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Operational Efficiency of Digital vs. Non-Digital Banks in Indonesia: A Comparative Analysis

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Abstract

This study examines the operational efficiency of digital and non-digital banks in Indonesia using panel data from 2015 to 2024. The analysis employs key financial indicators, including profitability (ROA), third-party funds (DPK), loan-to-deposit ratio (LDR), total assets, and a dummy variable representing bank type. The results show that ROA and DPK have a significant negative effect on BOPO, indicating improved efficiency, while LDR has a positive effect, suggesting reduced efficiency. Meanwhile, total assets and bank classification do not show significant effects. These findings indicate that operational efficiency is more influenced by internal financial performance than by the adoption of digital banking models. The study provides insights into banking efficiency dynamics in the context of digital transformation.

Keywords: Operational Efficiency, Total Assets, Return on Assets, Third Party Funds, Loan to Deposit Ratio, Digital Banking, Panel Data

INTRODUCTION

The banking industry is a sector that facilitates monetary transactions in both cash and credit forms, as well as providing various financial services supported by innovation, technology-based disruption, convergence, and data analytics. As banking transactions continue to increase, banks are required to enhance their transaction methods and

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service facilities in order to provide greater convenience for customers (Muhammad Basri & Muarif Leo, 2023). The banking sector also plays a crucial role as a key driver of a country's economy, encompassing consumption, investment, and export–import activities. Its contribution is particularly significant in supporting domestic economic growth, especially as one of the main contributors to Indonesia's Gross Domestic Product (GDP).

Digital transformation has become an unavoidable phenomenon across various industries, including banking. The advancement of information and communication technology has encouraged banks to reform traditional business models into more efficient and adaptive digital systems that respond to changing consumer needs (Nurma Sagita Sari et al., 2025). A bank's ability to generate profits, maintain efficiency, and sustain operational stability amid economic volatility can be evaluated through financial performance indicators. In the banking sector, this is commonly measured using profitability ratios such as Return on Assets (ROA), which reflects how effectively assets are utilized to generate income (Herlanlam et al., 2026).

Along with the rapid technological revolution and the widespread use of mobile internet through smartphones, nearly all sectors connected to the internet have experienced significant growth. One of the most impacted sectors is financial technology (FinTech). Initially, this term referred mainly to the use of computer technology to support internal banking operations or back-office activities. However, its scope has expanded considerably, encompassing a wide range of financial innovations for both commercial and personal financial needs. In addition to improving efficiency, financial stability—particularly in Islamic banking—has become a critical aspect that cannot be overlooked. The utilization of digital technology has the potential to strengthen stability through improved risk management and more integrated monitoring systems (Maulana et al., 2026).

In recent years, developments in information and communication technology have brought fundamental changes to the structure and dynamics of the financial industry. One of the most prominent changes is the emergence of financial technology, which has disrupted traditional business models in the financial sector, including banking. These innovations have transformed how individuals conduct transactions, save money, access financing, and manage their finances in everyday life (Tsakila et al., 2024). The banking industry is also facing the rise of FinTech startups, the growing adoption of blockchain technology, and the dominance of millennial users who tend to be more technologically

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literate. At the same time, increasing cybersecurity threats and fraud risks remain key concerns as banks continuously adapt to the evolving digital environment.

Digital banks are financial institutions that provide all or most of their services end-to-end through digital platforms, without relying on physical branch offices. All processes, including account opening, transactions, and customer service, are conducted online through internet-based applications. The main objective is to create efficiency, accessibility, and a fast and flexible user experience. In contrast, non-digital or conventional banks still rely on physical branch networks and face-to-face interactions in their operations. Although many have adopted technologies such as mobile banking and internet banking, their core services remain partially dependent on manual processes, such as customer identity verification and document handling.

Therefore, the key difference between digital and non-digital banks lies in the level of digitalization of their business processes. Digital banks emphasize automation and technological efficiency, while conventional banks maintain traditional structures that prioritize direct customer interaction. The rapid advancement of information technology has pushed the banking industry to move beyond traditional practices and undergo comprehensive transformation. Currently, technology has entered the era of the Industrial Revolution 4.0, bringing significant changes in how people work, interact, and carry out daily activities. This transformation has also affected the banking sector, which now faces new challenges due to the emergence of FinTech companies as both partners and competitors. As digitalization becomes increasingly embedded in society, particularly in Indonesia's financial sector, banks must recognize the vast potential of digital banking and accelerate their transformation to deliver more accessible, innovative, and customer-oriented financial services.

LITERATUR REVIEW

Agency Theory

Agency theory explains the existence of a contractual relationship between two parties, namely the principal and the agent. The principal, in this context referring to the owners or shareholders, delegates authority to the agent, namely management, to operate the company on their behalf and in their best interest. When both parties share aligned objectives, management is more likely to act in accordance with the owners' interests and support organizational policies aimed at achieving common goals (Chenkiani & Prasetyo, 2023).

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Resouce Based-View Theory

This approach emphasizes that firms need to effectively manage and develop internal resources and capabilities that possess strategic value and are difficult for competitors to imitate. From the perspective of the Resource-Based View, differences in firm performance are largely driven by the uniqueness of resources and capabilities owned by each firm, rather than solely by industry conditions or structural factors (Agustina & Lahindah, 2019).

RESEARCH METHOD

This study adopts a quantitative research approach using panel data to examine the determinants of operational efficiency in Indonesian banks. Quantitative research involves analyzing a specific population or sample through structured data collection and statistical techniques in order to test previously formulated hypotheses. This approach allows for the identification of significant relationships among variables.

The study focuses on analyzing the impact of Total Assets, Return on Assets (ROA), Third Party Funds (DPK), and Loan-to-Deposit Ratio (LDR) on the operational efficiency of digital and non-digital banks in Indonesia within the context of digital transformation.

The sample in this study was selected using a purposive sampling technique based on criteria such as data availability, consistency of financial reporting, and classification of banks into digital and non-digital categories. The final sample consists of 10 banks in Indonesia, comprising 5 digital banks (Bank Aladin Syariah, Bank Jago, Bank Neo Commerce, Blu by BCA Digital, and SeaBank) and 5 non-digital banks (Bank Central Asia, Bank Negara Indonesia, Bank Rakyat Indonesia, CIMB Niaga, and Bank Mandiri). The observation period spans ten years, from 2015 to 2024, providing sufficient variation for panel data analysis. The data used in this study are secondary data obtained from published financial reports of each bank.

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RESULT

Selection of Panel Data Regression Model Techniques

Chow test

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	21.647188	(4,41)	0.0000
Cross-section Chi-square	56.762007	4	0.0000

Figure 1. Chow Test Result

Based on the calculation result above, probability value of Cross-Section Chi-square 0.0000 < α (0.05), it can be concluded that Fixed Effect Model (FEM) will be used.

Hausman Test

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	86.588752	4	0.0000

Figure 2. Hausman Test Result

Based on the calculation result above, probability value of Cross-Section Chi-square 0.0000 < α (0.05), it can be concluded that Fixed Effect Model (FEM) will be used. Lagrange Multiplier Test is not necessary, because the best model has been determined, namely the Fixed Effect Model (FEM).

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Hypothesis Testing

F Test

F-statistic	81.95313
Prob(F-statistic)	0.000000

Figure 3. F Test Result

The F-statistic result of 81.95313 with a probability value of 0.000000 ($p < 0.05$) indicates that the independent variables, when considered simultaneously, have a statistically significant effect on the dependent variable.

T Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	91.58105	7.276166	12.58644	0.0000
ASET	-2.92E-09	2.60E-09	-1.122567	0.2682
ROA	-9.651604	0.734297	-13.14400	0.0000
DPK	-1.79E-08	5.20E-09	-3.440942	0.0013
LDR	0.207959	0.079272	2.623366	0.0122
DUMMY	10.49445	5.075390	2.067714	0.0686

Figure 4. T Test Result

The regression results indicate that several independent variables significantly influence the operational efficiency of banks, as measured by the BOPO ratio.

First, ROA has a negative and highly significant effect on BOPO (coefficient = -9.651604; p-value = 0.0000). This suggests that higher profitability leads to lower BOPO, indicating improved operational efficiency. In other words, banks that are more profitable tend to manage their operational costs more effectively.

Second, DPK also show a negative and significant effect on BOPO (coefficient = -1.79E-08; p-value = 0.0013). This implies that an increase in deposit funds contributes to better efficiency, as banks benefit from more stable and relatively lower-cost funding sources.

In contrast, LDR has a positive and significant effect on BOPO (coefficient = 0.207959; p-value = 0.0122). This indicates that higher lending activity is associated with

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increased operational costs, leading to lower efficiency. It suggests that excessive lending may raise monitoring costs and risk exposure.

Meanwhile, ASET has a negative but statistically insignificant effect on BOPO (coefficient = -2.92E-09; p-value = 0.2682). This indicates that bank size does not have a meaningful impact on operational efficiency in this model.

Similarly, the Dummy variable representing digital and non-digital banks shows a positive but not statistically significant effect (coefficient = 10.49445; p-value = 0.0686). Although the coefficient suggests that one group tends to have higher BOPO, the effect is not strong enough to conclude a significant difference in efficiency between digital and non-digital banks.

Finally, the constant term (C = 91.58105) represents the baseline level of BOPO when all independent variables are equal to zero.

Coefficient of Determiation

R-squared	0.941145
Adjusted R-squared	0.929661

Figure 5. Coefficient of Determiation Result

The coefficient of determination test shows an R-squared value of 0.941145. This indicates that approximately 94.11% of the variation in BOPO can be explained by the independent variables included in the model, namely Total Assets, Return on Assets (ROA), Third Party Funds (DPK), Loan-to-Deposit Ratio (LDR), and the dummy variable. Meanwhile, the Adjusted R-squared value of 0.929661 suggests that about 92.97% of the variation in BOPO remains explained by the model after adjusting for the number of variables used. The remaining 7.03% is influenced by other factors not included in this study.

DISCUSSION

Total Assets on Operational Efficiency

Total Assets have a negative but insignificant effect on operational efficiency (p = 0.2682), indicating that bank size does not necessarily improve efficiency. Larger banks may face higher operational complexity and costs that offset scale advantages. From

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agency theory, greater asset size can increase monitoring costs, while from the RBV perspective, assets only enhance efficiency if managed as strategic resources. This explains why digital banks, despite smaller assets, can achieve comparable or better efficiency through technology optimization.

Return of Asset on Operational Efficiency

ROA has a negative and significant effect on BOPO (p = 0.0000), showing that higher profitability leads to better efficiency. This reflects effective asset management and cost control. From agency theory, higher ROA reduces conflicts by aligning management with shareholder interests, while RBV highlights efficient resource utilization. Digital banks tend to benefit from lean structures and technology-driven operations.

Third Party Fund on Operational Efficiency

DPK negatively and significantly affects BOPO (p = 0.0013), indicating that stronger funding improves efficiency. A larger deposit base provides stable, low-cost funding. From agency theory, higher DPK increases managerial responsibility for efficient allocation, while RBV views it as a strategic resource. Digital banks are more efficient in managing DPK due to lower operational costs.

Loan to Deposit Ratio on Operational Efficiency

LDR has a positive and significant effect on BOPO (p = 0.0122), suggesting that higher lending reduces efficiency due to increased risk and operational costs. Agency theory explains this through higher monitoring costs, while RBV emphasizes the need for strong risk management capabilities. Digital banks are relatively better equipped through data-driven systems, but optimal LDR levels remain crucial.

Variable Dummy on Operational Efficiency

The dummy variable shows a positive but insignificant effect (p = 0.0686), indicating no strong efficiency difference between digital and non-digital banks. The positive sign suggests higher operational costs in one group, likely due to initial digital investment. As digitalization expands across all banks, efficiency is increasingly driven by internal factors such as management quality and cost structure rather than business model alone.

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CONCLUSION

This study concludes that operational efficiency in Indonesian banks is primarily driven by internal financial performance rather than differences in business models. Profitability (ROA) and funding capacity (DPK) significantly improve efficiency, while lending intensity (LDR) tends to reduce it. Meanwhile, Total Assets and the distinction between digital and non-digital banks do not have a significant impact.

These findings imply that bank management should focus on strengthening profitability and optimizing funding structures while maintaining prudent lending strategies. This study is limited by the variables and sample used, and future research is recommended to incorporate additional factors, particularly macroeconomic variables, to provide a more comprehensive analysis of banking efficiency.

This study is limited by the variables and sample used, and future research is recommended to incorporate additional factors, particularly macroeconomic variables such as interest rates, inflation, and economic growth, to provide a more comprehensive understanding of banking efficiency.

REFERENCES

Agustina, I., & Lahindah, L. (2019). Journal of Accounting and Business Studies Vol. 4, No. 1, Maret 2019. *Akuntansi Dan Bisnis*, *4*(1), 77–93.

AladinSyariah, B. (2024). *Membangun Pertumbuhan Usaha dengan Mengedepankan Metode Penyusunan dan Tentang Laporan Tahunan*.

Amalia, N. A., Dewi, L. C., Santoso, A., Faisal, M., Amin, A., & Prasetyo, T. A. (2026). *Dampak Financial Technology (FinTech) dan Bank Digital terhadap Kinerja Perbankan Konvensional di Indonesia*. *3*(November 2025).

Andriyanti, R. O., & Fatimah, A. (2024). Analisis Perbandingan Kinerja Industri Perbankan Indonesia Sebelum Dan Sesudah Era Inovasi Dan Teknologi. *Ekonis: Jurnal Ekonomi Dan Bisnis*, *26*(1). https://doi.org/10.30811/ekonis.v26i1.5019

Annual Report. (2024). *Laporan Tahunan BNI Tahun 2024*. www.bni.co.id.

BCADigital, B. (2024). Annual Report. *Quarterly Journal of Marketing*, *44*(1), 102–104. https://doi.org/10.7222/marketing.2024.037

BCADigital, B., & Anonim. (2024). *Laporan Tahunan Bank BCA 2024*.

Berger, A. N., & Mester, L. J. (1997). *Inside the Black BOX: What Explains Differences in the Efficiencies of Financial Institutions?*. *202*.

BRI, B. et al. (2021). *Annual Report*. *32*(3), 167–186.

Copyright at authors some right reserved this work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.

Chenkiani, P., & Prasetyo, A. (2023). Fraud Dan Monitoring Dalam Perspektif Teori Keagenan. *Jurnal Akuntansi*, *12*(2), 171–180. https://doi.org/10.46806/ja.v12i2.1016

Herlanlam, Q. R., Ahmad, G. N., Parlyna, R., Studi, P., Bisnis, S., Fakultas, D., Dan, E., Universitas, B., & Jakarta, N. (2026). *Pengaruh Transformasi Digital Terhadap Kinerja Keuangan Melalui Efisiensi Operasional Pada Perbankan Periode 2015-2024*. *2*(1), 2233–2253.

Hidayat, R. (2025). *Balance : Jurnal Akuntansi dan Manajemen Efektivitas Layanan Perbankan Digital dalam Meningkatkan Kinerja*. *4*(1), 373–380.

Jensen, M. C., & Meckling, W. H. (n.d.). *Theory of the Firm : Managerial Behavior , Agency Costs and Ownership Structure Theory of the Firm : Managerial Behavior , Agency Costs and Ownership Structure*.

Kazemian, S., & Mohd, Z. (2015). Earnings Management and Ownership Structure. *Procedia Economics and Finance*, *31*(15), 618–624. https://doi.org/10.1016/S2212-5671(15)01149-1

Laksono, B. A. & Nisa, F. L. (2024). *Pemanfaatan Teknologi dalam Perkembangan Operasional Perbankan Syariah*. *1*(3), 117–124.

Muhammad Basri, & Muarif Leo. (2023). Pengaruh Literasi Keuangan dan Digital Terhadap Preferensi Bank Digital. *Journal of Trends Economics and Accounting Research*, *3*(4), 421–427. https://doi.org/10.47065/jtear.v3i4.659

Neo, B., & Anonim. (2024). *Synergizing Strength Strength for Common Common Growth Growth*.

Nurma Sagita Sari, Sabrina Nurhaliza, Ghina Luthfiyatul Azizah, & Atik Budi Paryanti. (2025). Analisis Empiris Dampak Transformasi Digital Terhadap Produktivitas dan Efisiensi Biaya Operasional Pada Bank Komersial di Indonesia. *Journal of Capital Markets and Banking*, *13*(3), 88–97. https://doi.org/10.63607/jcmb.v13i3.26

PT Bank CIMB Niaga Tbk, & Anonim. (2020). Laporan Tahunan PT Bank CIMB Niaga Tbk 2020. *2020 Annual Report PT Bank CIMB Niaga Tbk*, 212. https://investor.cimbniaga.co.id/misc/AR/AR-2023-ID.pdf

PT Bank Mandiri (Persero) Tbk, & Anonim. (n.d.). *[Final - 2105] Laporan Tahunan Bmri 2024 - Single*.

PT Bank Seabank Indonesia, & Anonim. (2024). *Laporan Tahunan & Laporan Keberlanjutan 2024: Strategic Innovation to Empower Digital Growth*. 1. https://appmanager.seabank.co.id/seamoney/bke/app-manager/live/front_low_code/20250430/444724647615724111.pdf

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Tsakila, N. F., Wirahadi, M. A., Fadilah, A. A., & Simanjuntak, H. (2024). Analisis Dampak Fintech terhadap Kinerja dan Inovasi Perbankan di Era Ekonomi Digital. *Indonesian Journal of Law and Justice*, *1*(4), 11. https://doi.org/10.47134/ijlj.v1i4.2787

Umam, K., & Sri Murwanti. (2024). *4151-Article Text-12830-1-10-20240625*. *8*(2), 1257–1268.

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