelligence Readiness Disclosure Index (AIDI), which evaluates the extent to which Islamic banks disclose AI strategies, machine learning implementation, chatbot services, robotic process automation, fraud detection, predictive analytics, AI governance, AI investment, employee AI capability development, and related technological initiatives. The index consisted of fifteen disclosure indicators adapted from recent studies on AI adoption in banking ((Hamadou et al., 2024); (Mohsen et al., 2024);

(Syakirunni'am et al., 2025)). Digital Infrastructure (DI) was measured using the Digital Infrastructure Disclosure Index (DIDI), comprising fifteen disclosure indicators related to mobile banking, internet banking, cloud computing, cybersecurity, digital payment systems, core banking modernization, digital financing platforms, application programming interfaces (API), digital customer onboarding, IT investment, and digital ecosystem development. The measurement was adapted from Alqahtani et al., (2024), Al-Haija et al., (2025), Shanti et al., (2023), and Siregar et al., (2026).

Sustainability Performance (SP) served as the mediating variable and was measured using the Sustainability Performance Disclosure Index (SPDI). The index was developed based on Sustainability Reports covering four dimensions: economic, environmental, social, and governance (ESG). Twenty disclosure indicators were evaluated, including financial inclusion, green financing, energy efficiency, carbon emission management, employee development, community empowerment, customer privacy, anti-corruption, risk management, and corporate governance. This measurement was adapted from the Global Reporting Initiative (GRI) Standards and previous sustainability studies in banking ((Alsoukuni et al., 2025); (Tjahyono et al., 2025)). Profitability (PROF) represented the dependent variable and was measured primarily by Return on Assets (ROA), calculated as net income divided by total assets. ROA was selected because it is the most widely accepted profitability indicator in banking research, reflecting management efficiency in utilizing assets to generate earnings ((Meero, 2025); (Emmanuel et al., 2024)). Return on Equity (ROE) was additionally employed as a robustness measure. The operational definitions of the research variables are presented in Table 1.

Table 1. Operational Definition of Variables

Variable	Proxy	Measurement	Scale	Source
Artificial Intelligence Readiness (X_1)	AI Readiness Disclosure Index (AIDI)	Number of disclosed AI items / 15	Ratio	Annual Report
Digital Infrastructure (X_2)	Digital Infrastructure Disclosure Index (DIDI)	Number of disclosed digital infrastructure items / 15	Ratio	Annual Report
Sustainability Performance (Z)	Sustainability Performance Disclosure Index (SPDI)	Number of sustainability disclosure items / 20	Ratio	Sustainability Report
Profitability (Y)	Return on Assets (ROA)	Net Income / Total Assets	Ratio	Financial Statements

The panel data were analyzed using descriptive statistics, correlation analysis, and panel regression analysis. Model selection was performed through the Chow Test, Hausman Test, and Lagrange Multiplier Test to determine the most appropriate estimation model among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). Classical assumption tests, including multicollinearity and heteroscedasticity diagnostics, were conducted before hypothesis testing.

To examine the mediating role of Sustainability Performance, this study employed panel mediation analysis using the causal steps approach proposed by Baron and Kenny (1986), complemented by the Sobel Test to evaluate the significance of indirect effects. Statistical analyses were performed using EVIEWS 13 and SmartPLS 4 for robustness testing. Statistical significance was determined at the 5% level. The relationship among the variables is estimated using the following regression equations:

Model 1: Effect of Artificial Intelligence Readiness and Digital Infrastructure on Sustainability Performance

$$SP = \alpha + \beta_1 AIR + \beta_2 DI + e$$

where:

- SP = Sustainability Performance
- AIR = Artificial Intelligence Readiness
- DI = Digital Infrastructure
- α = Constant
- β_1 – β_2 = Regression coefficients
- e = Error term

Model 2: Effect of Artificial Intelligence Readiness, Digital Infrastructure, and Sustainability Performance on Profitability

$$PROF = \alpha + \beta_1 AIR + \beta_2 DI + \beta_3 SP + e$$

where:

- PROF = Profitability (measured by ROA)
- SP = Sustainability Performance
- AIR = Artificial Intelligence Readiness
- DI = Digital Infrastructure
- α = Constant
- β_1 – β_3 = Regression coefficients
- e = Error term

4. Results And Discussion

4.1 Descriptive Statistics

The descriptive statistics provide an overview of the distribution of Artificial Intelligence Readiness (AIR), Digital Infrastructure (DI), Sustainability Performance (SP), and Profitability (ROA) among Islamic Commercial Banks in Indonesia during the 2020–2025 observation period. The results are presented in Table 1.

Table 1. Descriptive Statistics

Variable	Mean	Std. Dev.	Minimum	Maximum
Artificial Intelligence Readiness (AIR)	0.741	0.112	0.480	0.940
Digital Infrastructure (DI)	0.783	0.095	0.550	0.960
Sustainability Performance (SP)	0.812	0.071	0.630	0.950
Profitability (ROA)	1.620	0.840	-0.720	3.950

The results indicate that the Islamic Commercial Banks in the sample demonstrated relatively high levels of disclosure related to AI readiness, digital infrastructure, and sustainability performance. The mean AIR score of 0.741 indicates that, on average, banks disclosed approximately 74.1% of the indicators included in the Artificial Intelligence Readiness Disclosure Index. Meanwhile, the mean DI score of 0.783 indicates relatively extensive disclosure of digital infrastructure capabilities. Sustainability Performance had the highest average index among the three disclosure-based variables, with a mean value of 0.812. This suggests that sustainability-related initiatives and governance practices were relatively well disclosed by Islamic Commercial Banks during the observation period. Profitability, measured using ROA, showed greater variation, with values ranging from negative to positive. This variation indicates differences in the ability of individual Islamic Commercial Banks to convert their assets into net income during the observation period.

4.2 Classical Assumption Tests

Before conducting the regression analysis, diagnostic tests were performed to ensure that the estimated models did not suffer from major violations of the underlying assumptions. The results of the normality, multicollinearity, and heteroskedasticity tests are presented in Table 2.

Table 2. Classical Assumption Tests

Test	Model 1: SP	Model 2: ROA	Decision
Jarque–Bera Probability	0.184	0.217	Normally distributed
Maximum VIF	2.184	2.417	No multicollinearity
Breusch–Pagan Probability	0.276	0.314	No heteroskedasticity

The Jarque–Bera probability values for both models are greater than 0.05, indicating that the residuals are normally distributed. The maximum Variance Inflation Factor (VIF) values are below the commonly used threshold of 10, indicating that multicollinearity does not represent a serious problem among the independent variables. Furthermore, the Breusch–Pagan probability values exceed 0.05, suggesting that the models do not exhibit statistically significant heteroskedasticity. These results indicate that the regression models satisfy the principal diagnostic requirements and can subsequently be used to examine the proposed relationships among AI readiness, digital infrastructure, sustainability performance, and profitability.

4.3 Regression Results

The regression analysis was conducted in two stages. The first model examines the effect of Artificial Intelligence Readiness and Digital Infrastructure on Sustainability Performance. The second model examines the effects of Artificial Intelligence Readiness, Digital Infrastructure, and Sustainability Performance on Profitability.

Table 3. Regression Results

Variable	Model 1: SP Coefficient	p-value	Model 2: ROA Coefficient	p-value
Constant	0.214	0.012	-0.865	0.031
Artificial Intelligence Readiness (AIR)	0.342	0.001***	0.281	0.003***
Digital Infrastructure (DI)	0.416	0.000***	0.298	0.007***
Sustainability Performance (SP)	—	—	0.367	0.001***
R ²	0.642		0.711	
Adjusted R ²	0.631		0.697	
F-statistic	31.470	0.000	38.920	0.000
Observations	72		72	

Note: *** $p < 0.01$.

The results in Model 1 indicate that Artificial Intelligence Readiness has a positive and statistically significant effect on Sustainability Performance. The coefficient of AIR is 0.342 with a significance level of 0.001. This result indicates that greater readiness to adopt and utilize artificial intelligence is associated with stronger sustainability performance among Islamic Commercial Banks.

Similarly, Digital Infrastructure has a positive and statistically significant effect on Sustainability Performance, with a coefficient of 0.416 and a p-value of 0.000. The coefficient is

larger than that of AIR, suggesting that the development of digital infrastructure may play an important role in supporting sustainability-related practices and disclosures in Islamic banking.

The R^2 value of 0.642 indicates that AIR and DI jointly explain approximately 64.2% of the variation in Sustainability Performance. The significant F-statistic further indicates that the variables included in Model 1 jointly have a significant relationship with Sustainability Performance. Model 2 examines the determinants of profitability. The results show that Artificial Intelligence Readiness has a positive and significant effect on ROA, with a coefficient of 0.281 and a p-value of 0.003. This finding suggests that stronger AI readiness is associated with improved profitability among Islamic Commercial Banks. Digital Infrastructure also has a positive and significant effect on profitability, as indicated by a coefficient of 0.298 and a p-value of 0.007. Thus, banks with stronger digital infrastructure capabilities tend to demonstrate better profitability.

Furthermore, Sustainability Performance has a positive and significant effect on profitability, with a coefficient of 0.367 and a p-value of 0.001. This finding indicates that sustainability-oriented banking practices are not merely associated with non-financial outcomes but may also contribute to improved financial performance. The R^2 value of 0.711 indicates that AIR, DI, and SP jointly explain approximately 71.1% of the variation in profitability. The significant F-statistic confirms that the explanatory variables jointly have a significant effect on ROA.

The results provide empirical support for the proposed relationships between technological capabilities, sustainability performance, and profitability in Islamic Commercial Banks. The positive coefficients for AIR and DI in both models also indicate that technological readiness and digital infrastructure may contribute to profitability both directly and indirectly through improved sustainability performance.

4.4 Discussion

4.4.1 The Effect of Artificial Intelligence Readiness on Sustainability Performance

The findings demonstrate that Artificial Intelligence Readiness (AIR) has a positive and significant effect on Sustainability Performance (SP) among Islamic Commercial Banks in Indonesia. This relationship can be explained through the Resource-Based View (RBV), which considers technological capabilities, organizational knowledge, and human expertise as strategic resources that can generate long-term organizational value when they are valuable, difficult to imitate, and effectively organized (Barney, 1991). In this context, AI readiness should not be understood merely as the availability of artificial intelligence technology, but as the organizational capacity to deploy AI through appropriate infrastructure, skilled human resources, governance mechanisms, data capabilities, and strategic alignment.

The mechanism through which AI readiness improves sustainability performance operates through several interconnected channels. First, AI can improve operational efficiency and resource utilization. Machine learning, predictive analytics, and intelligent automation can reduce repetitive manual processes, improve transaction processing, and optimize the allocation of organizational resources. In banking operations, these capabilities may reduce paper-based processes, unnecessary administrative activities, and operational inefficiencies. Consequently, digital and AI-enabled processes can contribute to economic and environmental dimensions of sustainability simultaneously.

Second, AI readiness strengthens risk identification and prevention. AI-based analytical systems can process large volumes of transaction and customer data to identify unusual transaction patterns, potential fraud, financing risks, and other forms of operational or financial risk. Earlier identification of risks enables banks to take preventive action before those risks generate larger financial or reputational consequences. From a sustainability perspective, stronger risk management supports organizational resilience because sustainability is not limited to environmental

performance but also encompasses the ability of financial institutions to maintain stable, responsible, and accountable operations.

Third, AI can improve the quality and timeliness of managerial decision-making. Islamic Commercial Banks operate in an environment characterized by increasingly complex digital transactions, diverse customer needs, and extensive regulatory requirements. AI-supported analytics allow management to identify patterns and generate information that can be used to improve strategic decisions. Better information can support more efficient resource allocation, customer service, financing decisions, and risk management. This mechanism explains why AI readiness may contribute to sustainability performance beyond the direct benefits of automation.

The relationship is particularly important in Islamic banking because AI adoption must be consistent not only with economic objectives but also with Sharia principles. Islamic banking emphasizes principles such as justice (*'adl*), trust (*amanah*), transparency, responsible conduct, and the avoidance of activities involving *riba*, *gharar*, and *maysir*. AI can support these principles when it is implemented as a decision-support and control mechanism rather than as an uncontrolled replacement for human judgment. For example, AI-based monitoring can strengthen the identification of potentially non-compliant transactions, support fraud and money-laundering detection, and improve the monitoring of financing portfolios. AI can therefore contribute to the institutionalization of responsible and transparent banking practices.

AI may also support financial inclusion, which is relevant to the social and ethical objectives of Islamic finance. Data analytics and intelligent digital services can help banks identify underserved customer segments, personalize financial services, and improve access to Islamic financial products. When appropriately governed, these capabilities may allow Islamic Commercial Banks to extend services to customers who have traditionally faced barriers to formal financial services. Such applications are consistent with the broader objective of promoting social welfare and equitable access to financial resources.

However, the sustainability benefits of AI should not be interpreted as automatic. AI systems may also create risks related to algorithmic bias, data privacy, cybersecurity, explainability, and inappropriate automated decision-making. These risks are particularly relevant when AI is used in financing assessment, customer profiling, or other decisions that may materially affect customers. Therefore, AI readiness in Islamic banking should include not only technological capability but also AI governance, ethical standards, data protection, human oversight, and Sharia oversight. The sustainability effect of AI is consequently stronger when technological innovation is accompanied by institutional governance that ensures that AI-supported decisions remain fair, transparent, accountable, and consistent with Islamic banking principles.

The finding is consistent with Hamadou et al., (2024), who highlighted the contribution of AI implementation to operational efficiency and customer service in Bank Syariah Indonesia. Mohsen et al., (2024) similarly emphasized the role of AI integration in accelerating digital transformation in financial institutions, while Emmanuel et al., (2024) demonstrated that AI-based technological innovation can improve banking performance through greater efficiency and better decision-making. The present finding extends this literature by showing that AI readiness should also be understood as a capability that contributes to the broader sustainability performance of Islamic Commercial Banks, particularly when supported by appropriate governance and human capabilities.

Thus, the positive relationship between AIR and SP is not simply a consequence of adopting advanced technology. Rather, AI creates sustainability value through efficiency improvement, risk prevention, information enhancement, responsible customer management, and stronger governance. In Islamic banking, these mechanisms become more meaningful when AI is aligned with Sharia principles and directed toward the broader objectives of responsible financial intermediation.

4.4.2 The Effect of Digital Infrastructure on Sustainability Performance

The results further indicate that Digital Infrastructure (DI) has a positive and significant effect on Sustainability Performance. Digital infrastructure provides the technological foundation through which banks can integrate data, digital services, cybersecurity systems, payment platforms, cloud computing, and core banking applications. Therefore, the sustainability benefits of digital infrastructure arise not simply from possessing digital technologies, but from the ability to connect these technologies into an integrated organizational system.

The first mechanism is process integration and operational efficiency. Integrated digital infrastructure allows information to flow more rapidly across organizational units and reduces dependence on fragmented and manual processes. Digital account opening, electronic documentation, mobile banking, digital payments, and integrated information systems can reduce transaction costs and processing time. These improvements contribute to economic sustainability by increasing operational efficiency while simultaneously reducing the use of physical resources.

The second mechanism is organizational resilience and risk management. Modern digital infrastructure enables banks to maintain more reliable information systems, monitor transactions in real time, strengthen cybersecurity, and improve data backup and recovery capabilities. These capabilities are increasingly important because the sustainability of a financial institution depends on its ability to continue delivering essential services despite technological, operational, and external disruptions. Consequently, digital infrastructure becomes a strategic capability that supports not only efficiency but also institutional resilience.

Third, digital infrastructure facilitates data integration for sustainability-oriented decision-making. Sustainability performance requires organizations to collect, process, monitor, and report information across economic, environmental, social, and governance dimensions. Integrated digital systems make it easier for banks to consolidate information concerning customers, financing portfolios, operational activities, risk exposure, and sustainability indicators. This improves the quality of internal monitoring and can strengthen the reliability of sustainability reporting.

From the perspective of Dynamic Capabilities Theory, digital infrastructure represents an enabling platform through which banks can sense changes in the external environment, seize emerging opportunities, and reconfigure organizational resources (Teece et al., 1997). In a rapidly changing financial environment, Islamic Commercial Banks need to continuously adapt their products and services to technological developments and changing customer expectations. Digital infrastructure enables such adaptation by providing a flexible technological foundation for innovation.

The implications are particularly relevant for Islamic banking. Digital infrastructure can expand access to Sharia-compliant financial services through mobile banking, digital onboarding, Islamic digital financing, and digital payment services. It can also improve transparency in the delivery of Islamic financial products by providing customers with clearer and more accessible information regarding contracts, fees, financing arrangements, and transaction records. In this respect, digitalization can support the principle of *amanah* by strengthening accountability and traceability in financial transactions.

Digital infrastructure can also facilitate more effective Sharia compliance monitoring. Integrated databases and transaction-monitoring systems provide Islamic banks with the ability to identify transactions or activities that require further review from compliance officers and Sharia supervisory functions. Technology does not replace the authority of Sharia governance, but it can provide better information and monitoring capabilities to support human decision-making. This distinction is important because the implementation of technology in Islamic banking should remain subject to appropriate institutional and Sharia oversight.

The finding is consistent with Alqahtani et al., (2024), who found that digital capabilities, cloud computing, AI, and IT flexibility contribute to organizational performance. Al-Haija et al., (2025) similarly demonstrated that digital banking transformation can improve efficiency and profitability in Islamic banking institutions. Shanti et al., (2023) also emphasized the role of digital transformation in changing banking business models. The present findings extend these studies by linking digital infrastructure not only to operational or financial outcomes but also to sustainability performance in the context of Islamic Commercial Banks in Indonesia.

Accordingly, digital infrastructure should be viewed as a strategic sustainability enabler rather than merely an IT investment. Its contribution to sustainability emerges when infrastructure is integrated with organizational processes, risk management, data governance, cybersecurity, customer protection, and Sharia governance. The stronger the integration between technology and these organizational functions, the greater the potential for digital infrastructure to generate sustainable value.

4.4.3 The Effect of Sustainability Performance on Profitability

The results show that Sustainability Performance has a positive and significant effect on Profitability. This relationship suggests that sustainability-oriented practices can generate economic value rather than functioning solely as compliance activities or additional organizational costs. The mechanism can be explained through improved operational efficiency, stronger risk management, stakeholder trust, reputation, and more effective allocation of organizational resources.

First, sustainability practices can improve operational efficiency. Environmental initiatives such as paperless banking, energy efficiency, and digital service delivery can reduce operating costs over time. Similarly, social and governance practices that improve employee capability, internal controls, and organizational accountability can reduce inefficiencies and operational risks. These improvements can ultimately support stronger financial performance.

Second, sustainability performance can reduce reputational and operational risks. Banks depend heavily on public trust because their business model involves managing funds and financial relationships with customers and other stakeholders. Weak governance, poor customer protection, data misuse, or unethical business practices can generate reputational damage and financial losses. Strong sustainability and governance practices can therefore act as a protective mechanism that contributes to organizational resilience and financial stability.

Third, sustainability performance can strengthen stakeholder relationships. Islamic Commercial Banks operate not only to generate financial returns but also within a broader ethical and social framework. Customers may place importance on whether the bank operates in accordance with ethical values, provides fair services, protects customer information, and contributes to society. Strong sustainability performance can strengthen stakeholder confidence and customer loyalty, which may support customer retention and long-term revenue generation.

The relationship is particularly relevant to Islamic Commercial Banks because sustainability is closely connected to the broader objectives of Islamic economics. Islamic financial institutions are expected to pursue not only financial efficiency but also social welfare, justice, responsible economic activity, and ethical conduct. Sustainability initiatives involving financial inclusion, SME financing, community development, employee welfare, responsible financing, and environmental responsibility can therefore reinforce the social legitimacy of Islamic banks.

This finding is consistent with Tjahyono et al., (2025), who highlighted the importance of risk management and AI integration in strengthening sustainable banking performance in Indonesia. Alsoukuni et al., (2025) also demonstrated the relevance of AI applications and organizational learning to sustainable innovation performance. Meero (2025) further emphasized that technological transformation and FinTech adoption can contribute to efficiency and stability in Islamic banking. The present findings complement these studies by demonstrating that stronger

sustainability performance can be associated with improved profitability in Islamic Commercial Banks.

Therefore, sustainability should not be positioned as a separate agenda from profitability. For Islamic banks, sustainability can become an economic and strategic capability when environmental, social, governance, and Sharia-oriented practices are integrated into the core banking strategy. Such integration allows banks to create value for shareholders while simultaneously fulfilling broader responsibilities toward customers, employees, regulators, communities, and society.

4.4.4 The Mediating Role of Sustainability Performance

The findings further indicate that Sustainability Performance functions as an important mechanism connecting technological capabilities with profitability. Artificial Intelligence Readiness and Digital Infrastructure can generate direct economic benefits through efficiency and improved decision-making, but their contribution to profitability can be strengthened when technological capabilities are translated into broader sustainability-oriented organizational practices.

The mediation mechanism can be understood as a three-stage process. First, AI readiness and digital infrastructure provide the technological capabilities required to improve banking processes, information quality, risk monitoring, and customer services. Second, these capabilities facilitate stronger sustainability practices through more efficient resource utilization, improved governance, better risk management, financial inclusion, and more transparent stakeholder engagement. Third, stronger sustainability performance creates economic value through greater efficiency, trust, resilience, and reputation, which ultimately contributes to profitability.

This mechanism provides an important theoretical contribution to the Resource-Based View and Dynamic Capabilities Theory. From an RBV perspective, AI and digital infrastructure do not automatically generate superior performance simply because they are available. Their value depends on how effectively the organization combines technological resources with human resources, organizational processes, governance, and strategic capabilities (Barney, 1991). From the perspective of Dynamic Capabilities Theory, sustainability performance represents one of the organizational outcomes through which technological resources are continuously reconfigured and transformed into long-term value (Teece et al., 1997).

The mediation relationship is especially meaningful in Islamic banking because technological transformation should ultimately support the ethical and social purpose of Islamic financial intermediation. AI and digital infrastructure can strengthen sustainability when they are used to improve transparency, fairness, customer protection, financial inclusion, responsible financing, and Sharia compliance. In other words, the profitability generated by technology becomes more sustainable when technological innovation is embedded within a responsible banking framework.

This also means that Islamic Commercial Banks should avoid treating AI and digital infrastructure as isolated technology projects. Investments in AI systems or digital platforms should be accompanied by investments in employee competencies, data governance, cybersecurity, ethical AI policies, risk management, and Sharia supervisory capabilities. Without these complementary capabilities, technological investment may improve short-term efficiency but may not necessarily create sustainable organizational value.

4.4.5 Managerial and Sharia-Banking Implications

The findings provide several specific implications for the management of Islamic Commercial Banks in Indonesia. First, banks should develop AI readiness as an organizational capability, rather than focusing exclusively on technology acquisition. This requires investment in employee competencies, data quality, AI governance, cybersecurity, ethical standards, and mechanisms for human oversight. AI applications in fraud detection, risk management, customer

service, predictive analytics, and financing assessment should be evaluated not only according to efficiency but also according to fairness, transparency, explainability, and customer protection.

Second, digital infrastructure investment should be directed toward interoperability and organizational integration. Cloud computing, core banking modernization, cybersecurity, digital payment systems, APIs, and integrated databases should operate as complementary components rather than independent technological projects. An integrated infrastructure enables banks to respond more rapidly to customer needs, regulatory requirements, operational risks, and sustainability objectives.

Third, Islamic Commercial Banks should incorporate Sharia governance into digital and AI transformation. The use of AI should be subject to appropriate review by management, risk and compliance functions, and Sharia supervisory mechanisms. This is particularly important when AI is applied to customer profiling, financing decisions, product recommendations, or transaction monitoring. Human and Sharia oversight can help ensure that automated systems do not produce decisions that conflict with principles of justice, transparency, accountability, and responsible financial conduct.

Fourth, banks should use digital and AI capabilities to strengthen financial inclusion and social value creation. Digital onboarding, mobile banking, Islamic financing platforms, and data-driven customer services can expand access to Sharia-compliant financial products, particularly for underserved customers and small businesses. Such applications can connect technological transformation with the social objectives of Islamic finance.

Finally, sustainability performance should be incorporated into strategic and performance-management systems rather than treated solely as a reporting requirement. Management should evaluate whether technology investments contribute to efficiency, responsible financing, customer welfare, environmental responsibility, governance quality, and long-term financial resilience.

The findings demonstrate that the relationship between technology and profitability in Islamic Commercial Banks is not a simple technology-to-financial-performance relationship. AI readiness and digital infrastructure create the technological foundation, sustainability performance represents an important organizational mechanism, and profitability represents one of the resulting economic outcomes. The sustainability value of technology is therefore maximized when technological capabilities are integrated with effective governance, human expertise, stakeholder responsibility, and Sharia principles. This integrated perspective reinforces the relevance of the Resource-Based View and Dynamic Capabilities Theory in explaining how Islamic Commercial Banks can transform technological resources into sustainable organizational value.

5. Conclusion

This study examined the influence of Artificial Intelligence Readiness and Digital Infrastructure on the Profitability of Islamic Commercial Banks in Indonesia, with Sustainability Performance serving as a mediating variable. The findings indicate that Artificial Intelligence Readiness and Digital Infrastructure positively contribute to Sustainability Performance, suggesting that banks with stronger technological capabilities and more advanced digital ecosystems are better positioned to implement sustainable banking practices. Furthermore, the results demonstrate that Sustainability Performance positively influences profitability, indicating that integrating sustainability principles into banking operations can strengthen financial performance over the long term.

The study also confirms that Artificial Intelligence Readiness and Digital Infrastructure have direct positive effects on profitability. These findings support the Resource-Based View and Dynamic Capabilities Theory by demonstrating that technological resources and organizational capabilities represent strategic assets capable of creating sustainable competitive advantages. The

integration of AI technologies, digital infrastructure, and sustainability initiatives enables Islamic banks to improve operational efficiency, strengthen risk management, enhance service quality, and increase stakeholder confidence, all of which contribute to sustainable financial performance.

This research contributes to the Islamic banking literature in several ways. First, it develops an integrated framework linking Artificial Intelligence Readiness, Digital Infrastructure, Sustainability Performance, and Profitability within a single empirical model. Second, the study introduces disclosure-based measurements for AI readiness and digital infrastructure using information reported in Annual Reports and Sustainability Reports, providing a more objective approach than perception-based survey methods. Third, the findings offer practical insights for banking managers and policymakers regarding the strategic importance of digital transformation in supporting sustainable banking development.

Despite these contributions, this study has several limitations. The observation period is limited to 2020–2025 and focuses on Islamic Commercial Banks operating in Indonesia. In addition, the measurement of Artificial Intelligence Readiness and Digital Infrastructure relies on corporate disclosure, which may not fully capture the actual maturity of technology implementation within each bank.

Future research is encouraged to extend the observation period, include Islamic banking institutions from multiple countries, and incorporate additional variables such as digital innovation capability, cybersecurity readiness, corporate governance, operational efficiency, or risk management. Future studies may also compare Islamic and conventional banks or employ advanced analytical approaches such as Structural Equation Modeling (SEM), dynamic panel regression, or machine learning techniques to provide deeper insights into the relationship between digital transformation, sustainability, and financial performance in the banking industry.

Author contribution statement

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