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# COMPARATIVE FINANCIAL PERFORMANCE OF DIGITAL BANKS USING CAMEL MODEL : EVIDENCE FROM INDONESIA DIGITAL BANKING INDUSTRY

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## Abstract

This study aims to evaluate and compare the financial performance of leading digital banks in Indonesia PT Bank Jago Tbk, PT Bank Neo Commerce Tbk, and PT Allo Bank Indonesia Tbk during the period of 2021–2024. Amidst the rapid digital transformation and shifting consumer behavior in Indonesia's financial sector, assessing the stability and sustainability of technology driven institutions is essential. Using a descriptive comparative quantitative approach, this research employs the CAMEL framework, focusing on key financial ratios : Capital Adequacy Ratio, Non Performing Loan, Operating Expenses to Operating Income, Return on Equity, and Loan to Deposit Ratio. Data analyzed using descriptive statistics and ANOVA to identify significant performance differences. The results indicate that while all three banks maintained capital adequacy well above regulatory requirements, significant variances exist in efficiency and profitability. Allo Bank demonstrated superior operational efficiency and the highest profitability, while Bank Neo Commerce faced initial profitability challenges before recovering in 2024. Bank Jago showed a stable transition from aggressive expansion to improved credit quality. Statistical tests confirm significant differences in financial health across the sampled banks. These findings provide valuable insights for regulators in monitoring digital banking stability and for management in optimizing risk based digital business models.

***Keywords : Digital Banking, CAMEL Model, Financial Performance***

## INTRODUCTION

The rapid advancement of digital technology over the past two decades has significantly transformed various sectors of the global economy, including the financial and banking industries. The emergence of technologies such as the internet, mobile applications, cloud computing, big data, and artificial intelligence has accelerated digital transformation within financial services. Digital transformation refers to the integration of digital technology into organizational processes to enhance operational efficiency, optimize service delivery, and create new value propositions for users. Within the banking industry, this transformation has triggered the rise of digital banking, representing a new paradigm in financial service delivery. Recent studies confirm that digital transformation in banking has become a strategic imperative rather than an option, particularly in emerging economics (Chauvet et al., 2024).

Digital banking refers to banking services that leverage digital technology to provide electronic products and services without full reliance on traditional physical branch networks. According to recent literature, digital banking is an evolution of banking institutions toward technology based financial platforms that enable customers to conduct transactions anytime and anywhere via digital devices (Windasari et al., 2022). These services encompass digital account opening, fund transfers, bill payments, investment services, and digital lending platforms. The development of digital banking also contributes significantly to increasing

financial inclusion, particularly for unbanked and underbanked populations. (Demirguc Kunt et al. (2022) in the updated Global Findex Database confirm that digital financial technology has substantially expanded financial access by reducing transaction costs and serving broader segments of society.

In Indonesia, digital banking has experienced significant growth in recent years. Rapid internet penetration, widespread smartphone adoption, and shifts in consumer behavior toward digital financial services have created strong momentum for the expansion of digital banking. As one of the largest digital economies in Southeast Asia, Indonesia consumers increasingly demonstrate a preference for fast, practical, and technology based financial services. Regulatory support also plays a vital role in accelerating this transformation. The Indonesia Financial Services Authority (OJK) issued POJK No. 12/POJK.03/2021 on Commercial Banks, which provides the regulatory foundation for digital banking operations, alongside POJK No. 12/POJK.03/2020 on Minimum Core Capital and the Consolidation of Commercial Banks (Indonesia Financial Authority, 2024).

Among the key players in Indonesia's digital banking ecosystem, three banks stand out as fully licensed digital banks: Bank Jago, Bank Neo Commerce, and Allo Bank. Despite offering advantages such as operational efficiency and improved accessibility, the rapid expansion of digital banks presents financial and operational challenges. Digital banks must maintain financial stability while pursuing aggressive growth, and substantial investments in technology, cybersecurity, and customer acquisition create financial pressure during early development stages (Murinde et al., 2022).

Furthermore, digital banks operate with business models that differ fundamentally from traditional banks, affecting their financial structures and risk profiles. These banks rely heavily on technology based operations, data driven credit decisions, and digital ecosystem partnerships characteristics that influence capital adequacy, asset quality, efficiency, profitability, and liquidity differently from conventional banks (Kowalewski & Pisany, 2022). In the context of financial system stability, evaluating the financial health of digital banks is essential to ensure operational sustainability and maintain public trust. One of the most widely used approaches to assess banking health is the CAMEL framework, which evaluates performance through Capital adequacy, Asset quality, Management efficiency, Earnings, and Liquidity. Recent empirical work continues to validate CAMEL as a robust supervisory and analytical instrument (Roy et al., 2022).

**Research Gap**

Although the CAMEL framework has been extensively applied in prior research, three substantive gaps emerge from a review of recent literature. First, the majority of CAMEL based studies in Indonesia and Southeast Asia continue to focus on conventional commercial banks, state owned banks, or Islamic banks (Wanke et al., 2021), with very limited attention to fully licensed digital banks whose business models, cost structures, and risk profiles differ substantially. Second, studies that do examine digital banks predominantly employ single case designs or sectoral aggregation, and therefore fail to capture strategic heterogeneity among digital banks operating under different ecosystem models Third, most empirical evidence relies on pre 2022 data and therefore does not capture the post pandemic consolidation phase (2021–2024) during which Indonesian digital banks transitioned from rapid customer acquisition to operational maturity and profitability pressure. The combination of these three gap the digital bank context gap, the comparative strategic gap, and the temporal gap justifies an updated, comparative CAMEL analysis on the most prominent fully licensed Indonesian digital banks. This study addresses these gaps directly by comparing three structurally distinct

digital banks using the most recent four year window (2021–2024).

**Rationale for the Selection of Three Digital Banks**

The decision to compare Bank Jago, Bank Neo Commerce, and Allo Bank rests on four substantive criteria that make the comparison theoretically and practically meaningful. First, all three are fully licensed digital banks operating under OJK digital bank regulatory framework (POJK 12/2021), as opposed to conventional banks that merely offer digital services through subsidiary brands. Second, all three were publicly listed on the Indonesia Stock Exchange (IDX) with complete and audited annual reports for the 2021–2024 period, ensuring data comparability and verifiability. Third and most importantly the three banks represent three structurally different digital business models: Bank Jago pursues an open ecosystem collaboration strategy through deep integration with GoTo (Gojek and Tokopedia), Bank Neo Commerce employs an aggressive

retail acquisition model backed by Akulaku Group with rapid customer base expansion; while Allo Bank operates a closed ecosystem model embedded within the CT Corporation. This strategic heterogeneity allows the study to compare not just financial outcomes but also the financial signatures of different digital banking strategies. Fourth, these three banks collectively dominate the public discourse and investor attention on Indonesian digital banking, making findings directly relevant to regulators, investors, and managers.

This research is expected to contribute to the academic literature by providing empirical evidence on the financial performance of digital banks in an emerging digital financial ecosystem. The findings are also expected to provide managerial implications for risk management, capital strengthening, operational efficiency, and the development of sustainable digital business models, as well as practical insights for regulators, investors, and other stakeholders.

## LITERATURE REVIEW

Financial performance serves as a primary indicator used to evaluate an organization's effectiveness in managing resources to achieve operational and strategic objectives. Within the banking industry, financial performance reflects a bank's capacity to generate profits, manage risks, maintain liquidity, and ensure stability. In digital banking, measuring financial performance becomes more complex due to distinct operational characteristics: technology based cost structures, ecosystem dependence, and aggressive customer acquisition strategies that exert temporary pressure on profitability (Naimi Sadigh et al., 2022).

***The CAMEL Model Framework***

The CAMEL model was originally developed by U.S. banking regulators (FFIEC) as a supervisory rating system. It evaluates banks across five dimensions: Capital adequacy, Asset quality, Management efficiency, Earnings, and Liquidity. Recent research confirms that CAMEL remains a robust analytical instrument for assessing banking soundness in emerging markets (Karim et al., 2023). The model strength lies in its ability to combine quantitative ratio analysis with comparative benchmarking across institutions. In the digital banking context, the CAMEL framework is particularly useful because each of its five dimensions captures a critical financial vulnerability that digital banks face: high capital requirements for technology investment, credit risk in data driven lending, operational inefficiency from acquisition costs, profitability pressure during ecosystem building, and liquidity volatility in third party fund mobilization.

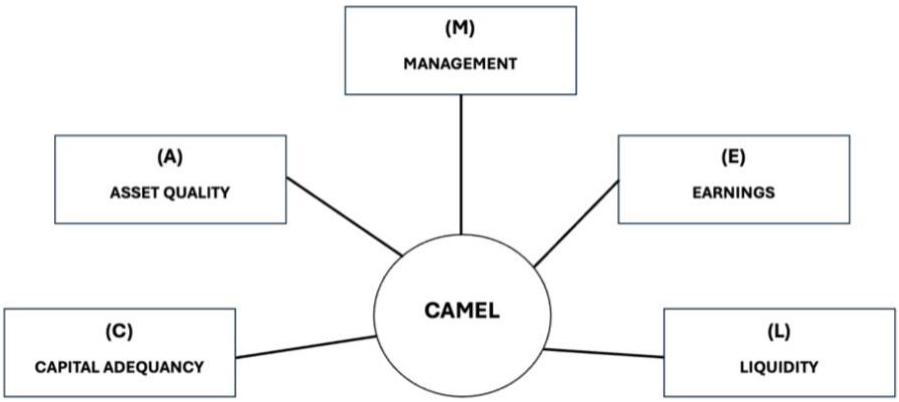


**Fig 1. Component CAMEL Model**

***Theoretical Underpinning***

The selection of CAMEL components in this study is grounded in three complementary theoretical perspectives that directly support each examined variable. First, the Buffer Theory of Capital Adequacy (Calem & Rob, 1999) explains why CAR is a core indicator: banks hold capital above regulatory minimums as a buffer against unexpected losses, and digital banks facing higher operational and cyber risk are predicted to maintain particularly high CAR during expansion phases. Second, Credit Risk Theory and the Information Asymmetry framework (by Berger et al., 2022) provide the theoretical foundation for NPL: digital banks that rely on alternative credit scoring face information asymmetry differently from traditional banks, producing distinctive NPL signatures. Third, the Efficiency Theory of Financial Intermediation (Wanke et al., 2021) underpins the use of BOPO: efficient banks convert operating income into earnings with lower cost to income ratios, and digital banks pursue technology driven efficiency as a core competitive lever. Fourth, the DuPont Profitability Framework (Roy et al., 2022) supports ROE as the earnings indicator: ROE decomposes profitability into operating efficiency, asset turnover, and financial leverage each of which is structurally different in digital banks. Finally, the Liquidity Management Theory (Acharya & Mora, 2015) supports LDR : banks balance intermediation aggressiveness against liquidity risk, and digital banks face unique liquidity dynamics due to the volatility of digital deposits. Together, these theoretical foundations directly justify the five CAMEL ratios selected as study variables.

***Capital Adequacy (CAR)***

The Capital Adequacy Ratio (CAR) measures a bank's ability to provide capital to cover potential losses from credit activities and securities trading. CAR reflects the extent to which a bank's risk weighted assets (RWA) are financed by the bank's own capital in addition to public deposits and debt (Mishkin, 2019). Every bank is required to maintain a minimum CAR of 8% of its RWA according to Basel standards adopted by Bank Indonesia. Fulfilling capital adequacy is not merely a regulatory obligation but also a buffer against economic shocks. A higher CAR indicates greater capacity to absorb operational losses and strengthens financial stability.

***Asset Quality (NPL)***

Credit risk is one of the most significant risks faced by banks because lending is a primary source of income. The level of credit risk depends heavily on the quality of the bank's assets, captured by the Non Performing Loan (NPL) ratio (Berger et al., 2022). NPL reflects management's ability to control bad debts within safe thresholds; OJK sets a maximum NPL of 5%. A lower NPL ratio indicates healthier asset quality and more effective credit risk management, which reinforces overall financial performance.

***Management Efficiency (BOPO)***

The ratio of Operating Expenses to Operating Income (BOPO) is the primary instrument used to evaluate operational efficiency and managerial capability (Purwanti & Mubarokah, 2023). A lower BOPO value signifies higher efficiency: the bank covers all operational expenses using its income effectively. Conversely, a higher BOPO value indicates inefficiency and increases the potential for losses. A low BOPO therefore serves as an important indicator of optimal management and tighter cost control.

***Earnings Ability (ROE)***

Return on Equity (ROE) is a fundamental profitability ratio that measures a company ability to generate net profit relative to shareholders equity (Roy et al., 2022). In banking, stable and competitive profitability is a key pillar of long term institutional health. Higher ROE indicates superior efficiency in utilizing equity to create returns. ROE allows stakeholders to evaluate the extent to which equity is converted into tangible profit and is therefore central to evaluating digital banks transitioning from growth to profitability.

***Liquidity (LDR)***

Liquidity is a pillar of banking stability and reflects a bank's capacity to fulfill payment obligations and financial commitments. The Loan to Deposit Ratio (LDR) is the primary liquidity indicator and compares disbursed credit against collected public funds and equity (Acharya & Mora, 2015). A higher LDR indicates lower liquidity because a large portion of funds is tied up in loans, while a lower LDR reflects stronger liquidity. OJK considers an LDR between 78%– 92% as healthy.

***Research Framework***

The literature and theoretical foundations above, this study evaluates the financial performance of three Indonesian digital banks using five CAMEL ratios (CAR, NPL, BOPO, ROE, LDR) and tests for significant performance differences using one way ANOVA. The conceptual research framework follows the structure.

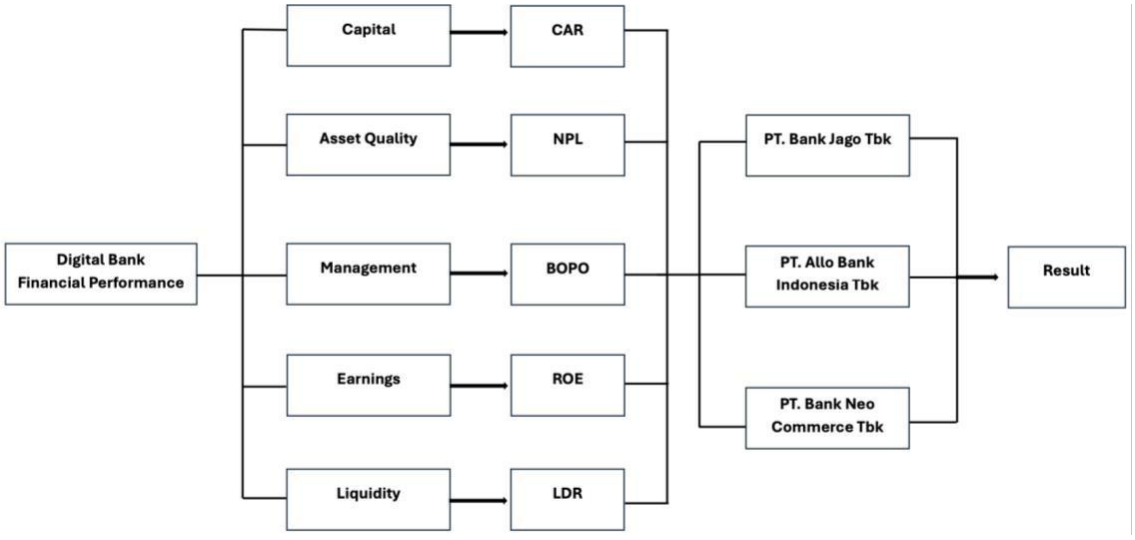


Fig 2. Research Framework Models

## RESEARCH METHOD

### *Research Approach*

This study employs a comparative descriptive quantitative approach. The descriptive component characterizes the financial performance of each bank through CAMEL ratios over the 2021–2024 period, while the comparative component statistically tests whether observed performance differences across the three banks are significant. This approach is appropriate for comparing financial outcomes of institutions operating in the same industry but pursuing different strategic models (Sekaran & Bougie, 2020).

### *Population and Sampling Technique*

The population of this study consists of all fully licensed digital banks operating in Indonesia under OJK's digital banking framework (POJK 12/2021) and listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. As of the end of 2024, there are three publicly listed digital banks in Indonesia (Bank Jago, Bank Neo Commerce, Allo Bank). From this population, the sample was determined using purposive sampling, based on the following selection criteria:

1. The bank operates as a fully licensed digital bank under OJK regulation throughout the 2021–2024 period;
2. The bank is publicly listed on the IDX with audited annual financial reports available for all four years (2021–2024);
3. The bank represents a distinct digital business model so that the comparison captures strategic heterogeneity;
4. The bank reports complete data for all five CAMEL ratios (CAR, NPL, BOPO, ROE, LDR) for every year in the observation window.

Three banks satisfy all four criteria: PT Bank Jago Tbk, PT Bank Neo Commerce Tbk, and PT Allo Bank Indonesia Tbk. The unit of analysis is the bank year, yielding a total sample of 12 firm year observations (3 banks × 4 years × 5 ratios = 60 data points). This sample size is consistent with comparable CAMEL based comparative studies on Indonesian banking (Roy et al., 2022) and is sufficient for one way ANOVA, which requires a minimum of three observations per group.

### *Data Sources and Variables*

Data are secondary, obtained from the audited annual financial statements of each bank for the fiscal years 2021–2024, published on each bank's investor relations website and the IDX. The five variables analyzed are CAR, NPL, BOPO, ROE, and LDR, each calculated according to the standard CAMEL formulation as defined by OJK guidelines.

### *Data Analysis Technique*

Data analysis was performed using IBM SPSS and proceeded in several stages. Descriptive statistics were computed for each ratio across the three banks. The assumptions of one way ANOVA were verified through tests of normality and homogeneity of variance. one way ANOVA was conducted at the 95% confidence level ($\alpha = 0.05$) to identify significant performance differences between the banks for each CAMEL ratio. Decisions were based on the p-value: $p < 0.05$ indicates a significant difference among banks, while $p \geq 0.05$ indicates no significant difference.

## RESULTS AND DISCUSSION

### 1.1 RESULT

#### *1.1.1 Capital Adequacy Ratio (CAR)*

**Table 1. Capital Adequacy Ratio (CAR)**

| Bank Name | 2021 | 2022 | 2023 | 2024 | Average |
|---|---|---|---|---|---|
| PT. Bank Jago Tbk | 169.92 | 82.75 | 61.77 | 44.40 | **89.71** |
| PT. Bank Neo Commerce Tbk | 55.49 | 36.79 | 27.86 | 35.30 | **38.86** |
| PT. Allo Bank Indonesia Tbk | 48.82 | 79.53 | 83.35 | 82.58 | **73.57** |

*Source: processed annual reports, 2021–2024.*

CAR serves as a fundamental indicator within the CAMEL framework. Bank Jago recorded an exceptionally high CAR of 169.92% in 2021, which gradually declined to 44.40% by 2024. This downward trend reflects credit expansion activities and an increase in Risk Weighted Assets. Bank Neo Commerce exhibited relatively lower CAR with a declining trend from 55.49% in 2021 to 27.86% in 2023, before rebounding to 35.30% in 2024 reflecting capital injection dynamics and rights issue activity in late 2023. Allo Bank demonstrated a strengthening trend, with CAR rising from 48.82% in 2021 to 82.58% in 2024, signifying reinforcement of its capital structure. Overall, all three banks remain significantly above the 8% regulatory minimum, confirming that Indonesian digital banks possess resilient capital adequacy levels.

#### *1.1.2 Non Performing Loan (NPL)*

**Table 2. Non Performing Loan (NPL)**

| Bank Name | 2021 | 2022 | 2023 | 2024 | Average |
|---|---|---|---|---|---|
| PT. Bank Jago Tbk | 0.58 | 1.82 | 0.84 | 0.16 | **0.85** |
| PT. Bank Neo Commerce Tbk | 1.75 | 2.56 | 3.73 | 3.30 | **2.84** |
| PT. Allo Bank Indonesia Tbk | 0.52 | 0.01 | 0.08 | 0.81 | **0.36** |

*Source: processed annual reports, 2021–2024.*

Bank Jago maintained an average NPL of 0.85%, fluctuating from 0.58% in 2021 to 1.82% in 2022 before declining to 0.16% in 2024 demonstrating progressive credit quality improvement. Bank Neo Commerce recorded the highest average NPL at 2.84%, rising from 1.75% in 2021 to a peak of 3.73% in 2023 before moderating to 3.30% in 2024, reflecting escalated credit risk from aggressive retail lending. Allo Bank exhibited the strongest asset quality with an average NPL of 0.36%, confirming effective credit risk management within its closed ecosystem model. All three banks remain well below OJK 5% maximum threshold.

#### *1.1.3 Operating Expenses to Operating Income (BOPO)*

**Table 3. BOPO Ratio**

| Bank Name | 2021 | 2022 | 2023 | 2024 | Average |
|---|---|---|---|---|---|
| PT. Bank Jago Tbk | 98.52 | 99.19 | 95.83 | 92.35 | **96.47** |
| PT. Bank Neo Commerce Tbk | 224.01 | 127.28 | 112.27 | 99.34 | **140.73** |
| PT. Allo Bank Indonesia Tbk | 52.38 | 60.51 | 59.87 | 66.78 | **59.89** |

*Source: processed annual reports, 2021–2024.*

BOPO reveals significant efficiency differences across the three banks. Allo Bank achieved the lowest average BOPO of 59.89%, indicating superior cost control within its closed ecosystem model. Bank Jago averaged 96.47%, with a consistent downward trend from 99.19% in 2022 to 92.35% in 2024, showing progressive efficiency improvement. Bank Neo Commerce recorded an exceptionally high average BOPO of 140.73%, although the ratio declined sharply from 224.01% in 2021 to 99.34% in 2024 indicating that operating expenses now nearly equal operating income.

The BOPO ratio is benchmarked against OJK efficiency standards, as elaborated in the BOPO classification used by Indonesian banking regulators (Otoritas Jasa Keuangan, 2023). The corrected classification is presented in Table 4 below.

**Table 4. BOPO Efficiency Classification**

| Health Category | BOPO Threshold |
|---|---|
| Very Healthy | BOPO ≤ 83% |
| Healthy | 83% < BOPO ≤ 85% |
| Fairly Healthy | 85% < BOPO ≤ 87% |
| Less Healthy | 87% < BOPO ≤ 89% |
| Unhealthy | BOPO > 89% |

*Source: Surat Edaran Bank Indonesia No. 13/24/DPNP and OJK (2023).*

The classification clarifies the original article's error in which Very Healthy and Healthy were both assigned the same threshold (<85%). Under the proper Bank criteria, Very Healthy is reserved for BOPO ≤ 83%, while Healthy covers 83%–85%. Applying this classification, Allo Bank (59.89%) falls clearly into the Very Healthy category, Bank Jago (96.47%) falls into Unhealthy, and Bank Neo Commerce (140.73%) is far above the Unhealthy threshold although Neo Commerce 2024 figure of 99.34% indicates substantial efficiency improvement and convergence toward sector norms.

### *1.1.4 Return on Equity (ROE)*

**Table 5. Return on Equity (ROE)**

| Bank Name | 2021 | 2022 | 2023 | 2024 | Average |
|---|---|---|---|---|---|
| PT. Bank Jago Tbk | 1.28 | 0.21 | 1.02 | 1.95 | **1.12** |
| PT. Bank Neo Commerce Tbk | -84.61 | -32.67 | -17.56 | 0.59 | **-33.56** |
| PT. Allo Bank Indonesia Tbk | 25.64 | 4.36 | 6.70 | 6.78 | **10.87** |

*Source: processed annual reports, 2021–2024.*

Allo Bank ROE averaged 10.87%, peaking at 25.64% in 2021 and stabilizing around 6.7%–6.8% in 2023–2024. Bank Jago maintained modest but positive profitability with an average of 1.12% and a strengthening trend reaching 1.95% in 2024. Bank Neo Commerce recorded negative ROE during 2021–2023 (-84.61%, -32.67%, -17.56%),
reflecting heavy front loaded acquisition costs, but turned positive (0.59%) in 2024, signaling the beginning of profitability normalization.

### *1.1.5 Loan to Deposit Ratio (LDR)*

**Table 6. Loan to Deposit Ratio (LDR)**

| Bank Name | 2021 | 2022 | 2023 | 2024 | Average |
|---|---|---|---|---|---|
| PT. Bank Jago Tbk | 145.86 | 113.76 | 107.77 | 94.08 | **115.37** |
| PT. Bank Neo Commerce Tbk | 56.73 | 73.21 | 79.94 | 69.20 | **69.77** |
| PT. Allo Bank Indonesia Tbk | 103.49 | 163.19 | 150.77 | 122.69 | **135.04** |

*Source: processed annual reports, 2021–2024.*

Allo Bank exhibited the most aggressive intermediation stance with an average LDR of 135.04%, peaking at 163.19% in 2022. Bank Jago averaged 115.37% with a declining trajectory toward 94.08% in 2024, indicating strategic recalibration toward more conservative liquidity management. Bank Neo Commerce maintained a more conservative position at 69.77% average, implying additional capacity to expand intermediation in coming years.

### *1.1.6 Result of ANOVA*

**Table 7. Results of ANOVA**

| CAMEL Ratio | Sig. (p-value) | Criterion | Decision |
|---|---|---|---|
| **CAR** | 0.052 | $p > 0.05$ | No significant difference |
| **NPL** | 0.002 | $p < 0.05$ | Significant difference |
| **BOPO** | 0.003 | $p < 0.05$ | Significant difference |
| **ROE** | 0.021 | $p < 0.05$ | Significant difference |
| **LDR** | 0.015 | $p < 0.05$ | Significant difference |

*Source: SPSS output, 2026.*

## 1.2 Discussion

Based on the findings of the CAMEL ratio analysis of Bank Jago, Bank Neo Commerce, and Allo Bank during the 2021–2024 period, there are significant disparities in financial performance among the studied digital banks. these differences indicate that each institution implements distinct business strategies, operational efficiency levels, and
risk management capabilities in executing their respective digital banking business models within the Indonesian digital financial landscape.

a) CAR stands as the sole ratio that fails to register a statistically significant difference among the three banks, producing a p-value of 0.052 that narrowly exceeds the conventional 0.05 threshold. This outcome does not necessarily reflect structural uniformity in capital composition; rather, it emerges from the interplay of several underlying factors:
    1. Volatility : Bank Jago CAR underwent extreme oscillation, collapsing from 169.92% in 2021 to 44.40% by 2024. This pronounced intra group variability amplifies the ANOVA error term and suppresses the F-statistic, effectively masking any meaningful cross bank differences that may otherwise be discernible.
    2. Convergent Capital Buffering : Notwithstanding their distinct business orientations, all three banks consistently upheld CAR figures substantially above the 8% Basel minimum, with group averages spanning from 38.86% to 89.71%. This convergence aligns with Buffer Theory, which argues that nascent digital banks deliberately accumulate surplus capital as a safeguard against technology

related risks and early stage operational uncertainties. Such uniformly cautious conduct naturally pulls their capital ratios toward a common equilibrium.

In sharp contrast to the CAR findings, the remaining four ratios each yield statistically significant results ($p < 0.05$), confirming that the distinctive strategic orientations of each institution are clearly and measurably reflected in their operational performance profiles:

b) NPL ($p = 0.002$): The pronounced inter bank variation in loan quality traces back to fundamentally different credit origination philosophies. Bank Jago and Allo Bank capitalize on proprietary ecosystem derived data to effectively screen borrowers and contain credit risk, while Bank Neo Commerce pursues a considerably more aggressive growth strategy within the open retail lending segment. These contrasting underwriting approaches give rise to meaningfully divergent non performing loan outcomes across the three institutions.

c) BOPO ($p = 0.003$): The considerable disparity in cost efficiency mirrors the structural differences in how each bank acquires customers and manages expenditures. Allo Bank benefits from a closed ecosystem framework that substantially reduces reliance on external marketing channels, thereby lowering its cost base. Bank Neo Commerce, by contrast, bears significantly elevated operational costs driven by its broad retail customer acquisition push and substantial ongoing investments in technology infrastructure.

d) ROE ($p = 0.021$): The significant variation in return on equity underscores differing levels of managerial effectiveness in generating shareholder value from deployed capital. Bank Neo Commerce continues to absorb the financial drag of its front loaded investment outlays and has yet to fully emerge from a loss recovery trajectory, whereas Bank Jago and Allo Bank have already progressed into a phase of steadier and more predictable earnings generation.

e) LDR ($p = 0.015$): Divergence in loan to deposit ratios reflects the contrasting stances each bank adopts toward intermediation intensity and liquidity management. Bank Jago and Allo Bank lean toward more aggressive loan deployment relative to their deposit base, driving their LDRs higher, while Bank Neo Commerce opts for a more restrained lending posture, deliberately preserving greater liquidity buffers as a risk management priority.

## 2. CONCLUSIONS

This study compared the financial performance of three Indonesian digital banks PT Bank Jago Tbk, PT Bank Neo Commerce Tbk, and PT Allo Bank Indonesia Tbk during the 2021–2024 period using the CAMEL framework. Three central conclusions emerge. First, all three banks maintained capital adequacy well above regulatory thresholds (CAR averages of 38.86%– 89.71%), but their capital structures have converged due to OJK minimum core capital regulation, and ANOVA confirms no statistically significant difference in CAR ($p = 0.052$). Second, the four other CAMEL dimensions show statistically significant differences (NPL $p = 0.002$, BOPO $p = 0.003$, ROE $p = 0.021$, LDR $p = 0.015$), reflecting structurally different digital business models:

Allo Bank delivers superior efficiency, asset quality, and profitability through its closed ecosystem model; Bank Jago achieves stable, ecosystem linked credit quality with strengthening profitability; and Bank Neo Commerce shows clear recovery from acquisition driven losses but remains the weakest performer in efficiency and profitability. Third, digital banking heterogeneity in Indonesia manifests most strongly in operating performance rather than capital structure a finding with direct theoretical and managerial relevance.

The study is subject to three limitations that point to future research directions. First, the sample is restricted to three fully licensed digital banks; future research could broaden to seven IDX listed digital banks to strengthen generalizability. Second, the four year window

captures the post pandemic expansion phase but not a full economic cycle; longitudinal extension beyond 2024 will be valuable. Third, future research could complement CAMEL with non financial indicators such as customer acquisition cost, monthly active users, and ecosystem stickiness metrics that more directly capture digital banking dynamics.

**Theoretical Implications**

This study contributes to the literature on banking financial performance in four ways.

1. CAMEL framework into the fully licensed digital banking context, demonstrating that all five CAMEL components remain analytically valid for digital banks but exhibit distinct empirical patterns relative to conventional banks particularly very high CAR wide BOPO dispersion and prolonged ROE volatility (profitability transition). This finding supports and refines Buffer Theory (Anginer et al., 2021) by showing that digital banks systematically maintain higher capital buffers than the theory's traditional bank predictions, and is consistent with recent evidence on fintech and neobank performance in Asia Pacific markets (Li et al., 2024).
2. The study contributes to the strategic heterogeneity literature in banking by showing that different digital business models produce statistically different signatures in four of the five CAMEL dimensions. This empirically operationalizes the qualitative claim in recent literature (Murinde et al., 2022) that digital banks are not a homogeneous category. The finding that NPL, BOPO, ROE, and LDR differ significantly while CAR does not provides a more nuanced theoretical claim: regulatory architecture homogenizes capital structure, but strategic choice differentiates operating performance.
3. The study refines Credit Risk Theory (Berger et al., 2022) for the digital lending context by demonstrating that ecosystem collaboration models (Jago, Allo) achieve markedly lower NPL than data driven aggressive acquisition models (Neo Commerce) evidence that closed information loops within ecosystems mitigate information asymmetry more effectively than open population alternative credit scoring during early growth phases.
4. The study extends Efficiency Theory of Financial Intermediation (Wanke et al., 2021) by showing that BOPO trajectories follow a learning curve in digital banks: extreme inefficiency (BOPO > 200%) in launch years that gradually converges toward sectoral norms (BOPO around 90%–100%) within three to four years. This contributes a temporal dimension to efficiency theory that is underdeveloped in the existing literature.

**Managerial Implications**

For digital bank management, the findings yield five concrete implications.

1. Capital management should explicitly distinguish between regulatory compliance (8% Basel minimum) and strategic buffer (technology and cyber risk reserve). The 38.86%–89.71% average CAR observed across the three banks suggests that digital banks should maintain at least a 30%–40% CAR during scaling phases, then gradually optimize as RWA matures.
2. BOPO control should be treated as a phased program: the Neo trajectory (from 224.01% to 99.34%) shows that aggressive front loaded investments can be normalized within four years, but management must explicitly plan the convergence path rather than rely on growth alone.
3. Credit risk management should align with the chosen business model. Aggressive acquisition models (Neo Commerce) require substantially stronger underwriting and provisioning frameworks than ecosystem collaboration models (Jago and Allo), because alternative credit scoring on broad populations produces higher NPL than ecosystem bounded lending.
4. Profitability transition requires patient capital and clear milestones : even Allo's strong ROE (10.87% average) cannot mask the volatility from 25.64% (2021) to 6.78% (2024),

and management should communicate ROE expectations transparently to shareholders.

5. Liquidity management should be calibrated to the ecosystem context: an LDR above 135% (Allo) is sustainable within a closed ecosystem with sticky deposits, but the same LDR in an open acquisition context would be hazardous. Management should match LDR ceilings to deposit stickiness empirics rather than apply uniform thresholds.

**Regulatory and Policy Implications**

For OJK and Bank Indonesia, the findings support three policy directions.

1. Supervisory benchmarking for digital banks should use peer group benchmarks that account for business model heterogeneity rather than apply uniform thresholds; the BOPO classification in Table 4, while still useful, may need digital bank specific calibration during the early growth phase.
2. Regulatory attention should focus on the operational dimensions (NPL, BOPO, ROE, LDR) where performance differences are statistically significant, rather than over emphasizing CAR where regulatory convergence has already homogenized outcomes.
3. LDR ceiling guidance should consider digital deposit stickiness data rather than apply conventional bank LDR norms uniformly to digital banks.

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