Digitalization, AI, and Service Quality in Islamic Banks: Customer Satisfaction and Knowledge as Parallel Mediators of Customer-Perceived Financial Performance

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Submitted:
MARCH 2025

Accepted:
JUNE 2025

ABSTRACT

Digitalization and artificial intelligence (AI) are reshaping retail banking, yet evidence on how they translate into financial performance in Islamic banks—particularly through customer-level mechanisms—remains limited. This study investigates the effects of digitalization, AI, and service quality on customer-perceived financial performance, with customer satisfaction and customer knowledge as parallel mediators. A cross-sectional survey was administered to 120 customers of Islamic banks in Medan, Indonesia, selected via purposive sampling (active users of digital services who interacted with AI features within the last six months). Data were analyzed using SEM–PLS. The measurement model met standard quality criteria (convergent and discriminant validity; reliability), and the structural model showed good fit (SRMR = 0.07) and predictive relevance ($Q^2 > 0$). The model explained substantial variance (R^2: satisfaction = 0.431, knowledge = 0.441, perceived financial performance = 0.760). Digitalization, AI, and service quality positively affected satisfaction and knowledge, which in turn improved customers' perceived financial performance; both mediators exhibited significant indirect effects. These findings indicate that robust digital channels and AI capabilities, when delivered with consistent service quality and coupled with effective customer education, enhance satisfaction and knowledge—key pathways through which customers perceive stronger financial performance of their Islamic bank. Practical implications and avenues for future research are discussed.

Keywords: Digitalization; Artificial Intelligence; Service Quality; Customer Satisfaction; Customer Knowledge; Customer-Perceived Financial Performance; Islamic Banks.

ABSTRAK

Digitalisasi dan kecerdasan buatan (AI) semakin membentuk layanan perbankan ritel, namun bukti tentang bagaimana keduanya berkontribusi pada kinerja keuangan berbasis persepsi nasabah

JIAKES

Jurnal Ilmiah Akuntansi Kesatuan
Vol. 13 No. 3, 2025
pg. 611 = 628
IBI Kesatuan
ISSN 2337 – 7852
E-ISSN 2721 – 3048
DOI: 10.37641/jiakes.v13i3.3762

di bank syariah masih terbatas. Studi ini menganalisis pengaruh digitalisasi, AI, dan kualitas layanan terhadap kinerja keuangan persepsi nasabah, dengan kepuasan dan pengetahuan nasabah sebagai mediator paralel. Survei potong lintang dilakukan pada 120 nasabah bank syariah di Medan (purposive sampling: pengguna aktif layanan digital dan pernah berinteraksi dengan fitur AI dalam enam bulan terakhir). Data dianalisis dengan SEM–PLS. Model pengukuran memenuhi syarat validitas–reliabilitas; model struktural menunjukkan SRMR = 0,07 dan $Q^2 > 0$. Varians yang dijelaskan tinggi (R^2: kepuasan = 0,431; pengetahuan = 0,441; kinerja-persepsi = 0,760). Digitalisasi, AI, dan kualitas layanan berpengaruh positif terhadap kepuasan dan pengetahuan, yang selanjutnya meningkatkan kinerja-persepsi nasabah; kedua mediator menunjukkan efek tidak langsung yang signifikan. Hasil menegaskan pentingnya kanal digital yang andal, kapabilitas AI, serta edukasi nasabah dan kualitas layanan yang konsisten untuk meningkatkan persepsi kinerja keuangan bank syariah.

***Kata kunci**: Digitalisasi; Kecerdasan Buatan; Kualitas Layanan; Kepuasan Nasabah; Pengetahuan Nasabah; Kinerja Keuangan (Persepsi Nasabah); Bank Syariah.*

INTRODUCTION

The development of information technology in the last decade has driven significant transformation in the global banking sector, including Islamic banking in Indonesia. Digitalization is a strategic need that not only drives operational efficiency, but also improves service quality and expands customer reach. In this context, digital banking is the main instrument in increasing the competitiveness of Sharia banks (Alwi & al., 2023; Kotler et al., 2021). A report by the Financial Services Authority (OJK, 2023) shows that the trend of adoption of Islamic banking digital services in Indonesia continues to increase, especially in urban areas such as Medan City.

In addition to digitalization, the implementation of Artificial Intelligence (AI) is also starting to be widely adopted by Islamic banks in order to improve the quality of service to customers. AI is used in various forms such as chatbots, product recommendation systems, to real-time customer risk analysis (Biswas et al., 2020; Draganov & al., 2020) A study by (Putra & Rachmawati, 2022) states that the application of AI in the Indonesian banking sector is able to speed up the service process, improve information accuracy, and provide a more personalized service experience for customers.

However, technology alone is not enough. Service quality remains a fundamental factor in building loyalty and customer satisfaction of Islamic banks. The concept of service quality in the context of Islamic banking not only includes physical dimensions and reliability, but also involves aspects of compliance with Sharia principles (Melewar et al., 2021; Parasuraman et al., 1988). (Muttakin et al., 2022) in their study emphasized that customers' trust in Islamic banks is greatly influenced by their perception of the quality of services provided, including the suitability of services with Islamic values.

Customer satisfaction is one of the crucial mediation variables in the relationship between digitalization, AI, service quality, and bank performance. The theory of customer satisfaction developed by (Oliver, 1997) states that satisfaction is the result of the cognitive and affective evaluation of customers on the service experience they receive. Research by (Farihah & Setiawan, 2020) proves that in the context of Islamic banks in Indonesia, the level of customer satisfaction has a positive influence on improving the bank's financial performance.

In addition to satisfaction, customer knowledge also has an important role in strengthening the relationship between service quality and bank performance. Customers who have a good understanding of the products, processes, benefits, and risks of Islamic banking services tend to show higher loyalty and make more transactions (H. Ahmed, 2023; Ghozali, 2021). A study by (Adinugraha, Shulhoni, et al., 2023) also confirms that good Islamic financial literacy from customers can increase positive perceptions of Islamic bank performance.

Although many studies have examined the influence of digitalization, AI, and service quality on bank performance, most studies still focus on conventional banks or only analyze the direct influence between variables without considering the mediating role of customer satisfaction and knowledge (Adinugraha, Shulhoni, et al., 2023; Rashid et al., 2020). In addition, research related to Islamic banks outside the Java Island area, such as in the city of Medan, is also still limited.

Based on this background, this study aims to analyze the influence of digitalization, artificial intelligence, and service quality on the financial performance of Islamic banks, with the role of mediating customer satisfaction and customer knowledge, using a study on customers of Sharia Commercial Banks in the city of Medan.

This study advances the Islamic retail banking literature in four ways. First, it **conceptually disentangles** *digitalization* (channel/feature readiness) from **AI capabilities** (data-driven conversational, personalization, and risk-analytics functions) and operationalizes them with **non-overlapping reflective indicators**, addressing a recurrent measurement flaw in prior work. Second, it tests a **parallel double-mediation** mechanism—through **customer satisfaction** and **customer knowledge**—rather than the common single-mediator approach, thereby clarifying *how* digital/AI investments translate into outcomes. Third, it **contextualizes service quality** for Islamic banking by incorporating **sharia-compliance salience** alongside core SERVQUAL facets. Fourth, it links these antecedents to **customer-perceived financial performance**, offering a practically meaningful yet underexplored outcome that captures customers' integrated assessment of bank performance. Using SEM–PLS, the model demonstrates substantial explained variance, delivering both **conceptual clarity** and **managerial levers** (channels, AI capability building, and customer education).

LITERATURE REVIEW DAN HIPOTESIS

Digitization of Sharia Banking Services

The digitization of Islamic banking services is a process of adopting digital technology in various aspects of Islamic bank operations and services, ranging from transactions, product information, to customer relationship management. Digitalization allows banks to provide easy access to banking services anytime and anywhere with more efficient operational costs (Alwi & al., 2023). In the era of the industrial revolution 4.0, digital banking is one of the keys to improving service quality, expanding market penetration, and strengthening the competitiveness of Islamic financial institutions amid high consumer demands for technology-based services (Putra & Rachmawati, 2022) The implementation of digital banking in Islamic banks includes various features such as mobile banking, internet banking, and other electronic transaction services that support Islamic financial inclusion.

Recent research shows that digitalization not only has an impact on operational aspects, but also has strategic implications for customer satisfaction and financial performance of banks (A. Alshehri, 2024) Customers who feel the convenience and speed of digital services tend to have higher levels of satisfaction, which ultimately has a positive impact on bank loyalty and profitability (H. Ahmed, 2023) According to (Rashid et al., 2020)the success of digital banking implementation in the context of Islamic banking is largely determined by the level of technology adoption by customers and the quality of digital services provided by banks.

Artificial Intelligence (AI) in Sharia Banking Services

Artificial Intelligence (AI) in Islamic banking refers to the use of intelligent systems that can process data automatically to provide fast, accurate, and personalized services to customers (Biswas et al., 2020) This technology is applied in various forms such as chatbots, robo-advisors, fraud detection systems, and personalized product recommendations. According to (Draganov & al., 2020)AI is able to increase the speed of service response and reduce the level of customer complaints.

Research by (Putra & Rachmawati, 2022) shows that the application of AI in Islamic banks can increase customer satisfaction by providing quick solutions to customer complaints and requests. In addition, AI technology is also able to increase customer knowledge through digital education features available in Sharia banking applications (H. M. Ahmed, 2023)

Sharia Service Quality

The quality of sharia services is an important dimension in building a long-term relationship between banks and customers. In the context of Islamic banking, the quality of service does not only involve physical aspects and reliability, but also includes compliance with sharia principles (Melewar et al., 2021) The main dimensions of service quality include tangibles, reliability, responsiveness, and compliance with sharia (Muttakin et al., 2022). Research by (Farihah & Setiawan, 2020) found that service quality has a significant effect on customer satisfaction of Islamic banks in Indonesia. In addition, service quality can also increase customer knowledge related to Islamic bank products and service processes (H. Ahmed, 2023) Through good service interaction, customers become more aware of the benefits and risks of the products they use.

Customer Satisfaction

Customer satisfaction describes the level of positive evaluation of customers of the service experience they receive from Sharia banks (Oliver, 1997) Factors such as service quality, ease of digital access, and AI technology are the main determinants in shaping customer satisfaction (Putra & Rachmawati, 2022) High satisfaction drives customer loyalty and increases the potential contribution to the bank's financial performance. (H. M. Ahmed, 2023; A. F. Alshehri, 2024b) states that satisfied customers tend to make more transactions, extend relationships with banks, and recommend services to other parties. In this context, customer satisfaction has a strategic impact on improving the financial performance of Islamic banks.

Customer Knowledge

Customer knowledge related to Islamic banking products and services is an important factor that influences customer financial decisions. This knowledge includes an understanding of product features, benefits, risks, and service processes available (Ghozali, 2021) Studies by (Adinugraha, Shulhoni, et al., 2023) show that customer knowledge can strengthen the relationship between service quality and bank performance. In addition, (H. Ahmed, 2023) stated that customer knowledge can increase customer involvement in the active use of Islamic banking services. Thus, the higher the customer's knowledge, the greater their potential contribution to the bank's financial performance.

Financial Performance of Sharia Banks

The financial performance of Islamic banks is a reflection of the bank's success in managing resources, increasing profitability, and maintaining financial stability in accordance with Sharia principles (A. F. Alshehri, 2024a) The dimensions of financial performance measurement in this context include perceptions of profitability, financial stability, asset growth, and customer-based financial perceptions (Sutjipto & Hadi, 2024) In the context of this study, measurements are carried out based on customer perceptions of the bank's financial performance. According to (Farihah & Setiawan, 2020) increasing customer satisfaction and knowledge of Islamic bank products has a positive impact on the bank's financial performance. Research by (Adinugraha, Alamsyah, et al., 2023) also confirms that digitalization and adoption of AI can indirectly improve the financial performance of Islamic banks through improving the quality of relationships with customers.

Conceptual Framework Model

To explain the relationship between variables in this study, the following is presented a conceptual framework that describes the influence of digitalization, artificial intelligence, and service quality on the financial performance of Islamic banks through the mediation of customer satisfaction and knowledge.

Based on the literature review and conceptual framework described earlier, this study proposes several hypotheses related to the influence of Digitalization and Artificial

Intelligence on Financial Performance, with the mediating role of Customer Satisfaction. The formulation of this hypothesis is based on theories and empirical findings from various previous studies.

1) Digitalization has a positive effect on Customer Satisfaction
2) Artificial Intelligence has a positive effect on Customer Satisfaction
3) Service Quality has a positive effect on Customer Satisfaction
4) Digitalization has a positive effect on Customer Knowledge
5) Artificial Intelligence has a positive effect on Customer Knowledge
6) Service Quality has a positive effect on Customer Knowledge
7) Customer Satisfaction has a positive effect on Financial Performance
8) Customer Knowledge has a positive effect on Financial Performance
9) Customer Satisfaction significantly mediates the relationship between Digitalization and Financial Performance
10) Customer Satisfaction significantly mediates the relationship between Artificial Intelligence and Financial Performance
11) Customer Satisfaction significantly mediates the relationship between Service Quality and Financial Performance
12) Customer Knowledge significantly mediates the relationship between Digitalization and Financial Performance
13) Customer Knowledge significantly mediates the relationship between Artificial Intelligence and Financial Performance Customer Knowledge significantly mediates the relationship between Service Quality and Financial Performance

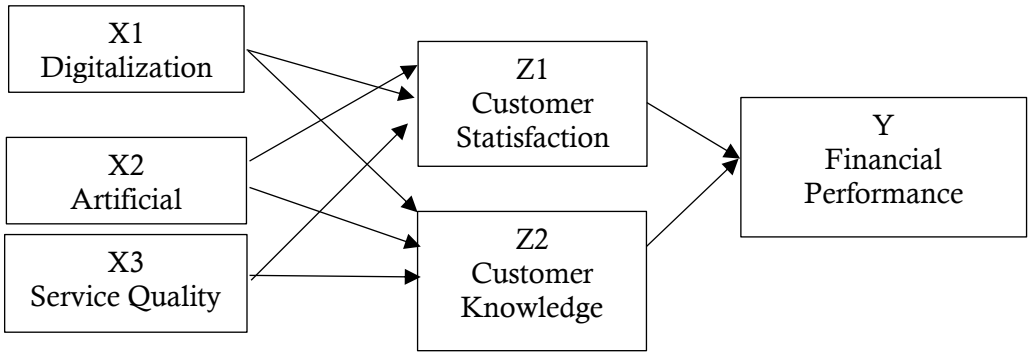

Figure 1. Conceptual Framework

METHODS

This study uses a quantitative approach with a causality design to test the influence of digitalization of Islamic banking services, artificial intelligence (AI), and service quality on the financial performance of Islamic banks, with customer satisfaction and customer knowledge as mediation variables. The population in this study is customers of Sharia Commercial Banks in the city of Medan who have been actively using digital banking services and AI-based services in the last six months. The selection of three banks, namely Bank Syariah Indonesia (BSI), Bank Muamalat Indonesia, and Bank Mega Syariah, is based on the high level of implementation of digital and AI services in the city of Medan as well as the large number of Islamic bank customers according to data (Otoritas Jasa Keuangan, 2023) and Sharia Banking Statistics (OJK, 2023).

Sampling was carried out using purposive sampling techniques, with a total of 120 respondents. This number has met the minimum requirements of the Structural Equation Modeling-Partial Least Squares (SEM-PLS) analysis based on the "10 times rule" of (Hair et al., 2019) Data collection was carried out through an online questionnaire using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), with a total of 72 indicator

items arranged based on the research variables. The sample size (N = 120) in this study is adequate and robust for SEM–PLS analysis. First, an a priori power analysis for multiple regression with a maximum of five predictors, $\alpha = 0.05$, and a medium effect ($f^2 = 0.15$) indicates a minimum required sample of approximately $N \approx 92$; thus, N = 120 exceeds the recommended threshold. Second, the model's strength is reflected in the high endogenous R^2 values—Z1 = 0.431 and Z2 = 0.441 (corresponding to Cohen's $f^2 \approx 0.76$–0.79, large effects) and Y = 0.760 ($f^2 \approx 3.17$, very large)—which, in a post hoc sense, imply power > 0.99 for the principal path tests (note: this post hoc evaluation complements, rather than replaces, the a priori analysis). Third, from a PLS-SEM practice perspective, N = 120 satisfies bootstrap stability requirements (e.g., 5,000 resamples) and comfortably exceeds the lower bound of the "10-times rule" (10 × the number of arrows pointing to the most complex endogenous construct), thereby minimizing risks of unstable estimates and collinearity-driven bias. Taken together, the a priori justification, the model's explanatory power (R^2), and adherence to PLS best practices affirm that our sample size is appropriate and sufficiently powerful to detect effects of theoretical and practical relevance.

To facilitate data measurement and analysis, each variable in this study is described into an operational definition consisting of independent, mediated, and dependent variables. The operational definitions of these variables are compiled based on relevant theory and previous research. Full details of the operational definition of each variable can be seen in Table 1 below:

Table 1. Operational Definition of Research Variables

Variable	Operational Definition	Indicators	Scale	Reference
Digitization of Sharia Banking Services (X1)	The ease and speed of digital banking services improve access, security, and customer service features through internet banking and mobile banking	Accessibility, Efficiency, Security, Service Features	Likert 1-5	(Erwin & Nugroho, 2015; Wahyuningsih & Janah, 2018)
Artificial Intelligence (X2)	The use of artificial intelligence in banking services to improve the convenience, accuracy, and personalization of interactions with customers.	Online Information, Account Opening/Closing, E-commerce Transaction, Online Investment, Customer Profiling	Likert 1-5	(Draganov & al., 2020; Kotler et al., 2021)
Sharia Service Quality (X3)	Customer perception of the quality of Islamic bank services includes physical aspects, reliability, responsiveness, and compliance with sharia principles.	Tangibles, Reliability, Responsiveness, Compliance with Sharia	Likert 1-5	(Al-Qaradawi, 2010; Parasuraman et al., 1988)
Customer Satisfaction (Z1)	The level of customer satisfaction with service quality, digital convenience, and AI services in Islamic banks.	Service Satisfaction, Digital Satisfaction, AI Satisfaction, Overall Satisfaction,	Likert 1-5	(Kotler et al., 2021; Oliver, 1997)
Customer Knowledge (Z2)	The extent to which customers understand the products, service processes, risks, and benefits of Islamic banking is still relatively low to moderate, influenced by financial literacy, product knowledge, service quality, and religiosity	Product Knowledge, Service Process Understanding, Risk Awareness, Benefit Awareness	Likert 1-6	(Hakim, 2017; Permana, 2015; Triana & Mahdi, 2017)

Financial Performance of Sharia Banks (Y)	Customer perception of the profitability, stability, growth, and financial reputation of Islamic banks. (Sutjipto & Hadi, 2024; Hair et al., 2019)	Perceived Profitability, Financial Stability, Growth Performance, Customer-Based Financial Perception	Likert 1-5	(Kurniawati, 2014; Maya, 2019; Prabowo, 2019; Sutjipto & Hadi, 2024)

Source: Secondary Data Processed, 2025

Furthermore, the data were analyzed using the SEM-PLS method through SmartPL software, with testing stages that included the evaluation of the outer model (convergent validity, reliability, and discriminant validity) and the inner model (R^2 test, path coefficient, path significance, effect size (f^2), and predictive relevance (Q^2)).

RESULTS

Evaluation of Outer Model (*Measurement Model*): Testing Validity and Reliability

Convergent validity is part of the measurement model in SEM-PLS known as the outer model, while in covariance-based SEM it is called confirmatory factor analysis (CFA). The convergent validity test was carried out with two main criteria, namely a loading factor value above 0.7 and a significant p-value (<0.05). However, for new questionnaires, often the loading does not reach 0.7 so values between 0.40–0.70 can still be considered by analyzing their impact on average variance extracted (AVE) and composite reliability. Indicators with loads below 0.40 must be removed, while indicators with loads of 0.40–0.70 are only removed if their removal can improve AVE (at least 0.50) and composite reliability (minimum 0.7). In addition, the decision to maintain indicators with low loading must also consider their contribution to the content validity of the construct. The outer loading values for each indicator are shown in Table 2.

Table 2. Validity Testing based on *Outer Loading*

	Artificial Intelligence (X2)	Customer Knowledge (Z2)	Customer Satisfaction (Z1)	Digitalization (X1)	Financial Performance (Y)	Service Quality (X3)
X1.1				0,921		
X1.2				0,919		
X1.3				0,947		
X1.4				0,928		
X2.1	0,921					
X2.2	0,916					
X2.3	0,927					
X2.4	0,930					
X2.5	0,921					
X3.1						0,922
X3.2						0,937
X3.3						0,917
X3.4						0,921
Y1					0,917	
Y2					0,921	
Y3					0,925	
Y4					0,916	
Z1.1			0,929			
Z1.2			0,899			
Z1.3			0,918			
Z1.4			0,927			
Z2.1		0,941				
Z2.2		0,914				
Z2.3		0,933				
Z2.4		0,949				

Source: Primary Data Processed, 2025

Table 2. shows that the results of the convergent validity test based on the outer loading value show that all indicators of each construct have a loading value above 0.7. This shows that all indicators have a good contribution in measuring the latent variable in question. The highest loading value is found in the Z2.4 (Customer Knowledge) indicator of 0.949, while the lowest loading value is Z1.2 (Customer Satisfaction) of 0.899, but it remains above the minimum threshold of 0.7. Thus, all indicators in the model are

declared to meet the criteria of convergent validity, so that they can be continued to the next stage of analysis.

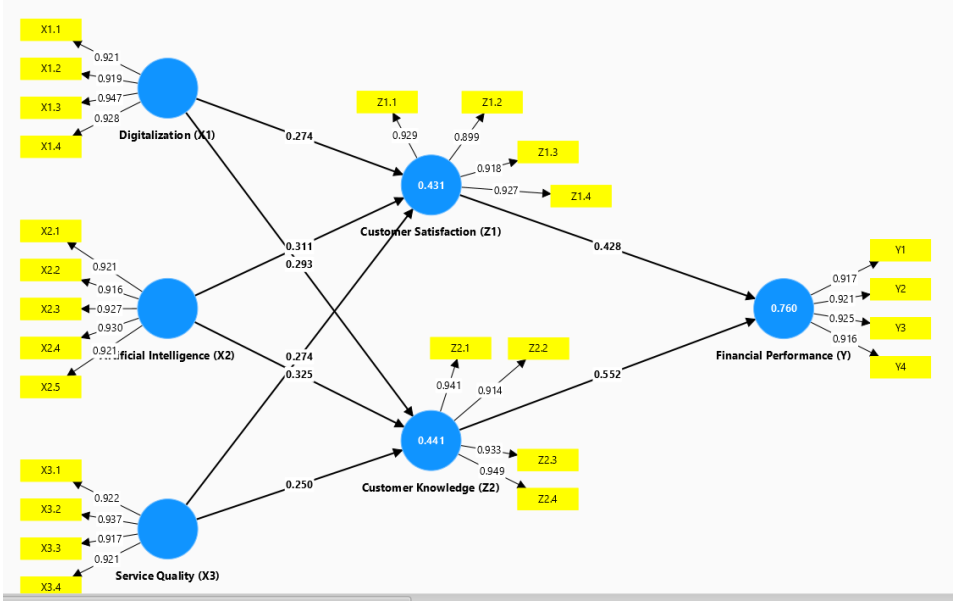

Figure 2. Validity Testing based on *Outer Loading*

Based on the outer loading validity test in Figure 2, it is known that all *outer loading* values > 0.7, which means that they have met the validity requirements based on *the outer loading* value. Furthermore, validity testing was carried out based on *the average variance extracted* (AVE) value.

Table 3. Validity Testing based on Average Variance Extracted (AVE)

	Average variance extracted (AVE)	The Square Root of AVE
Artificial Intelligence (X2)	0,852	0.923
Customer Knowledge (Z2)	0,873	0.934
Customer Satisfaction (Z1)	0,844	0.919
Digitalization (X1)	0,863	0.929
Financial Performance (Y)	0,845	0.919
Service Quality (X3)	0,855	0.925

Source: Primary Data Processed, 2025

Table 3. The results of the Average Variance Extracted (AVE) test showed that all constructs in this study had an AVE value above 0.5, which ranged from 0.844 to 0.873. This shows that each construct is able to explain more than 50% of the variance of its indicators, thus meeting the criteria of convergent validity. The highest AVE value was found in the Customer Knowledge (Z2) variable of 0.873, while the lowest value was in Customer Satisfaction (Z1) of 0.844, but it remained well above the minimum limit of 0.5. Thus, all constructs in the model can be declared to be valid in a convergent manner.

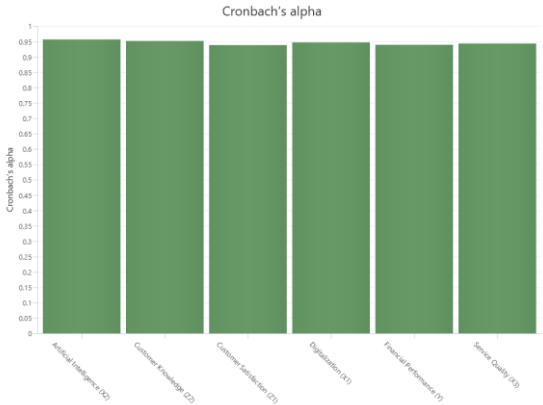

Figure 3. Reliability based on Cronbach's Alpha (CA)

Figure 3. Indicates the recommended CA value is above 0.7. It is known that all CA values > 0.7, which means that they have met the reliability requirements based on

Cronbach's alpha. Next, a discriminatory validity test was carried out using the Fornell-Larcker approach. Table 4. The results of the discriminatory validity test are presented.

Table 4. Discriminant Validity Testing: Fornell & Larcker

Construct	Artificial Intelligence (X2)	Customer Knowledge (Z2)	Customer Satisfaction (Z1)	Digitalization (X1)	Financial Performance (Y)	Service Quality (X3)
Artificial Intelligence (X2)	(0,923)					
Customer Knowledge (Z2)	0,524	(0,934)				
Customer Satisfaction (Z1)	0,512	0,576	(0,918)			
Digitalization (X1)	0,370	0,511	0,497	(0,929)		
Financial Performance (Y)	0,641	0,799	0,746	0,643	(0,919)	
Service Quality (X3)	0,364	0,483	0,496	0,395	0,652	(0,924)

Source: Primary Data Processed, 2025

Table 4. The results of the discriminant validity test using the Fornell-Larcker criterion showed that the square root value of AVE (shown in the diagonal brackets of the table) for each construct was higher compared to the correlation between other constructs. For example, the root value of AVE for Artificial Intelligence (X2) is 0.923, which is greater than the correlation with other constructs such as Customer Knowledge (0.524) and Customer Satisfaction (0.512). The same goes for all other variables. Thus, all constructs in this research model are declared to meet the criteria of discriminant validity, which means that each construct is able to distinguish itself from other constructs in the model.

Table 5. HTMT Discriminant Validity Testing

	Artificial Intelligence (X2)	Customer Knowledge (Z2)	Customer Satisfaction (Z1)	Digitalization (X1)	Financial Performance (Y)
Customer Knowledge (Z2)	0,546				
Customer Satisfaction (Z1)	0,540	0,610			
Digitalization (X1)	0,389	0,538	0,526		
Financial Performance (Y)	0,676	0,844	0,793	0,680	
Service Quality (X3)	0,382	0,509	0,525	0,418	0,693

Source: Primary Data Processed, 2025

The results of the discriminant validity test using the Heterotrait-Monotrait Ratio (HTMT) method as shown in Table 5 show that all HTMT values between constructs are below the maximum threshold of 0.90, in accordance with the criteria suggested by (Henseler et al., 2015). HTMT value between Artificial Intelligence (X2) and Customer Knowledge (Z2) is 0.546, and between Customer Satisfaction (Z1) and Financial Performance (Y) is 0.793, all of which are still below the critical value of 0.90. Thus, it can be concluded that each construct in the model has a clear difference from the other constructs and meets the requirements of discriminant validity based on the HTMT test. These results reinforce the previous findings of the Fornell-Larcker test that the research model has good discrimination between latent variables.

Influence Significance Test (Boostrapping) (Hypothesis Test) (Inner Model)

After evaluating the measurement model, the next step is to test the relationship between latent variables in the inner model through path coefficient analysis using the bootstrapping method. This test aims to determine the significance of the direct influence between variables in the research model. The main parameters that are considered are the original sample value (O), T-statistic, and p-value. A relationship is said to be significant if the T-value is > 1.96 and the p-value < 0.05.

The results of the significance test of the influence between variables in this research model are presented in the following Table 6:

Table 6. Test Path Coefficient & Significance Influence

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Digitalization (X1) -> Customer Satisfaction (Z1)	0,274	0,279	0,085	3,227	0,001
Artificial Intelligence (X2) -> Customer Satisfaction (Z1)	0,311	0,310	0,086	3,615	0,000
Service Quality (X3) -> Customer Satisfaction (Z1)	0,274	0,265	0,090	3,054	0,002
Digitalization (X1) -> Customer Knowledge (Z2)	0,293	0,299	0,089	3,280	0,001
Artificial Intelligence (X2) -> Customer Knowledge (Z2)	0,325	0,327	0,095	3,418	0,001
Service Quality (X3) -> Customer Knowledge (Z2)	0,250	0,239	0,100	2,483	0,013
Customer Satisfaction (Z1) -> Financial Performance (Y)	0,428	0,422	0,117	3,671	0,000
Customer Knowledge (Z2) -> Financial Performance (Y)	0,552	0,558	0,113	4,873	0,000

Source: Primary Data Processed, 2025

Based on Table 6, it can be seen that all the influence paths between latent variables in the model show statistically significant results, as the entire T-statistic value is greater than 1.96 and the p-value is smaller than 0.05. For example, Digitalization (X1) has a significant effect on Customer Satisfaction (Z1) with T = 3.227 and p = 0.001, as well as Artificial Intelligence (X2) on Customer Satisfaction (Z1) (T = 3.615; p = 0.000), and Service Quality (X3) on Customer Satisfaction (Z1) (T = 3.054; p = 0.002).

In addition, the influence of Customer Satisfaction (Z1) and Customer Knowledge (Z2) on Financial Performance (Y) was also proven to be significant with T-statistic values of 3,688 and 5,588, respectively. These findings show that all proposed research hypotheses are acceptable and provide empirical support for the relationships between variables in the model.

In addition to examining the direct influence between variables, this study also conducted an analysis to determine the mediating role played by Customer Satisfaction (Z1) and Customer Knowledge (Z2) in the relationship between exogenous variables (Digitalization (X1), Artificial Intelligence (X2), and Service Quality (X3)) on Financial Performance (Y). This mediation test was carried out using the bootstrapping technique to obtain a significant estimate of the indirect effect. The significance criteria used were the same as the previous hypothesis test, namely T-statistic > 1.96 and p-value < 0.05. The results of the mediation test are presented in the following Table 7:

Table 7. Mediation Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Digitalization (X1) -> Customer Satisfaction (Z1) -> Financial Performance (Y)	0,117	0,119	0,054	2,181	0,030
Artificial Intelligence (X2) -> Customer Satisfaction (Z1) -> Financial Performance (Y)	0,133	0,132	0,056	2,389	0,017
Service Quality (X3) -> Customer Satisfaction (Z1) -> Financial Performance (Y)	0,117	0,116	0,059	1,995	0,047
Digitalization (X1) -> Customer Knowledge (Z2) -> Financial Performance (Y)	0,162	0,169	0,066	2,433	0,015

Artificial Intelligence (X2) -> Customer Knowledge (Z2) -> Financial Performance (Y)	0,180	0,186	0,074	2,416	0,016
Service Quality (X3) -> Customer Knowledge (Z2) -> Financial Performance (Y)	0,138	0,135	0,068	2,021	0,044

Source: Primary Data Processed, 2025

Based on the results shown in Table 7, it can be seen that all the mediated pathways tested showed statistically significant results. For example, Digitalization (X1) has a significant effect on Financial Performance (Y) through Customer Satisfaction (Z1) with a value of T = 2.181 and p = 0.030. Likewise, the influence of Artificial Intelligence (X2) and Service Quality (X3) on Financial Performance (Y) is also significantly mediated by Customer Satisfaction (Z1).

In addition, Customer Knowledge (Z2) has also proven to be a significant mediator in the relationship between Digitalization (X1), Artificial Intelligence (X2), and Service Quality (X3) to Financial Performance (Y). All mediation channels have a T-statistic value above 1.96 and a p-value below 0.05, so it can be concluded that Customer Satisfaction and Customer Knowledge have an important role in mediating the influence of exogenous variables on the financial performance of Islamic banks.

Based on the determination coefficient (R-Square) test, it is known that this model has a fairly strong ability to explain endogenous variables. The R-Square value (R^2) is shown in the following Table 8:

Tabel 8. R-Square

Variabel Endogen	R-Square
Customer Satisfaction (Z1)	0,431
Customer Knowledge (Z2)	0,441
Financial Performance (Y)	0,760

Source: Primary Data Processed, 2025

In table 8. The R^2 value shows that 43.1% of the variation in customer satisfaction can be explained by Digitalization, AI, and Service Quality. Meanwhile, 44.1% of the variation in customer knowledge was explained by these three variables. The 76% variation in the financial performance of Islamic banks (Y) is explained by Customer Satisfaction and Customer Knowledge, showing the strength of a good model.

Furthermore, the results of the Q-Square (Q^2) test show that the entire endogenous construct has a positive Q^2 value, which means that the model has predictive relevance. The full value can be seen in the following Table 9:

Tabel 9. Q-Square

Variabel Endogen	Q-Square
Customer Satisfaction (Z1)	0,353
Customer Knowledge (Z2)	0,372
Financial Performance (Y)	0,631

Source: Primary Data Processed, 2025

In table 9. The results of Q^2, which are all above zero, show that this model is predictively relevant to the endogenous variables in the study.

Furthermore, to assess the overall fit level of the model, a Goodness of Fit (GoF) test with the Standardized Root Mean Square Residual (SRMR) indicator was used. The SRMR value obtained was 0.07, smaller than the maximum limit of 0.10, which means the model has a good match rate. These values are presented in the following Table 9:

Tabel 10. Goodness of Fit Model (SRMR)

Model Fit Index	Value
SRMR	0,07

Source: Primary Data Processed, 2025

In table 10. The results of the Goodness of Fit Model test using the Standardized Root Mean Square Residual (SRMR) indicator, obtained a value of 0.07. This value is lower than the recommended maximum limit of 0.10, as stated by (Hair et al., 2019) These results show that the structural model in this study has a good level of fit between the

research data and the developed theoretical model. Thus, the model used is declared feasible for use in testing relationships between latent variables.

DISCUSSION

The Effect of Digitalization on Customer Satisfaction

The results of this study show that Digitalization has a positive and significant influence on Customer Satisfaction in the context of Islamic banking. These findings show that the higher the level of digitalization of Islamic bank services, the higher the level of customer satisfaction felt. Ease of access, speed of service, transaction security, and completeness of digital service features are the main factors driving increased customer satisfaction. Digital banking allows customers to make transactions anytime and anywhere, thereby strengthening customers' positive perceptions of the quality of Islamic bank services.

These results are in line with previous research by (Zouari & Abdelhedi, 2021) which found that the digitalization dimension contributes significantly to increasing customer satisfaction in Tunisian Islamic banks. Another study by (Nasution et al., 2023) al. (2023) found that the quality of mobile banking has a significant effect on customer satisfaction of the millennial generation. In addition, research (Fadila et al., 2024) confirms that the integration of digital services in Islamic banks has a direct impact on increasing customer satisfaction. Research by (Imran, 2024) also emphasizes that digital banking technology is a major factor in meeting the expectations of younger customers in Bangladesh. In addition, research by (Desky & Maulina, 2022) reinforces these findings, which show that the digital transformation of Islamic banking contributes greatly to improved customer experience and satisfaction.

The Effect of Artificial Intelligence on Customer Satisfaction

The results of this study show that Artificial Intelligence (AI) in Islamic banking services has a positive and significant influence on Customer Satisfaction. The use of AI technology such as chatbots, voice assistants, and product recommendation systems has improved the quality of customer interactions with banks. The use of AI allows banks to provide faster, personalized, and available services 24 hours a day, thereby increasing customer convenience and satisfaction. Aspects such as AI's ability to respond to customer complaints in real time, provide product recommendations as needed, and speed up the transaction process are the main factors that increase customer satisfaction.

These results are consistent with previous research by (Khan & Rabbani, 2021)which found that the implementation of AI-based chatbots in Islamic banking improves the quality of customer interaction and satisfaction. (Alotaibi, 2024) in the context of Saudi Arabia's banking also proves that AI adoption contributes significantly to increasing customer satisfaction despite challenges in its implementation. A study by (Khan & Rabbani, 2020) reinforces these findings by showing that AI chatbots (CaIFE) are able to improve customer experience in the Islamic finance sector. In addition, research by (Alaoui et al., 2022) using an AI approach with Kano Analysis in Morocco shows that AI features in Islamic banking services are an important factor in increasing customer satisfaction. Recent research by (Sunil & Shiny, 2024) also confirms that AI attributes such as visual attractiveness and problem solving have a significant impact on digital banking customer satisfaction.

The Influence of Service Quality on Customer Satisfaction

The results of this study show that Service Quality has a positive and significant influence on Customer Satisfaction in Islamic banks. Service quality dimensions such as tangibility, reliability, responsiveness, and compliance with sharia significantly increase customer satisfaction. Fast, precise, friendly, and in accordance with sharia principles is an important aspect in shaping a positive customer experience.

These findings are in line with research (Mariyanti et al., 2021) which states that service quality, especially in the tangibles and responsiveness aspects, are key factors in increasing customer satisfaction of Islamic banks in Jakarta. In addition, (Zouari & Abdelhedi, 2020) also found that service quality plays a significant role in increasing

customer satisfaction in Islamic banking in Tunisia. (Khan & Rabbani, 2021) that service quality is a dominant factor in driving customer satisfaction of Islamic banks in Pakistan. (Fadila et al., 2024) also emphasized that the quality of sharia-based digital services also plays a role in shaping customer satisfaction.

The Influence of Digitalization and AI on Customer Knowledge

The results of the analysis show that both Digitalization and AI have a positive and significant effect on Customer Knowledge. Easy access to information through mobile banking applications and AI-based chatbots helps customers better understand the products, service processes, risks, and benefits of Islamic banking services. This innovation also improves customer financial literacy and understanding.

These findings are strengthened by research (Judijanto et al., 2024) found that the digitization of Islamic bank services increases customer understanding of banking products. Research (Desky & Maulina, 2022) also shows that digital transformation in Islamic banks contributes to increasing customer literacy. (Alotaibi, 2024) stated that AI in Saudi Arabian banks also emphasizes the importance of utilizing AI to improve customer understanding of bank products. (Khaddam & Alhanatleh, 2024) in a fintech banking study in Jordan concluded that AI increases trust and customer knowledge in Islamic banking services. Lastly, (Khan & Rabbani, 2020) showed that AI-based chatbots help customers understand Islamic bank products and policies in real time.

The Influence of Customer Satisfaction and Customer Knowledge on Financial Performance

The test results show that Customer Satisfaction and Customer Knowledge have a significant positive influence on the Financial Performance of Islamic banks. The high satisfaction and knowledge of customers related to bank products and services encourages increased loyalty, transaction frequency, and the use of more bank products which ultimately has a positive impact on financial performance.

These results are in line with findings (Mulazid & Fatmawati, 2023) which show that customer satisfaction significantly impacts the loyalty and profitability of digital Islamic banks in Indonesia. (Saputra, 2024) also found that the level of customer knowledge strengthens the relationship between the use of bank products and the improvement of financial performance of Islamic banks. (Rachmawati & Putra, 2022) found that customer satisfaction contributes directly to improving financial performance. (Al-Dmour et al., 2022) in Jordan also stated that customer knowledge has a significant effect on banks' financial performance through increasing transaction intensity. In addition, (Judijanto et al., 2024) also shows that customer knowledge is able to increase service usage intention, which leads to an increase in bank revenue.

The Mediation Role of Customer Satisfaction and Customer Knowledge

Mediation testing shows that Customer Satisfaction and Customer Knowledge have a significant role as mediators in the relationship between Digitalization, AI, and Service Quality to Financial Performance. This means that improving the bank's financial performance does not occur directly from the development of digital services and service quality, but through increasing customer satisfaction and knowledge first.

These findings are strengthened by (Febriyanti et al., 2023), who found that customer satisfaction can be a significant mediator in the relationship between service digitization and customer financial decisions in Islamic banks. (Abdillah et al., 2024) also proves the role of customer satisfaction mediation in the relationship between digital banking experience and financial performance. In addition, studies (Khaddam & Alhanatleh, 2024) show that knowledge-based engagement is a major mediator in the relationship between technology and financial outcomes of banks in Jordan. Research by (Rachmawati & Putra, 2022) also shows that customer satisfaction and customer knowledge are mediating channels in improving financial performance in Indonesian Islamic banking. Finally, (Mulazid & Fatmawati, 2023) also emphasized the role of satisfaction mediation in the relationship between digital service quality and financial performance of Islamic banks in Indonesia.

Internationally, the links among digitalization, AI capabilities, service quality, and the parallel mediators of satisfaction and knowledge are likely to **vary across countries** due to differences in digital infrastructure, regulatory regimes (data protection, open banking, regulatory sandboxes), sharia governance arrangements, and cultural preferences toward automation and personalization. Contexts such as **Southeast Asia, South Asia, the GCC/MENA, and Sub-Saharan Africa** span diverse technology adoption trajectories and sharia-compliance salience, which may moderate path strengths in this model. To strengthen global relevance, future studies should conduct **invariance testing (MICOM)** and **multi-group analyses** across countries, and employ **multilevel modeling** with country-level moderators (e.g., national digital readiness, fintech competition intensity, and privacy strictness). At the measurement level, **cross-cultural adaptation** (translation–back-translation, differential item functioning tests) is needed to keep **Digitalization** and **AI** constructs non-overlapping and metrically equivalent. Practically, banks should pair **reliable digital channels** with **transparent, accountable AI**, aligned with local norms on sharia compliance and privacy; regulators can promote **interoperable e-KYC**, collaborative sandboxes, and AI audit standards so benefits are **transferable across jurisdictions** without eroding public trust.

CONCLUSION

This study proves that the digitization of Islamic banking services, the use of artificial intelligence (AI), and service quality have a positive and significant influence on increasing customer satisfaction and customer knowledge. These two mediation variables then significantly contribute to improving the financial performance of Islamic banks. The test results also show that both customer satisfaction and knowledge play an important role as mediators in the relationship between digitalization, AI, and service quality to financial performance.

In practical terms, these findings imply that Islamic banks' efforts to improve financial performance are not enough only by developing digital technology and artificial intelligence, but also need to pay attention to aspects of service quality and customer knowledge empowerment. Customer satisfaction and knowledge are important bridges in connecting technological innovation with improving bank performance. Therefore, Islamic banks in Indonesia, especially in the city of Medan, are advised to continue to invest in the development of user-friendly digital and AI services, while maintaining service quality and improving Islamic financial education for customers.

Limitations and Future Research

This study has several limitations. First, its cross-sectional design limits causal inference; the concurrent self-report of all variables also increases the risk of common method bias, which was not fully mitigated analytically. Second, the outcome is operationalized as **customer-perceived** financial performance rather than objective bank KPIs, so findings should be interpreted as perception-based. Third, the purposive sample of active digital/AI users in a single city (Medan) constrains external validity and may introduce self-selection. Fourth, measurement choices may still blur boundaries between **digitalization** and **AI**; although we propose a cleaner operationalization, future work should validate it rigorously (HTMT with CIs, MICOM/invariance across banks), include standard controls (age, gender, tenure, usage intensity), and address **endogeneity** (e.g., Gaussian-copula or IV/2SLS-PLS). Predictive evidence should be strengthened via **PLSpredict** (RMSE/MAE vs. linear benchmark) and temporal separation or a marker variable to further reduce method bias.

Future research should employ **longitudinal/panel** or quasi-experimental/field A/B designs, link survey responses to **objective KPIs** (ROA, ROE, BOPO, NIM) and behavioral/app-usage logs, and broaden coverage to multi-city or cross-country Islamic banking contexts. Testing **serial/moderated mediation** (e.g., digital/financial literacy, religiosity, or sharia-compliance salience) is warranted. Conceptually, model **AI** as a **second-order formative** construct (conversational AI, personalization/scoring, fraud-risk

analytics) and consider qualitative triangulation (interviews/diaries) to uncover mechanism detail.

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