



Digital transformation, intellectual capital, and Sharia compliance in Indonesian Islamic banking

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Abstract

Purpose – This study aims to systematically synthesize and evaluate existing empirical evidence on the performance effects of digital transformation and intellectual capital in Indonesian Islamic banking, with particular attention to their complementarity and the role of institutional and regulatory contexts. It also incorporates Islamic law viewpoints by examining how Sharia governance and compliance considerations shape digital economy practices and performance outcomes.

Methodology – Adopting a systematic literature review approach guided by PRISMA, this study reviews peer-reviewed articles indexed in Scopus database. Studies were screened using explicit inclusion and exclusion criteria and analyzed thematically across four domains: digital transformation pathways to performance and intellectual capital–performance linkages.

Findings – The review finds that digital transformation enhances efficiency, innovation, sustainability, and financial inclusion in Islamic banking. Intellectual capital—human, structural, and relational—emerges as a critical enabling capability that converts digital initiatives into both financial and Sharia-aligned performance outcomes.

Implications – For practitioners and policymakers, the findings highlight the importance of aligning digital strategies with investments in intellectual capital and supportive governance structures. For scholars, this review underscores the need to integrate capability-based and institutional perspectives.

Originality – This study offers one of the first comprehensive, theory-integrated syntheses of digital transformation and intellectual capital in Indonesian Islamic banking, advancing a holistic capability-based framework that explains performance heterogeneity beyond technology adoption alone, while integrating an Islamic law perspective to link Islamic digital economy practices in Sharia banking with socio-economic sustainability, financial inclusion, customer trust, and institutional legitimacy.

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Introduction

Digital transformation has emerged as a defining force that is reshaping the global banking industry, fundamentally altering how financial institutions design business models, deliver services, and engage with customers. Within this context, Islamic banking has experienced an accelerated push toward digitalization in response to fintech competition, regulatory modernization, and the need

to expand outreach while preserving Sharia principles. Recent studies consistently show that the adoption of advanced digital technologies enables Islamic banks to optimize internal operations, enhance service efficiency, and improve accessibility for customers, thereby strengthening their competitive position compared to conventional banks (Putri et al., 2024; Yudaruddin, 2022; Zhao et al., 2023).

Empirical evidence suggests that the operational agility afforded by digital transformation not only streamlines banking processes but also enables Islamic banks to broaden their market reach and enhance their resilience in the face of competitive and macroeconomic pressures (Bousrih, 2023; Wahyuni et al., 2024). However, the effectiveness of digital transformation initiatives depends critically on the availability and deployment of intangible organizational resources, particularly that of intellectual capital. Intellectual capital, commonly conceptualized through its human, structural, and relational components, represents a core driver of value creation in knowledge-intensive service industries such as banking (Afgani et al., 2024; Li et al., 2024; Ullah et al., 2018).

Prior research highlights that banks endowed with strong intellectual capital are better positioned to leverage digital technologies for innovation, service differentiation and sustainable growth (Khanchel et al., 2024; Yilmaz & Tuzlukaya, 2023). Islamic banks have developed distinctive fintech solutions that integrate technological sophistication with ethical finance, forming a digital ecosystem that fundamentally differs from conventional banking systems (Al-Haija et al., 2025; Hammadi et al., 2024; Rahman et al., 2023). While conventional banks often emphasize speed, scale, and profit maximization, Islamic banks must balance innovation with Sharia governance, ethics, and social responsibility. This balance influences not only product design but also governance structures, risk management practices, and customer engagement strategies.

The conceptualization and measurement of firm performance in Islamic banking reflect a dual orientation. Financial performance remains a central concern and is commonly assessed using conventional indicators such as profitability ratios, cost-to-income efficiency, asset quality, and liquidity. In contrast, Sharia-aligned performance emphasizes compliance with Islamic principles, ethical conduct, social impact, and customer satisfaction derived from value-based financial services in the context of Islamic digital economy practices, with stronger attention to financial inclusion, customer trust, and institutional legitimacy as key performance dimensions beyond profitability.

Recent research increasingly advocates for integrated performance frameworks that combine financial outcomes with Sharia-oriented dimensions, thereby offering a more holistic assessment of Islamic banks' success (Afgani et al., 2024; Ristanović et al., 2025; Sayari, 2024). Such multidimensional perspectives are particularly relevant in the digital era, where technological innovation can simultaneously enhance efficiency and reshape the ethical and social roles of the financial institutions. In Indonesia, the world's largest Muslim-majority country, the digital transformation of Islamic banking unfolds within a distinctive institutional and regulatory environment. Recent studies have highlighted that Islamic fintech platforms and digital banking initiatives in Indonesia have introduced innovative solutions aimed at strengthening consumer trust, improving transparency, and expanding financial inclusion (Faizi et al., 2025; Kayed et al., 2024; Putri et al., 2024).

These developments are supported by regulatory guidelines and Sharia rulings that provide clarity on permissible digital financial practices. Empirical evidence suggests that successful digital transformation in Indonesian Islamic banking depends on the ability of institutions to navigate this regulatory environment while simultaneously building internal capabilities that support innovation and compliance (Faizi et al., 2025; Farliana et al., 2024). Despite the growing body of research on digital transformation and performance in Islamic banking, several gaps and inconsistencies remain. A prominent limitation is the dominant focus on financial performance indicators, which often marginalizes Sharia-aligned and socio-ethical outcomes integral to Islamic finance. This narrow focus creates a disconnect between empirical evaluations and the normative foundations of Islamic banking (Haridan et al., 2023; Putri et al., 2024; Sayari, 2024). Furthermore, existing studies employ diverse definitions, proxies, and methodological approaches to capture digital

transformation, ranging from fintech adoption indicators to broader notions of digital maturity. This heterogeneity complicates cross-study comparisons and limits the accumulation of coherent knowledge (Rahman et al., 2023; Yudaruddin, 2024).

Moreover, relatively few studies have explicitly examined the complementary roles of digital transformation and intellectual capital in shaping performance outcomes. The lack of integrative frameworks means that important mechanisms, such as how human capital enables effective technology use or how structural capital supports digital governance, remain underexplored. Addressing these gaps requires a systematic synthesis that integrates financial and Sharia-aligned performance measures, reconciles methodological inconsistencies, and situates empirical findings within a capability-based theoretical framework. Recent calls in the literature emphasize the need for future research to adopt more cohesive measurement approaches and examine digital transformation within the broader context of organizational capabilities and Islamic values (Afgani et al., 2024; Kholidah et al., 2024; Syarif & Aysan, 2024).

In response to these challenges, this systematic literature review synthesizes and critically evaluates existing research on digital transformation, intellectual capital, and firm performance in Indonesian Islamic banking. By examining how these elements interact and identifying key theoretical, methodological, and contextual gaps, this review seeks to advance a more integrated understanding of performance in the digital era of Islamic finance. The findings are expected to contribute to academic scholarship by clarifying capability-based performance pathways while offering practical insights for policymakers and practitioners seeking to strengthen the competitiveness and sustainability of Islamic banks in Indonesia.

Literature Review

This section establishes the theoretical foundations of the relationships between digital transformation, intellectual capital, and firm performance in Islamic banking. In addition to capability-based explanations, Islamic banking performance is assessed through a Sharia objectives-oriented lens that captures ethical conduct, social impact, customer trust, and institutional legitimacy alongside conventional financial outcomes (Alhammadi et al., 2022; Naja, 2023). Drawing on established theories in strategic management and information systems, this discussion integrates the Resource-Based View (RBV), Knowledge-Based View (KBV), and Dynamic Capabilities (DC) theory.

Relevant theories, models, and historical perspectives

Resource-Based View (RBV) and performance differences among banks

From an RBV perspective, banks that effectively leverage intangible resources, such as intellectual capital, brand reputation, and long-standing customer relationships, are more likely to achieve superior performance outcomes (Chatterjee et al., 2024; Ullah et al., 2021). In Islamic banking, reputational assets are closely tied to perceived Sharia alignment, where trust and legitimacy function as strategic resources that shape customer retention and the sustainability of performance outcomes in digital service settings (Hamidi & Worthington, 2021; Sudarwanto et al. 2023).

Empirical research highlights that banks excelling in human capital (skilled and knowledgeable employees), structural capital (efficient organizational processes, information systems, and governance routines), and relational capital (trust-based customer and stakeholder relationships) are better positioned to adapt to market changes and regulatory demands (Feng and Nie, 2024; Li et al., 2024).

Intellectual capital within the Knowledge-Based View (KBV)

The Knowledge-Based View (KBV) extends the RBV by explicitly conceptualizing knowledge and intellectual capital as the most critical strategic resources of the firm. Within KBV, intellectual capital comprises human capital (employees' skills, expertise, and experience), structural capital (organizational routines, databases, and knowledge systems), and relational capital (relationships with customers, regulators, and partners) (Baig et al., 2024; Li et al., 2024). For Islamic banks, knowledge resources also include Sharia governance routines, compliance assurance, and value-

based service design, which strengthen customer trust and institutional legitimacy when banking services shift to digital channels (Hamidi & Worthington, 2021; Sudarwanto et al., 2023).

KBV suggests that effective management of intellectual capital enhances organizational learning, adaptability, and innovation capability, which indirectly translates into improved performance and competitive positioning (Feng & Nie, 2024; Ullah et al., 2021).

Dynamic capabilities and adaptation to digital transformation

In the context of digital transformation, dynamic capabilities enable banks to sense technological and market shifts, seize emerging opportunities, and transform their organizational processes accordingly (Chatterjee et al., 2024; Iman, 2025). In Islamic banking, this renewal must remain consistent with Sharia-aligned objectives, meaning that digital capability building is evaluated not only by efficiency gains but also by whether it sustains trust, fairness, and socially beneficial outcomes such as inclusion (Naja, 2023). Dynamic capabilities are essential for sustaining relevance and efficiency in banks operating in increasingly digitalized financial markets. By fostering organizational learning, experimentation, and flexibility, banks can realign their strategies and reallocate resources in response to fintech competition and evolving customer expectations (Feng & Nie, 2024; Ullah et al., 2021).

Micro-foundations of dynamic capabilities and digital transformation

Micro-foundations of dynamic capabilities in banking organizations

In banking organizations, these micro-foundations operate at the individual, team, and organizational levels, shaping how dynamic capabilities are enacted (Bouheni et al., 2024; Yudaruddin, 2022). First, knowledge management systems play a central role in developing dynamic capabilities by facilitating the acquisition, sharing, and utilization of knowledge across the organization (Bouheni et al., 2024; Chatterjee et al., 2024). Second, collaborative networks, including partnerships with fintech firms and cross-sector collaborations, enhance banks' access to external knowledge and technological expertise, thereby strengthening their adaptive capacity (Le et al., 2024; Yudaruddin, 2022). Third, leadership and organizational culture are critical enablers of dynamic capabilities (Bouheni et al., 2024; Probojakti et al., 2024).

Digital Transformation as a Sensing–Seizing–Transforming Capability

In the sensing phase, banks utilize digital tools and data analytics to monitor customer behavior, market trends, and competitive dynamics, enabling the early identification of opportunities and threats (Nguyen et al., 2023). In the seizing phase, organizations mobilize their technological and intellectual resources to develop digital solutions, such as mobile banking applications or AI-driven customer service platforms, to address identified opportunities (Duan & Zhang, 2025). Finally, the transformation phase involves reconfiguring organizational structures, processes, and business models to embed digital innovations into routine operations, enhancing agility and responsiveness (Senadjki et al., 2023).

This capability sequence is especially relevant in Islamic finance because value capture from digitalization depends on whether digital services simultaneously deliver efficiency and preserve trust-based legitimacy through credible Sharia-aligned governance. Evidence from the Islamic finance and fintech literature indicates that weak regulatory and governance clarity can constrain inclusion and trust outcomes, even when technology adoption expands (Hamidi & Worthington, 2021; Sudarwanto et al., 2023).

Ongoing debates, complementarities, and integrative perspectives

Intellectual capital and digital innovation outcomes

The theoretical links between intellectual capital and digital innovation outcomes are strongly grounded in the KBV. Relational capital further enhances innovation by enabling collaboration and knowledge sharing with external partners and facilitating technology diffusion and ecosystem development (Ardda et al., 2025). Collectively, effective management of intellectual capital translates into superior digital innovation outcomes and improved competitive positioning (García

and Salamanca, 2024). Within Islamic banking, relational capital also reflects value congruence and perceived integrity, which influence customers' willingness to adopt digital services and remain loyal over time (Hamidi & Worthington, 2021; Sudarwanto et al., 2023).

Complementarity between IT capability and organizational resources

IT capabilities amplify the value of human and structural capital by enabling data-driven decision-making, process automation and service innovation (Li et al., 2024; Sun & Zhou, 2024). When aligned effectively, this complementarity enhances operational efficiency, customer service quality, and strategic responsiveness, resulting in superior performance and a competitive advantage (Russo et al., 2025). In Islamic digital finance, complementarity also includes governance capability, where technology-enabled service innovation must be paired with credible Sharia assurance mechanisms to sustain trust and institutional legitimacy (Naja, 2023).

Technology–organization fit and absorptive capacity

Technology–organization fit models, such as the Technology–Organization–Environment (TOE) framework, explain how technological adoption is influenced by organizational readiness and environmental conditions (Ardda et al., 2025). Complementing this view, absorptive capacity theory posits that a firm's ability to recognize, assimilate, and apply external knowledge mediates the relationship between knowledge resources and innovation outcomes (Arslan et al., 2023; Van et al., 2023). Empirical evidence suggests that banks with strong absorptive capacities are better able to integrate new technologies into existing systems, fostering innovation and market responsiveness (Nguyen et al., 2023; Pellegrino et al., 2024). Fintech related evidence in Islamic finance indicates that absorptive capacity must be reinforced by financial literacy and governance readiness to translate digital access into meaningful inclusion and sustainable outcomes (Hamidi & Worthington, 2021; Sudarwanto et al., 2023).

Competitive advantage, leadership, and capability complementarity

In service industries such as banking, intellectual capital is central to establishing and sustaining a competitive advantage. Effective management of human, structural, and relational capital enables firms to adapt quickly to market changes and reinforce their strategic positions (Ardda et al., 2025; Dewi, 2025). Capability complementarity and co-specialization theories further explain how synergy effects arise when organizations align and combine complementary capabilities, either internally or through strategic partnerships, leading to enhanced performance and innovation (Prihandono et al., 2024). Transformational and adaptive leadership styles foster a culture of innovation, collaboration, and change readiness, which are essential for navigating digital disruptions (Arslan et al., 2023; Zhang et al., 2025).

Institutional theory, governance, and integrated frameworks

In regulated industries such as banking, compliance requirements and governance structures shape how resources are deployed and how digital transformation unfolds (Jafari et al., 2025; Shevchenko et al., 2023). Therefore, governance and control mechanisms are integral to capability-based theories, ensuring the alignment, coordination, and effective execution of strategic capabilities (Haridan et al., 2023; Läng et al., 2022).

For Islamic banks, institutional pressures include Sharia governance expectations that function as legitimacy constraints and performance enablers, where customers evaluate digital service quality through operational experience and perceived value alignment (Naja, 2023).

The integration of RBV, KBV, and DC provides a holistic framework for explaining Islamic banking performance. This integrated perspective is strengthened when performance is framed as multidimensional, where financial outcomes are interpreted alongside inclusion, trust, ethical conduct, and institutional legitimacy, which are central to Sharia-aligned banking objectives (Naja, 2023). This integrated perspective offers a robust theoretical foundation for understanding how Islamic banks leverage digital transformation and intellectual capital to achieve sustainable performance in dynamic and regulated environments (Rahman et al., 2023; Wang & Prajogo, 2024).

Research Methods

This study adopts a systematic literature review (SLR) methodology to synthesize and critically evaluate prior research on digital transformation, intellectual capital, and firm performance in Indonesian Islamic banking. In particular, the review process was structured in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, which provides a standardized approach for identifying, screening, and synthesizing relevant studies.

Search strategy

The literature search was conducted using multiple academic databases that are widely recognized for their comprehensive coverage of peer-reviewed research in banking, finance and organizational studies. Consistent with prior SLRs in digital banking and intellectual capital research, the primary database used was Scopus (Maniam, 2024; Saputra et al., 2023).

These keywords were combined using Boolean operators to systematically capture the relevant literature while maintaining precision. Specifically, the operator AND was used to connect different conceptual domains (e.g., “digital banking AND intellectual capital”), OR was applied to include synonyms or closely related terms (e.g., “fintech OR digital banking”), and NOT was used to exclude irrelevant topics (e.g., “digital banking NOT cryptocurrency”). This Boolean-based approach is commonly adopted in SLRs to refine the search results and enhance the relevance and quality of the retrieved studies (Zuhroh, 2021).

Eligibility criteria

Explicit inclusion and exclusion criteria were applied to curate a focused and high-quality corpus of literature. The inclusion criteria were guided by the standards commonly used in SLRs within banking, fintech, and organizational capability research. First, only peer-reviewed journal articles were included to ensure methodological robustness and credibility (Maniam, 2024; Saputra et al., 2023). Second, studies were required to demonstrate direct relevance to digital banking, fintech innovation, and/or intellectual capital within banking contexts, with particular attention to performance implications (Maniam, 2024; Sayari, 2024). Third, to reflect current research trends and technological developments, the review prioritized studies published within a recent time horizon, typically the last five to ten years (Rastogi et al., 2022).

Exclusion criteria were applied to remove studies that did not align with the review objectives. Non-empirical studies lacking systematic data analysis were excluded to maintain a focus on evidence-based findings (Andronie et al., 2023). Studies addressing financial topics unrelated to digital banking, fintech, or intellectual capital were also omitted to preserve thematic coherence (Tarawneh et al., 2024). Studies not available in English were excluded because of accessibility and consistency considerations, as language limitations may hinder accurate interpretation and synthesis (Rastogi et al., 2022).

Screening and selection process

The process began with a clear articulation of the research questions, which guided the development of the search strategy and eligibility criteria (Srivastava & Srivastava, 2024). A PRISMA flow diagram was used to visually summarize the screening and selection stages, including the number of records identified, screened, excluded, and ultimately included in the review (Srivastava & Srivastava, 2024). Depending on the nature of the studies, the synthesis involved qualitative thematic analysis and structured comparison rather than a statistical meta-analysis. This approach is consistent with prior SLRs that integrate diverse empirical designs (Waliullah et al., 2025).

Quality assessment

To ensure the credibility and reliability of the synthesized evidence, all the included studies were subjected to a methodological quality appraisal. For quantitative studies, established instruments such as the Cochrane Risk of Bias Tool and Jadad Scale were used to assess issues related to

randomization, bias, and methodological rigor (Srivastava & Srivastava, 2024). For qualitative studies, the Critical Appraisal Skills Programme (CASP) checklist and Consolidated Criteria for Reporting Qualitative Research (COREQ) were applied to evaluate credibility, relevance, and transparency in reporting (Andronic et al., 2023).

For studies adopting mixed-methods designs, the Mixed Methods Appraisal Tool (MMAT) was used to provide a holistic assessment of methodological quality across qualitative and quantitative components (Bahida et al., 2023). The initial database search yielded 128 records that were screened. To ensure the relevance and quality of the reviewed literature, several refinement steps were applied. First, the subject areas were restricted to Business, Management and Accounting and Economics, Econometrics and Finance, which reduced the number of records to 98. The document type was then limited to peer-reviewed journal articles, resulting in 74 studies being selected. The English-language criterion further narrowed the dataset to 73 articles. An additional filter retaining only DOI-registered publications reduced the pool to 64. Finally, based on a detailed assessment of thematic relevance and alignment with the research questions, 42 articles were selected as the final sample for an in-depth review (see Figure 1).

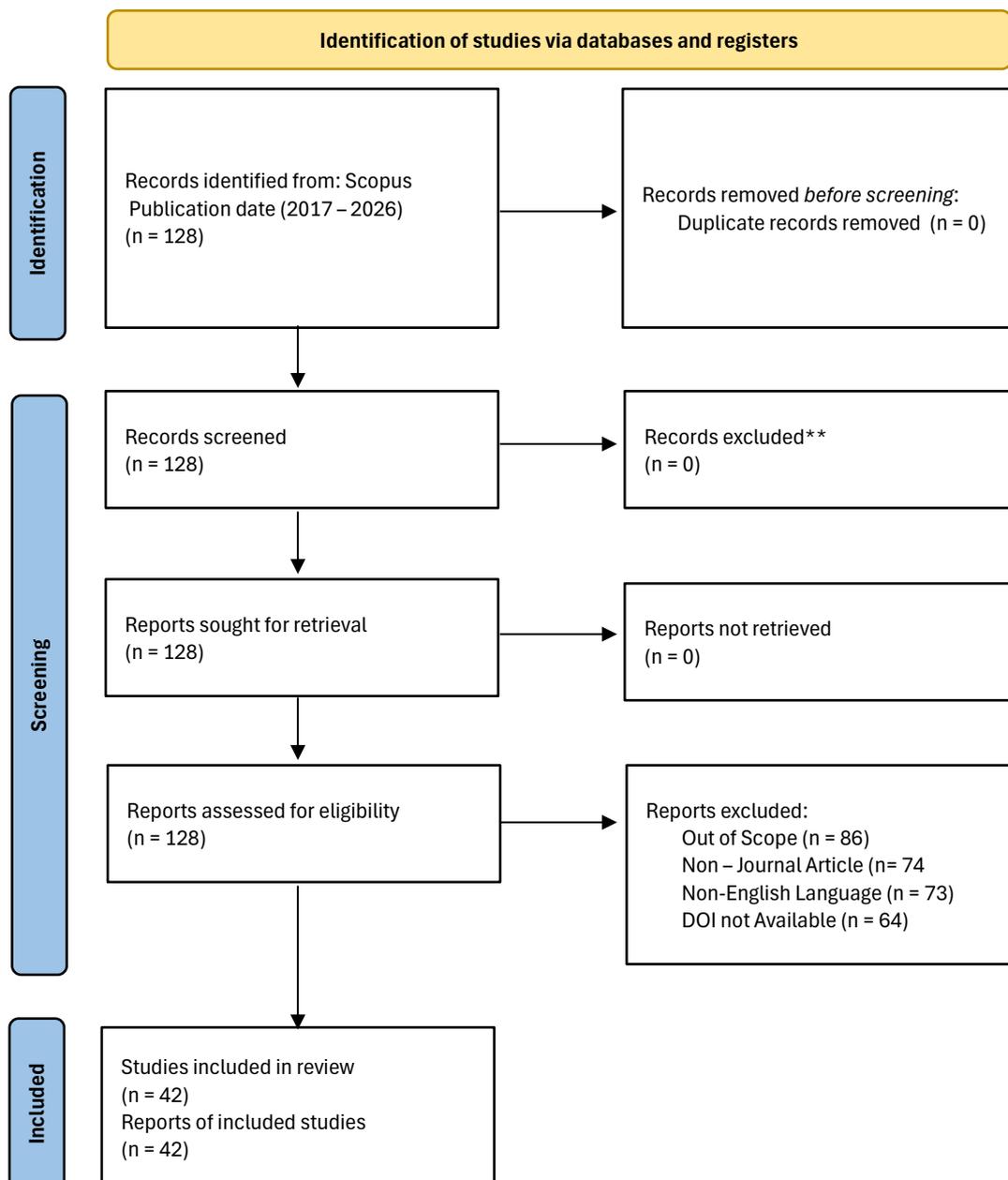


Figure 1. The PRISMA flow diagram detailing the screening and selection process of literature
Source: Processed by Author

Results and Discussion

Digital transformation pathways to performance in Indonesian Islamic banking

The literature reviewed under this theme consistently demonstrates that digital transformation is a critical pathway through which Indonesian Islamic banks enhance their performance, resilience, and sustainability. Importantly, several studies indicate that in Islamic banking contexts, digital transformation outcomes also operate through non-financial pathways, such as financial inclusion, customer trust, and perceived institutional legitimacy, which shape long-term performance sustainability (Naja, 2023; Yusuf & Ichsan, 2021).

At the organizational level, Siswanti et al. (2024) provide direct evidence from 30 Indonesian Islamic rural banks (BPRS) observed over the 2016–2021 period using PLS-SEM. Their findings show that digital transformation has a statistically significant positive effect on financial performance and sustainable business outcomes, with financial performance mediating the relationship between digital transformation and sustainability. In the same setting, digital service reliability and transparency can also be interpreted as trust-reinforcing mechanisms, which are particularly salient for Islamic banks because customers evaluate digital services based on both service quality and perceived Sharia alignment (Naja, 2023; Yusuf & Ichsan, 2021).

Evidence from broader banking sector panels further nuances these findings. Using a large panel of 124 Indonesian banks spanning 2004–2018, Yudaruddin (2023) applies a two-step System GMM approach and finds that fintech startup intensity exerts a negative average effect on bank performance. This heterogeneity is also consistent with Islamic finance performance perspectives that emphasize that capability alignment must support not only efficiency but also inclusion-oriented market expansion and confidence in Shariah-compliant digital offerings (Naja, 2023).

Complementary evidence is offered by Wahyuni et al. (2024), who analyze an unbalanced panel of 121 Indonesian banks (including 16 Islamic banks) before and during the COVID-19 period using a fixed-effects estimation. Their results show that P2P lending growth is positively associated with bank performance, particularly with return on assets (ROA). This quantitative contrast with Yudaruddin (2023) highlights that fintech-driven digital transformation does not uniformly enhance Islamic bank performance; instead, performance outcomes depend on timing, crisis conditions, and banks' internal readiness to absorb fintech-related shocks. From a Sharia objectives-oriented interpretation, crisis period digital shocks may undermine customer trust and perceived legitimacy when risk controls, disclosure, and consumer protection mechanisms do not keep pace with the speed of digital expansion (Naja, 2023).

Beyond financial metrics, digital transformation influences broader sectoral and strategic outcomes. Dahlan et al. (2023), using SEM-PLS on survey data from 178 Islamic banking customers in Indonesia and Malaysia, demonstrate that AI adoption, social dynamics, and political support significantly enhance Islamic banking's progress. This mechanism is also aligned with the view that performance in Islamic finance is multi dimensional, where managerial decisions must translate digital adoption into socially beneficial outcomes, such as wider access and fairer service delivery (Naja, 2023).

Several studies emphasize the roles of fintech collaboration and regulatory contexts in shaping performance outcomes. Rahman et al. (2023) argue, based on a cross-country empirical analysis including Indonesia, that fintech adoption enhances the resilience and post-pandemic recovery of Islamic finance institutions. Similarly, Agustin et al. (2024) highlight that fintech–Islamic bank cooperation can expand market share and financial inclusion, provided that legal certainty and Sharia guidance are established. The emphasis on legal certainty is consistent with Islamic digital finance discussions that link regulatory clarity to public interest protection and the credibility of Sharia-compliant digital contracts (Sudarwanto et al., 2023).

Strategic and ecosystem-oriented perspectives further enrich the evidence base of this study. Iskandar et al. (2022) employed an Analytic Network Process (ANP) to identify internal organizational factors, such as human resources, governance, and process readiness, as higher priorities than external factors in designing Islamic banking fintech models. Moeliadi et al. (2025) provide complementary quantitative evidence using mediation–moderation models, showing that fintech collaboration improves bank sustainability through collaboration capabilities, with

government policy strengthening this effect. In Islamic banking settings, collaboration capability also supports legitimacy because partnerships with fintech providers often require stronger governance assurances to maintain customer confidence (Yusuf & Ichsan, 2021).

Legal and doctrinal perspectives also contribute to the understanding of performance pathways. Yusuf and Ichsan (2021) emphasize that digitalization in Islamic banking must be grounded in Shariah compliance to sustain customer trust and long-term performance. Recent evidence in Islamic banking performance measurement further supports the need to consider Sharia objectives-oriented indicators alongside financial metrics when assessing performance comprehensively (Naja, 2023).

Taken together, the evidence synthesized in Table 1 demonstrates that digital transformation in Indonesian Islamic banking is positively associated with financial performance, sustainability, resilience, and sectoral progress; however, these effects are neither automatic nor uniform.

Table 1. Digital transformation pathways to performance in Indonesian Islamic banking

Authors	DT construct/proxy	Research context & sample	Data & period	Method/model	Performance outcome(s)	Key findings & notes
Siswanti et al. (2024)	Digital transformation	30 BPRS, West Java	2016–2021	PLS-SEM	Financial performance; sustainability	DT positively affects financial performance and sustainability; financial performance mediates DT → sustainability
Yudaruddin (2023)	Fintech startup intensity	124 Indonesian banks	2004–2018	System GMM	Bank performance	Fintech harms average performance but improves Islamic bank performance via interaction
Wahyuni et al. (2024)	P2P fintech lending growth	121 banks (16 Islamic)	Pre & during COVID-19	Fixed effects	ROA	P2P improves ROA overall but negatively interacts with Islamic bank status
Dahlan et al. (2023)	AI adoption	178 Islamic bank customers	Cross-sectional	SEM-PLS	Banking progress	AI improves progress via strategic decision quality
Abdul Rahman et al. (2023)	Fintech adoption	Multi-country incl. Indonesia	Pandemic period	Empirical analysis	Resilience	Fintech strengthens resilience of Islamic finance
Agustin et al. (2024)	Fintech–bank cooperation	Indonesia	Descriptive	Conceptual/empirical	Market reach	Cooperation expands inclusion and market share
Iskandar et al. (2022)	Fintech model strategy	Islamic banking	Cross-sectional	ANP	Strategic readiness	Internal factors dominate fintech strategy
Moeliadi et al. (2025)	Fintech collaboration	Islamic banks	Survey	Mediation–moderation	Sustainability	Collaboration capability mediates DT → sustainability
Yusuf & Ichsan (2021)	Digitalization	Islamic banks	Normative	Legal analysis	Long-term performance	Sharia compliance conditions DT success
Bousrih (2023)	Digital banking	Emerging markets	Panel	Econometric	Inclusion & performance	Digitalization enhances inclusion and efficiency

Source: Processed by Author

Intellectual capital–performance linkages in Indonesian Islamic banking

The evidence summarized in [Table 2](#) demonstrates that intellectual capital (IC) is a central determinant of performance in Indonesian Islamic banking, operating through both direct financial channels and broader Islamic-oriented, innovation, and employee-performance pathways. In addition, several studies imply that intellectual capital also strengthens Sharia-aligned service credibility through improved governance routines, staff competence, and relationship quality, which support customer trust and perceived legitimacy ([Naja, 2023](#)).

Using data from 11 Indonesian Islamic banks over the 2013–2016 period, [Setyawati et al. \(2019\)](#) show that value-added intellectual capital significantly improves profitability and growth, with structural capital efficiency exerting a statistically significant positive effect on assets (ROA) and asset growth. [Faozan \(2023\)](#) highlights the role of governance as a conditioning factor in the IC–performance relationship is highlighted by [Faozan \(2023\)](#). Analyzing quarterly data from 14 Indonesian Islamic banks over the 2015–2019 period (266 observations), the authors find that intellectual capital exerts a beneficial impact on financial performance, and that this effect is strengthened by good corporate governance (GCG). From an Islamic finance perspective, governance strengthened IC also supports legitimacy because credible oversight reinforces confidence that value creation remains aligned with Sharia-compliant objectives ([Naja, 2023](#)).

Beyond conventional profitability measures, several studies have extended the performance lens to Islamic-oriented and market-based outcomes. [Mawardi et al. \(2024\)](#), examining 10 Sharia banks between 2018 and 2022, employ the Islamic Performance Index (IPI) using the profit-sharing ratio (PSR) and demonstrate that both the level of intellectual capital and its growth (ROGIC) significantly enhance Sharia-based performance. Similarly, [Dahlifah and Nopia \(2017\)](#), using data from 11 Islamic banks over the 2009–2013 period, show that intellectual capital and Sharia compliance jointly exert positive and statistically significant effects on firm value, reinforcing the importance of legitimacy and ethical alignment in creating value. This is consistent with broader evidence that multidimensional Sharia-objective-oriented performance measurement provides a more holistic assessment than financial indicators alone ([Naja, 2023](#)).

Temporal dynamics in the IC–performance relationship are explored by [Wahyuni et al. \(2024\)](#), who analyze Islamic banking firms listed on the Indonesia Stock Exchange from 2014 to 2019. Their results indicate that ROGIC predicts current-year financial performance but fails to predict future profitability over a longer horizon. [Satryo et al. \(2025\)](#), drawing on survey data from 288 employees in the Indonesian Sharia banking industry, adopt a dynamic capabilities framework and show that human and relational capital significantly enhance innovation performance through absorptive capacities.

[Pertiwi et al. \(2025\)](#), based on responses from 225 Islamic banking employees, found that leadership strategies, employee engagement, and workforce optimization—key human capital drivers—have direct and indirect positive effects on service innovation, interpreted through Sharia objectives. This perspective is consistent with discussions on Islamic banking performance that emphasize service quality, fairness, and trust as integral outcomes of Sharia-aligned value-based finance ([Naja, 2023](#)).

Additional evidence on human capital micro-foundations is provided by [Eliyana and Istyarini \(2017\)](#), who examine workforce planning, talent management, followership, and knowledge sharing in Indonesian Sharia banking. Similarly, [Gul et al. \(2023\)](#), using SEM-PLS on data from 273 Sharia bank employees in Pekanbaru, demonstrated that competency significantly improves employee performance both directly and indirectly through organizational citizenship behavior (OCB).

Collectively, the evidence summarized in [Table 2](#) indicates that intellectual capital exerts a robust and multifaceted influence on performance in Islamic banking in Indonesia. Quantitative findings across samples ranging from 10 to 14 banks, 130–266 bank-year observations, and 225–288 employee surveys reveal that IC enhances profitability (ROA), firm value, Islamic performance (IPI/PSR), innovation performance, service innovation, and productivity. Consistent with the theoretical foundations outlined in Sections 1 and 3, these findings support the view that intellectual capital represents a strategic resource whose performance impact is maximized when embedded within strong governance structures and complemented by the firm’s dynamic capabilities.

Table 2. Intellectual capital–performance linkages and measurement choices in Indonesian Islamic banking

Refs.	IC measure	Sample/period	Analytical framework	Main results on performance	Implications
Setyawati et al. (2019)	VAIC (HCE, SCE, CEE)	11 Islamic banks; 2013–2016	VAIC-based	Structural capital efficiency improves ROA and asset growth	Strengthen structural capital
Faozan et al. (2023)	IC + GCG	14 Islamic banks; 2015–2019 (266 obs.)	Governance contingency	IC improves financial performance; GCG strengthens effect	Align IC with governance
Mawardi et al. (2024)	IC + ROGIC	10 Sharia banks; 2018–2022	Islamic performance (IPI/PSR)	IC and ROGIC improve Sharia-based performance	Support Islamic objectives
Wahyuni et al. (2023)	ROGIC	Listed Islamic banks; 2014–2019	Predictive analysis	ROGIC predicts current-year performance only	IC growth is short-term signal
Dahlifah & Nopia (2017)	IC + Sharia compliance	11 Islamic banks; 2009–2013	Compliance–value	IC and compliance raise firm value	Combine capability & legitimacy
Akbar (2017)	IC + firm size	Sharia banks; 2011–2014	ISR framework	IC improves profitability; indirect ISR effect	Profit not equal social output
VAICTM study (2022)	VAICTM + FDR + NPF	Islamic banks; 130 obs.	Profitability determinants	IC affects ROA with liquidity & risk	Balance IC and prudence
Satryo et al. (2025)	Human, relational, structural capital	288 employees	Dynamic capabilities	IC improves innovation via DRAC	Institutionalize learning
Pertiwi et al. (2025)	Human capital drivers	225 employees	Maqashid Sharia lens	Human capital improves service innovation	HR as innovation lever
Eliyana & Istyarini (2017)	HR planning & knowledge sharing	Sharia banking workforce	HR capability	IC mechanisms raise employee performance	Address skill gaps
Gul et al. (2023)	Competency + OCB	273 employees	SEM-PLS	Competency boosts employee performance	Invest in competencies

Source: Processed by Author

Complementarity between digital transformation and intellectual capital

The evidence synthesized in [Table 3](#) demonstrates that performance outcomes associated with digital transformation (DT) in Islamic banking are strongly conditioned by complementary intellectual capital (IC) resources. This complementarity also helps explain why digitalization contributes more reliably to inclusion and trust when it is supported by literacy, governance readiness, and credible compliance routines ([Naja, 2023](#)).

At the level of financial inclusion and sustainability, [Rokhlinasari et al. \(2025\)](#) provide quantitative evidence that Shariah-compliant fintech improves MSME sustainability when it is mediated by financial literacy and supported by Shariah banking governance. This finding illustrates how DT-related services depend on complementary IC resources to generate measurable performance outcomes. Similarly, [Dahlan et al. \(2023\)](#), using SEM-PLS on survey data from 178 Islamic banking customers, found that artificial intelligence (AI), social dynamics, and political support significantly improve the progress of Islamic banking only when mediated by the quality of strategic decisions.

Organizational support and internal capability development further reinforce the DT–IC complementarity. [Yasin et al. \(2025\)](#) demonstrated that technology adoption drivers derived from the Technology Acceptance Model (TAM) are significantly strengthened by organizational support, including training, technical assistance, and management encouragement. [Satryo et al. \(2025\)](#), based on 288 employee responses from Indonesian Sharia banks, show that human and relational capital significantly enhance innovation performance through absorptive capacity, with dynamic realized absorptive capacity (DRAC) exhibiting stronger mediating effects than potential absorptive capacity.

Consistent with this, [Pertiwi et al. \(2025\)](#), analyzing survey data from 225 Islamic banking employees, found that leadership strategies, employee engagement, and workforce optimization—key human capital drivers—have significant direct and indirect effects on service innovation, a core outcome of digital and omnichannel transformation. In Islamic banking, these innovation pathways

can reinforce legitimacy because improved service innovation can strengthen perceived fairness, accessibility, and trust in value-based digital finance (Naja, 2023).

Ecosystem-based DT underscores the necessity of relational and structural capital. Moeliadi et al. (2025) show that fintech partnerships improve bank performance sustainability through collaboration capability, with ambidextrous leadership enhancing this pathway and government policy strengthening the conversion of collaboration capability into sustainable outcomes. Yudaruddin (2023), using a two-step System GMM on 124 Indonesian banks over 2004–2018, finds that fintech intensity is detrimental on average but becomes performance-enhancing for Islamic banks when interaction effects are considered.

Crisis-period evidence further illustrates the complementarity gaps. Wahyuni et al. (2024), analyzing 121 Indonesian banks (including 16 Islamic banks) before and during COVID-19, find that while P2P lending growth improves overall bank ROA, the interaction between P2P lending and Islamic bank status is negative and statistically significant, with stronger adverse effects during the pandemic. From a Sharia objectives-oriented perspective, these gaps may also weaken customer confidence if consumer protection and transparency mechanisms lag behind digital expansion (Naja, 2023).

Strategic and institutional perspectives reinforce these findings. Iskandar et al. (2022), using an Analytic Network Process (ANP), identified internal organizational factors—human resources, governance, and process readiness—as the highest priorities in designing Islamic banking fintech models, implying that DT success is contingent on internal IC alignment. Agustin et al. (2024) similarly argue that fintech–Islamic bank cooperation can expand market share and inclusion only when supported by clear legal certainty and Sharia direction, which are critical elements of structural and relational capital. Recent legal and governance discussions on Islamic digital finance similarly emphasize that stronger oversight and clearer compliance frameworks support public interest protection and sustained trust in digital platforms (Hamidi & Worthington, 2021; Sudarwanto et al., 2023).

Collectively, the evidence in Table 3 demonstrates that DT and IC function as complementary rather than independent capabilities in Islamic banks. These results empirically substantiate the theoretical proposition that DT creates performance potential and that IC enables value realization.

Table 3. Evidence of digital transformation (DT) × Intellectual Capital (IC) complementarity and performance effects

Refs.	DT variable(s)	IC variable(s) / proxy	Interaction / mediation design	Performance domain tested	Core complementarity insight
Rokhlinasari et al. (2025)	Shariah-compliant fintech	Financial literacy; governance	Mediation	MSME sustainability	Literacy enables fintech value capture
Dahlan et al. (2023)	AI, social dynamics	Strategic decision quality	Mediation	Banking progress	Decisions convert AI into progress
Yasin et al. (2025)	Technology adoption	Organizational support	Moderation	Adoption readiness	Support strengthens DT adoption
Satryo et al. (2025)	Innovation capability	Human & relational capital	Mediation (DRAC/DPAC)	Innovation performance	Absorptive capacity is key
Pertiwi et al. (2025)	Service innovation	Human capital drivers	Direct/indirect	Service innovation	HR systems drive DT outcomes
Moeliadi et al. (2025)	Fintech collaboration	Collaboration capability	Mediation & moderation	Sustainability	Partnerships need capability & policy
Yudaruddin (2023)	Fintech intensity	Organizational capability (implicit)	Interaction	Bank performance	IC converts fintech pressure
Wahyuni et al. (2024)	P2P lending	Internal capability (implicit)	Interaction	ROA	Capability gaps hurt performance
Iskandar et al. (2022)	Fintech strategy	Internal readiness	ANP prioritization	Strategic readiness	Internal IC dominates DT success
Agustin et al. (2024)	Fintech cooperation	Legal & relational capital	Descriptive	Market reach	Structure & trust enable DT

Source: Processed by Author

Contextual and institutional contingencies shaping performance outcomes

The evidence summarized in [Table 4](#) demonstrates that contextual and institutional contingencies play a decisive role in shaping how intellectual capital (IC) and digital transformation-related capabilities translate into performance outcomes in Indonesian Islamic banking. This contingency logic is consistent with Islamic finance performance approaches that treat legitimacy and public interest protection as enabling conditions for sustainable performance ([Naja, 2023](#)).

[Simanjuntak et al. \(2025\)](#) highlight that governance quality is positively related to Islamic bank performance, while SSB conflicts of interest (such as cross-membership) and audit committee independence condition the strength of this relationship. [Setiawan et al. \(2025\)](#), using a panel fixed-effects estimation, show that corporate governance practices—encompassing board and audit structures—serve as key drivers of financial performance in Islamic banking, indicating that IC-related performance gains are more likely to materialize under robust oversight systems.

[Nainggolan et al. \(2023\)](#) provide more granular governance evidence, documenting that board characteristics and SSB attributes influence risk-taking behavior and, by extension, performance stability. Their findings indicate that female directors are associated with lower risk-taking, while commissioners' and SSB members' Islamic and financial expertise shapes governance effectiveness. Similarly, [Nashirudin and Rosadi \(2025\)](#), analyzing panel data from 2010 to 2020, demonstrate that board characteristics and innovation jointly affect bank performance, reinforcing the view that governance structures condition how innovation and capability investments affect outcomes.

The moderating role of governance is further evidenced in the nexus between IC and performance. [Faozan \(2023\)](#), drawing on quarterly data from 14 Indonesian Islamic banks (266 observations) and employing dynamic panel techniques, found that intellectual capital positively affects financial performance and that good corporate governance (GCG) strengthens this relationship. [Duriyanto et al. \(2025\)](#), through a comparative regulatory analysis of Indonesia and Malaysia, show that Sharia fintech regulation, legal certainty, and supervisory clarity shape fintech viability and Islamic finance outcomes. This policy-enabling role is echoed by [Moeliadi et al. \(2025\)](#), who demonstrate that government policy strengthens the relationship between collaboration capability and sustainability in Islamic banking, indicating that institutional support amplifies the performance returns of relational and structural capitals. Broader Islamic crowdfunding and fintech governance research similarly shows that weak oversight can constrain compliance credibility and reduce the effectiveness of digital finance ecosystems ([Hamidi & Worthington, 2021](#); [Sudarwanto et al. 2023](#)).

Macroeconomic uncertainty and crisis conditions further influence performance outcomes. [Zuhroh \(2021\)](#), using ARDL and mean group estimators across countries, including Indonesia, reports that global economic policy uncertainty (GEP) exerts heterogeneous effects on Islamic bank performance. Crisis-specific evidence is provided by [Yudaruddin \(2023\)](#), who shows that COVID-19 case growth and government policy responses jointly influence bank performance, with differential effects between Islamic and conventional banks during the early stages of the pandemic.

[Wahyuni et al. \(2024\)](#) examine fintech-related shocks under crisis conditions by analyzing 121 Indonesian banks (including 16 Islamic banks) using fixed-effects models before and during COVID-19. Their results indicate that while P2P lending growth is positively associated with overall bank performance, the interaction between P2P lending and Islamic bank status is negative and statistically significant, with stronger adverse effects during the pandemic.

Finally, [Siswanti et al. \(2024\)](#), using PLS-SEM on 30 Islamic rural banks (BPRS) over the 2016–2021 period, find that digital transformation improves financial performance and sustainability, with financial performance mediating the relationship between DT and sustainability. Taken together, the evidence in [Table 4](#) shows that contextual and institutional factors, ranging from governance architecture and Sharia supervision to regulatory policy, macroeconomic uncertainty, and crisis conditions, systematically shape performance outcomes in Indonesian Islamic banking.

These results align with the institutional theory and capability-based perspectives discussed in Section 3, underscoring that performance in Islamic banking is the product of both internal capabilities and the external rules, norms, and uncertainties within which banks operate.

Table 4. Contextual and Institutional Contingencies Shaping DT/IC–Performance Relationships in Indonesian Islamic Banking

Refs.	Contingency factor	Methods / tools	Outcome / relationship affected	Key findings	Future directions
Simanjuntak et al. (2025)	SSB conflicts; AC independence	Governance analysis	Governance → performance	Governance improves performance; effects conditioned by SSB/AC	Refine SSB metrics
Setiawan et al. (2025)	Corporate governance	Panel fixed effects	Governance → financial performance	Strong governance enhances performance	Integrate Sharia governance
Faozan et al. (2023)	GCG moderation	System GMM; 266 obs.	IC → performance	GCG strengthens IC impact	Disaggregate governance
Nainggolan et al. (2023)	Board & SSB traits	Empirical governance study	Risk & performance	Female directors reduce risk	Link to digital risk
Nashirudin & Rosadi (2025)	Board & innovation	Panel regression (2010–2020)	Innovation → performance	Board traits condition outcomes	Model DT explicitly
Durianto et al. (2025)	Fintech regulation	Comparative analysis	Regulation → fintech outcomes	Legal clarity enables DT	Measure policy impact
Zuhroh (2021)	GEPU	ARDL / MG	Uncertainty → performance	Short-run ROA pressure	Test DT buffering
Yudaruddin (2023)	COVID-19 policy	Empirical analysis	Crisis → performance	Policy & cases shape outcomes	Identify policy levers
Wahyuni et al. (2024)	Crisis × fintech	Fixed effects; 121 banks	Fintech → ROA	Negative interaction for IB	Study alliances
Moeliadi et al. (2025)	Government policy	Mediation–moderation	Collaboration → sustainability	Policy strengthens effect	Validate with archives
Siswanti et al. (2024)	Governance context	PLS-SEM; 30 BPRS	DT → sustainability	Governance not significant mediator	Expand samples

Source: Processed by Author

Conclusion

This systematic literature review synthesizes prior evidence on digital transformation, intellectual capital, and performance in Indonesian Islamic banking. In direct answer to the research questions, the reviewed studies indicate that digital transformation is generally associated with improved performance and sustainability-related outcomes, but the effects are heterogeneous across banks and periods, especially under crisis conditions. Intellectual capital consistently supports performance through human capability, structural routines, and relational trust, including outcomes linked to Sharia governance and institutional legitimacy. The evidence also confirms that digital transformation and intellectual capital function as complementary capabilities, meaning that technology-driven gains are stronger and more consistent when supported by adequate knowledge resources, governance routines, and collaboration networks within supportive regulatory settings.

The review's implication is that performance in the digital era is best explained by capability alignment rather than technology adoption alone, highlighting the role of intangible resources and governance credibility in sustaining trust and responsible access to technology. Limitations include the heterogeneous measurement of digital transformation and intellectual capital, an overreliance on short-term financial metrics, limited representation of Sharia-aligned performance, and restricted causal inference due to observational and cross-sectional designs. Future studies should harmonize measurements, incorporate validated Sharia-aligned and socio-ethical performance indicators, apply longitudinal designs, and operationalize governance and regulatory clarity as testable mechanisms shaping digital era outcomes.

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