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# Assessing the Financial Performance of Digital Banks: A Comparative Analysis

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## Abstract

The digital shift drives the banking sector to evolve by creating digital business models. The emergence of digital business models in banking prompts an examination of the financial performance of digital banks relative to traditional banks, considering the substantial investment required and the complexity of the transition process. This study aims to assess the financial performance of two categories of banks: those that have undergone complete digital transformation, or neo-banks, and those that continue to employ conventional business practices in Indonesia or traditional banks. The findings indicate that neo-banks excelled in generating interest income, while traditional banks had greater efficiency, liquidity, and profitability. These findings theoretically explain the productivity paradox theory and offer insights for bank management in formulating policies regarding digital business models.

**Keywords:** Digital Transformation, Digital Bank, Financial Performance, Productivity Paradox

## 1. Introduction

The swift advancement of digital technology is impacting several industrial sectors, including the financial industry and the banking sector. Digital technology has intensified and diversified the competitive landscape, as entities compete offline and online, with the emergence of fintech enterprises with distinct business strategies. The advent of digital technology has transformed client behavior, leading to an increased reliance on online retailers to fulfill their demands (Verhoef et al., 2021). Digital banking represents an initiative to align banking practices with advancements in digital technology and the consequent shifts in customer behavior. The digital transformation in banking began with alterations in traditional bank office operations, referred to as phase 1.0; subsequently advanced to phase 2.0, defined by the implementation of ATM technology; progressed to phase 3.0, driven by innovations in smartphone mobile banking; and is currently in phase 4.0, distinguished by ongoing

digital transformation and the emergence of digital banks providing digital-centric products or services (Vial, 2019). A study from Mogaji (2024) proposed a classification of banks, dividing them into three categories: Traditional Banks Adopting FinTech (TBAF), Traditionally-Driven Neo Banks (TDNBs), and Digitally-Driven Neo Banks (DDNBs). TBAFs are traditional high street banks, while DDNBs function exclusively via mobile applications without physical locations. TDNBs signify a hybrid banking model: a classification of app-only banks created by conventional high street banks. Digitally-driven banks (DDNBs) are also known as neobanks or challengers' banks (Mogaji & Nguyen, 2024). Digital banks, also known as neobanks or challenger banks, exclusively concentrate on digital banking goods and services, providing them through digital channels (Shanti et al., 2024). Although digital transformation is essential for banks to evolve into future-ready organizations, the costs and benefits of such transformation must be meticulously evaluated. The success rates for these transformation initiatives are persistently poor, with fewer than 30% achieving success (Sia et al., 2021).

The growth of digital technology also affects Indonesia, one of the most populous developing nations. In 2020, there were around 202.6 million internet users, constituting 73.7% of the Indonesian population; 345.3 million mobile connections, representing 125.6% of the population; and 170 million active social media users, accounting for 61.8% of the population. On average, the Indonesian population spends 8 hours daily using the internet and 2 hours on social media, with the most used mobile applications being messaging, social media, e-commerce, and mobile banking (FSA, 2021). A McKinsey survey of 900 financial service customers in Indonesia reveals that digital penetration in 2017 is 1.6 times higher than in 2014, reaching 58 percent, consistent with trends across Emerging Asia. Digitally engaged clients in Indonesia acquire more banking products than their non-digital or somewhat digital counterparts (Barquin et al., 2019). Digital banking services in Indonesia started in 2016 and continue to evolve, particularly following the Covid-19 epidemic. Numerous conventional banks transformed into neo-banks, thus altering their vision, mission, and business strategy. Nonetheless, the inquiry in this study is whether there is a disparity in financial performance (profitability, efficiency, liquidity) between neo-banks and traditional banks.

## 2. Literature Review

### 2.1. Digital Transformation and Banking Industry

Digital transformation is a process in which digital technologies induce disruptions that prompt strategic responses from organizations aiming to modify their value creation trajectories while addressing structural changes and organizational obstacles that influence the outcomes of this process (Vial, 2019). Companies must undergo digital transformation, which is driven by advancements in digital technology, heightened digital rivalry, and evolving digital consumer behavior (Verhoef et al., 2021).

Verhoef identifies three stages of digital transformation: digitization, digitalization, and digital transformation. Digitization is the conversion of analog information into a digital format (i.e., binary code), enabling computers to store, process, and communicate this information. Digitalization refers to the utilization of information technology or digital technologies to transform existing business processes. Digital transformation is a significant phase in the business where companies change their business models to gain a competitive advantage. This change involves implementing new business logic to create and capture value, transforming how enterprises deliver value to customers and convert payment into profits (Verhoef et al., 2021).

Digital transformation in banking includes either the deployment of technology or the ongoing innovation and adaptation to shifts in the financial services sector. Banks must cultivate dynamic skills, including the identification of new trends, the exploitation of technological opportunities, and the reconfiguration of organizational structures to enhance innovation and agility. The Resource-Based View (RBV) posits that banks achieve a competitive edge by managing valuable, uncommon, unique, and non-substitutable resources. In the digital transformation era, conventional banks must utilize internal resources such as technological infrastructure, human capital, and customer base to compete with neo-banks and fintech firms. On the other hand, the Dynamic Capabilities (DC) View posits that organizations must constantly adapt their resources and capabilities to achieve enduring success (Di Stefano et al., 2014; Eisenhardt & Martin, 2000).

Digital transformation is an important approach that may markedly enhance bank performance by incorporating digital technology into all company operations. This can augment the competitiveness of banks by offering more personalized and accessible services to clients, resulting in heightened satisfaction, loyalty, and retention rates. Automating normal processes and implementing digital technology may improve operational efficiency, minimize human errors, and save expenses. Digital technologies such as artificial intelligence, machine learning, and robotic process automation can streamline procedures, including account creation, loan management, and fraud detection, leading to diminished overhead costs, enhanced productivity, and improved profitability. Furthermore, digital transformation allows banks to gather and analyze extensive customer data, yielding insights that inform product development, marketing, risk management, and decision-making processes (Doran et al., 2022). Digitalization has also facilitated the rise of new technological startups over established firms and business models that rely more on digital infrastructures than on physical components. Implementing advanced digital technologies, including mobile, artificial intelligence, cloud computing, blockchain, and the Internet of Things (IoT), facilitates significant business enhancements, such as improving customer experience, optimizing processes, and developing innovative business models. Along with that, digitalization has been shown to promote the emergence of new technical startups over traditional enterprises and business models that depend more on digital infrastructures than on physical components. The adoption of advanced digital technologies, such as mobile, artificial intelligence, cloud computing, blockchain, and the Internet of Things (IoT), enables substantial business improvements, including enhanced customer experience, process optimization, and the creation of innovative business models (Ritter & Lettl, 2018; Warner & Wäger, 2019).

## *2.2. Digital transformation and financial performance*

Research on the implications of digitalization yields varied results; some studies indicate a favorable influence on digital transformation, while others do not. The study of digital transformation within the Chinese banking sector indicates that investments in science and technology are more effective, alongside their digital maturity and expertise in digital transformation. The results indicate that investments in digitalization have greatly increased the production efficiency of commercial banks, yet there is variation between institutions (Zuo et al., 2021). A study by Uddin (2020) examines the impact of disruptive digital transformation on bank stability. This study especially examines the effect of the law of diminishing marginal returns from excessive digitalization expenditures on bank stability (Uddin et al., 2020). The study, based on a worldwide sample of 43 nations, reveals that exceeding a specific threshold in digitalization expenditure adversely affects bank stability. The study conducted by Cao et al. (2022) examines how financial institutions invest in digital technology and use their resources. Findings indicate that bank holding companies (BHCs) have not gained the advantages of technological innovation due to inadequate resource management. To enhance performance in resource utilization, banks should augment their diversity levels and cultivate their innovative capabilities (Cao et al., 2022). Furthermore, the ineffectiveness of ICT investments in improving productivity has reinforced the longstanding concept of a 'productivity paradox.' Commonly referred to in the literature as Solow's productivity paradox, this anomaly highlights a scenario in which commercial enterprises exhibit static or declining productivity trends despite significant technological developments (Prakash et al., 2021).

This study aims to evaluate the financial performance of digital banks and traditional banks in Indonesia. This study examines the determinants of bank profitability, efficiency, and liquidity. Key ratios used include return on assets (ROA) and return on equity (ROE). ROA refers to management's ability to gain profit, while ROE measures income available to shareholders for capital invested in the company. Efficient bank performance is crucial for improving profitability, as it reduces costs, lowers loan interest rates, and enhances competitiveness. The cost-to-income ratio (CER ratio) is another determinant of efficiency.

Previous studies have used different approaches to examine determinants of bank efficiency, but inconsistent results have been found. This study uses CER as the determinant of efficiency. The study focuses on Indonesian banks implementing digitalization strategies to increase operational efficiency and improve profitability and liquidity. The main comparison between banks is profitability, efficiency, and liquidity. Bank performance is crucial for assessing the impact of strategic changes like digital transformation. Key metrics for evaluating bank performance include return on assets (ROA), return on equity (ROE), net interest margin (NIM), Cost Efficiency

Ratio (CER), and loan-to-deposit ratio. Digitalization can influence operational efficiency, which is a key predictor of long-term profitability and productivity in the banking sector. Recent research emphasizes the growing importance of these metrics, especially as banks undergo digital transformation to improve financial and operational performance by reducing costs, improving service delivery, and expanding access to new customer bases.

This study employs a quantitative research methodology to compare the financial performance of two groups: the first is a fully digital bank or neo bank, and the second group is a traditional bank whose business models are still conventional. This study examines the profitability ratio, including ROA, ROE, and NIM, efficiency ratio CER, and liquidity ratio (LDR).

### 3. Methods

The study examines the financial data of thirteen traditional banks and five digital banks to determine whether there are any significant differences between the two groups. Data was obtained from the Financial Services Authority-OJK (OJK 2024) website at [www.ojk.go.id](http://www.ojk.go.id) and the respective banks' websites, comprising quarterly financial reports from 2018 to 2022. This research examines profitability ratios (NIM, ROA, ROE), efficiency ratios (CER), and liquidity ratios (LDR). The initial phase of this study involves descriptive analysis, utilizing the Mann-Whitney U test to evaluate the financial performance ratios between neo-banks and traditional banks. The Mann-Whitney U test, or Wilcoxon rank-sum test, is a statistical technique employed to ascertain the statistically significant difference between two independent groups when the assumption of normality is not fulfilled. The assumptions employed in this study are as follows:

Ho: There are no significant differences in financial performance (NIM, ROA, ROE, CER, LDR) between neo-banks and traditional banks

H1: There are significant differences in financial performance (NIM, ROA, ROE, CER, LDR) between neo-banks and traditional banks.

### 4. Result and Discussion

#### 4.1. Descriptive analysis

The descriptive analysis of the two groups, neo-banks and traditional banks, as presented in Table 1, indicates that traditional banks have a better ROA and ROE ratio compared to neo-banks. The ROA and ROE metrics for non-neo banks exhibit superior figures, with a ROA of 1.23% for non-neo banks compared to -1.32% for neo banks and a ROE of 4.54% for non-neo banks vs -5.61% for neo banks. The standard deviation of ROA and ROE for non-neo banks is lower. This suggests that neo-banks frequently need to optimize their assets and equity for income generation efficiently, exhibiting significant disparities in their asset and capital optimization practices. Conversely, the NIM ratio reveals that neo-banks possess a superior NIM value compared to non-neo banks, signifying that neo-banks may produce larger interest income than their non-neo counterparts. Similar to ROE and ROA, the NIM ratio has a significant standard deviation for neobanks, signifying substantial disparities in profitability ratios across them.

Table 1: Descriptive Analysis

Variable	Traditional Bank		Neo Bank	
	Mean	Std Dev	Mean	Std Dev
ROA	1.23	1.20	-1.32	4.14
ROE	4.54	3.31	-5.61	19.66
NIM	4.44	2.15	5.47	3.17
CER	85.9	15.26	112.27	51.27
LDR	77.46	34.73	92.49	96.90

Source: Author's Calculation

The efficiency ratio shown by the CER ratio reveals that neo-banks have a greater CER ratio than non-neo-banks, demonstrating that neo-banks are less efficient in controlling their operating expenditures. This may be attributable to elevated expenses associated with the digital transformation process. Nonetheless, this requires more investigation with more sophisticated techniques. The standard deviation of CER at neo-banks significantly exceeds that of non-neo banks, indicating substantial variability in CER values among neo-banks. Neo-banks have a higher LDR (92.49%) compared to traditional banks (77.46%), indicating that neo-banks are more aggressive in lending relative to their deposit base.

#### 4.2. Comparative analysis

This study employed the Mann-Whitney test to compare the financial performance of Indonesian neo-banks and conventional banks (non-neo banks) during their digital transition. The examined financial measures are Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Cost Efficiency Ratio (CIR), and Loan-to-Deposit Ratio (LDR). These key performance indicators were selected since they provide a holistic perspective on the profitability, efficiency, and liquidity of banks, particularly in the context of technological disruption and digital banking paradigms. The Mann-Whitney test was conducted on 100 data samples from five neo banks and 260 data samples from thirteen conventional banks, with findings presented in Table 2.

Table 2: Mann-Whitney test result

Ratio	Z	Prob >  z	Ho rejected/accepted	Significance
<b>ROA</b>	7.066	0.0000	Ho rejected	Significant
<b>ROE</b>	6.962	0.0000	Ho rejected	Significant
<b>NIM</b>	-2.036	0.0417	Ho rejected	Significant
<b>CER</b>	-6.878	0.0000	Ho rejected	Significant
<b>LDR</b>	-3.871	0.0001	Ho rejected	Significant

Source: Author's calculation

The findings of the Mann-Whitney test presented in Table 3 indicate substantial differences between neo-banks and conventional banks in the ROA, ROE, NIM, CER, and LDR ratios. The test findings indicate substantial disparities in the ROA and ROE ratios between the two groups. The findings indicate that the Return on Assets (ROA) and Return on Equity (ROE) of conventional banks substantially exceed those of neo-banks. This indicates that the assets and equity used are suboptimal in producing returns. The CER figure demonstrates a notable disparity, with neo-banks exhibiting a substantially higher CER compared to traditional banks. This indicates that traditional banks remain more efficient than neo-banks.

Moreover, the test findings indicate considerable disparities between the two groups regarding the NIM ratios, with neo-banks exhibiting superior outcomes compared to conventional banks. This indicates that neo-banks derive greater income from loans in relation to their assets. This raises concern, as it may represent a high-risk strategy. The comparative analysis reveals that traditional banks demonstrate more efficiency and profitability, whereas neo-banks use a more assertive strategy for generating interest revenue.

## 5. Conclusion

Amid the rapid development of the digital economy, this study aims to compare two groups in the financial industry, namely banks with different business models, namely traditional banks and neo-banks. While neo-banks are banks with a business strategy where most operations are digital, traditional banks continue to employ a conventional business model. This study employs descriptive and non-parametric comparative analyses, namely the Mann-Whitney test. The analytical findings indicate substantial disparities between neo-banks and conventional banks in terms of ROA, ROE, NIM, CER, and LDR ratios. Traditional banks remain more lucrative and efficient than neo-banks, yet neo-banks exhibit a more aggressive approach to obtaining interest revenue. A quasi-experimental analysis can be conducted to definitively ascertain the impact of digital transformation on bank

financial performance by comparing treatment and control variables, as well as assessing pre- and post-treatment effects of digitalization.

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