

Digital Transformation, Performance, and Valuation of Indonesian Digital Banks

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ABSTRAK

Studi ini meneliti bagaimana transformasi digital memengaruhi kinerja keuangan dan valuasi pasar bank digital Indonesia, sebuah isu penting karena digitalisasi perbankan diharapkan dapat meningkatkan efisiensi, profitabilitas, dan persepsi investor, sementara temuan empiris sebelumnya masih beragam. Studi ini berkontribusi dengan mengembangkan Indeks Transformasi Digital (DTI) komposit berdasarkan pengguna aktif bulanan, jumlah produk digital, dan intensitas pengeluaran teknologi informasi. Menggunakan data sekunder dari lima bank digital yang terdaftar di Bursa Efek Indonesia selama tahun 2017–2024, studi ini menerapkan pengujian perbedaan PRE–POST, regresi panel efek tetap dua arah, dan analisis mediasi bertahap. Temuan menunjukkan bahwa DTI meningkat secara signifikan setelah transformasi. DTI memiliki pengaruh positif yang signifikan terhadap ROA dan pengaruh negatif yang signifikan terhadap PBV, tetapi tidak secara signifikan memengaruhi BOPO, NIM, ROE, atau PER. Kinerja keuangan tidak memediasi hubungan DTI–valuasi. Temuan ini menunjukkan bahwa manfaat transformasi digital tetap selektif dan membutuhkan strategi monetisasi, efisiensi, dan profitabilitas yang lebih kuat.

ABSTRACT

This study examines how digital transformation affects the financial performance and market valuation of Indonesian digital banks, an important issue because banking digitalization is expected to improve efficiency, profitability, and investor perception, while prior empirical findings remain mixed. This study contributes by developing a composite Digital Transformation Index (DTI) based on monthly active users, digital product count, and information technology expense intensity. Using secondary data from five digital banks listed on the Indonesia Stock Exchange during 2017–2024, this study applies PRE–POST difference testing, two-way fixed effects panel regression, and stepwise mediation analysis. The findings show that DTI increased significantly after transformation. DTI has a significant positive effect on ROA and a significant negative effect on PBV, but does not significantly affect BOPO, NIM, ROE, or PER. Financial performance does not mediate the DTI–valuation relationship. These findings indicate that the benefits of digital transformation remain selective and require stronger monetization, efficiency, and profitability strategies.

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1. INTRODUCTION

Digital transformation has become a strategic agenda in banking as advances in information technology, changing customer behavior, and digital ecosystems reshape financial service delivery. In banking, digital transformation involves not only the migration of services to digital channels but also changes in business models, operational processes, customer experience, and technology-based capabilities (Hie, 2021; Munira, 2025; Rahi et al., 2021). In Indonesia, this transformation is supported by fintech collaboration, platform-based financial ecosystems, and national payment infrastructure such as QRIS, BI-FAST, and SNAP, which strengthen interoperability and digital transaction adoption (Bank Indonesia, 2025; Octrina et al., 2025; Rahadian et al., 2023; Sofwatunnisa et al., 2023). The regulatory framework also emphasizes governance, risk management, and operational resilience in digital banking services (Otoritas Jasa Keuangan, 2023).

The emergence of digital banks listed on the Indonesia Stock Exchange provides a relevant setting for examining whether digital transformation produces measurable financial and market outcomes. Several banks have transformed through rebranding, acquisition, application development, and ecosystem integration. Digital banking maturity depends not only on the availability of digital channels but also on customer experience, ecosystem integration, and the ability to build scalable digital business models (Deloitte, 2022; Shanti et al., 2023). This study focuses on five listed digital banks because their transformation processes are documented in annual reports and can be linked to financial performance and market valuation indicators. The sample banks and their transformation characteristics are presented in Table 1.

Table 1. Sample Banks and Digital Transformation Timeline

Code	Bank	Transformation Period	Digital Transformation Characteristics
ARTO	Bank Jago	2020/2021	Digital-first retail banking, application-based services, and ecosystem orchestration
BBYB	Bank Neo Commerce	2020/2021	Neo banking application, digital transaction promotion, and customer engagement
BBHI	Allo Bank Indonesia	2021/2022	Lifestyle ecosystem, digital payment services, and application feature development
AGRO	Bank Raya Indonesia	2021	Digital banking for retail and MSME segments with group integration
BABP	Bank MNC Internasional	2021/2022	Motion Banking, digital channels, and MNC Group ecosystem integration

Source: Annual reports and issuer publications, processed by the author, 2026.

Table 1 shows that the observed banks entered a major digital transformation phase around 2020–2022. Therefore, this study classifies 2017–2019 as the PRE period and 2021–2024 as the POST period, while 2020 is excluded as a transition period. This classification follows the transformation timeline of the sample banks and allows the study to compare the level of digital transformation before and after the major transformation phase. This study examines the five selected digital banks using secondary data on DTI, financial performance, and market valuation indicators.

Theoretically, digital transformation may improve bank performance through efficiency and revenue channels by reducing operating costs, expanding customer acquisition, and strengthening

ecosystem-based services. From an information technology business value perspective, digital capabilities can create operational and strategic value when embedded in business processes (Bharadwaj, 2000; Melville et al., 2004). In capital markets, investors may also respond to digital transformation by reassessing banks perceived to have scalable digital business models and stronger growth prospects (Koller et al., 2010; Schrieck et al., 2024).

However, prior empirical findings remain inconclusive. Some studies show that digital banking and information technology adoption improve profitability, productivity, and operational efficiency (Atasyadila & Muchlis, 2024; Maharani & Daljono, 2023; Pratiningsih & Wardhani, 2024; Sari et al., 2025; Setiawan & Prakoso, 2024). In contrast, other studies indicate that the benefits of digital transformation may take time to materialize, may be nonlinear, or may not immediately improve bank performance and valuation (Citterio et al., 2024; Dadoukis et al., 2021; Kriebel & Debener, 2019; Natsir et al., 2023). This inconsistency suggests that the effect of digital transformation on bank performance and valuation requires further empirical examination, particularly in the context of Indonesian digital banks.

A second gap concerns measurement. Many previous studies use single proxies, such as information technology expenditure, digital banking adoption, intangible digital assets, or the number of digital services (Atasyadila & Muchlis, 2024; Maharani & Daljono, 2023; Sari et al., 2025). This study therefore develops a composite Digital Transformation Index (DTI) based on monthly active users, digital product count, and information technology expense intensity to capture both usage and capability dimensions of digital transformation.

This study examines whether digital transformation differs between the PRE and POST periods, whether DTI affects financial performance and market valuation, and whether financial performance mediates the DTI–valuation relationship. Financial performance is measured using BOPO, NIM, ROA, and ROE, while market valuation is measured using PBV and PER. The study contributes by developing a composite DTI for Indonesian digital banks and by linking digital transformation to both accounting-based performance and market-based valuation outcomes.

2. THEORETICAL REVIEW

2.1 *Digital Transformation and Bank Performance*

Digital transformation in banking refers to the use of digital technology to redesign business processes, service channels, customer interaction, and value creation mechanisms. It involves not only technology adoption but also strategic change, organizational capability, and digital business model development (Hie, 2021; Munira, 2025; Rahi et al., 2021; Rogers, 2016).

The relationship between digital transformation and bank performance can be explained through the information technology business value perspective, which argues that digital capabilities improve performance when embedded in business processes and supported by complementary organizational resources (Bharadwaj, 2000; Kohli & Grover, 2008; Melville et al., 2004). In banking, value may arise through an efficiency channel, such as automation and process integration, and a revenue channel, such as customer acquisition, transaction intensity, and ecosystem-based services.

In this study, financial performance is represented by BOPO, NIM, ROA, and ROE, which capture operational efficiency, intermediation margin, asset productivity, and equity returns (Atasyadila & Muchlis, 2024; Menne, 2023). Digital transformation is expected to improve these indicators when digital capabilities are translated into cost efficiency, customer acquisition, transaction activity, and income generation.

Empirical findings remain mixed. Several studies show that digital banking and information technology adoption improve profitability, productivity, and operational efficiency (Atasyadila & Muchlis, 2024; Maharani & Daljono, 2023; Sari et al., 2025), while other studies indicate that the benefits may not appear immediately or may differ across performance indicators (Citterio et al., 2024; Dadoukis et al., 2021). In Indonesia, digital

business models have also been linked to banking performance and business model development (Shanti et al., 2023). Therefore, this study proposes the following hypotheses:

H1: Digital transformation differs significantly between the PRE and POST periods.

H2: Digital transformation affects the financial performance of Indonesian digital banks.

2.2 Digital Transformation and Market Valuation

Market valuation reflects investors' assessment of a company's prospects, profitability, risk, and growth potential. This study uses PBV and PER because they capture different dimensions of market expectations: PBV reflects market valuation relative to accounting equity, while PER reflects valuation relative to current earnings (Koller et al., 2010; Murhadi, 2024).

Digital transformation may influence valuation when investors perceive digital banks as having stronger growth prospects, scalable business models, and broader ecosystem potential. In the Indonesian digital banking context, valuation may reflect not only current earnings but also growth expectations and perceived digital business potential (Avianto et al., 2022). However, market responses depend on implementation credibility, monetization capacity, and financial realization (Natsir et al., 2023; Schreieck et al., 2024).

The effect may also differ across valuation indicators because PBV is more closely related to growth expectations and intangible capabilities, while PER is more sensitive to current earnings, which may fluctuate during early transformation stages. Therefore, this study proposes the following hypothesis:

H3: Digital transformation affects the market valuation of Indonesian digital banks.

2.3 Financial Performance, Valuation, and Mediation Mechanism

Financial performance may affect market valuation because investors respond to profitability, efficiency, and earnings quality. In this study, BOPO, NIM, ROA, and ROE represent financial performance, while PBV and PER represent market valuation. The use of accounting-based financial ratios is consistent with empirical financial research in Indonesia, where such indicators are widely used to evaluate firm condition, risk, and performance (Kristanti & Dhaniswara, 2023).

The relationship between financial performance and valuation is consistent with valuation theory, which states that firm value is influenced by the ability to generate future cash flows, manage risk, and create sustainable returns for shareholders (Koller et al., 2010). In the banking sector, profitability and efficiency indicators provide important signals because they reflect how effectively banks use assets, manage operating costs, and generate returns from equity.

Digital transformation may also influence market valuation indirectly through financial performance when digital capabilities are translated into efficiency, profitability, and sustainable earnings. However, this mechanism may not occur immediately because transformation often requires technology investment, customer acquisition costs, and organizational learning before producing stable profitability. Therefore, this study proposes the following hypotheses:

H4: Financial performance affects the market valuation of Indonesian digital banks.

H5: Financial performance mediates the relationship between digital transformation and market valuation.

3. METHODOLOGY

This study applies a quantitative explanatory design using secondary data from annual reports, financial statements, issuer publications, and capital market data. The population consists of banks listed on the Indonesia Stock Exchange, while the sample is selected through purposive sampling based on documented digital transformation momentum and data availability during the observation period. The final sample consists of five digital banks: Bank Jago, Bank Neo Commerce,

Allo Bank Indonesia, Bank Raya Indonesia, and Bank MNC Internasional. The observation period covers 2017–2024, with 2020 excluded as a transition year. The PRE period is 2017–2019, while the POST period is 2021–2024. The PRE–POST test uses both periods, whereas the panel regression models are estimated using POST-only observations.

Digital transformation is measured using a composite Digital Transformation Index (DTI) constructed from monthly active users, digital product count, and information technology expense intensity, measured as the ratio of information technology expenses to operating expenses. The construction of DTI follows the composite indicator approach, including indicator selection, normalization, weighting, and aggregation (Guo et al., 2019; Nardo et al., 2005). Each indicator is normalized using the min–max method. To preserve the two-dimensional structure of the index, the usage dimension is represented by monthly active users and digital product count, while the capability dimension is represented by IT expense intensity. The DTI is specified as follows:

$$DTI_{iys} = \frac{(MAU_{iy}^{norm} + PROD_{iy}^{norm})/2 + IT/BO_{iys}^{norm}}{2} \times 100\% \quad (1)$$

where i denotes bank, y denotes year, and s denotes semester. MAU^{norm} represents normalized monthly active users, $PROD^{norm}$ represents normalized digital product count, and $ITBO^{norm}$ represents normalized IT expense intensity. MAU and product count represent the usage dimension, while ITBO represents the capability dimension. Annual MAU and product count values are mapped to both semesters in the same year, while ITBO uses semester data when available.

Financial performance is measured using BOPO, NIM, ROA, and ROE. BOPO reflects operational efficiency, NIM reflects net interest income generation from productive assets, ROA measures asset productivity, and ROE reflects returns generated from shareholders' equity (Atasyadila & Muchlis, 2024; Menne, 2023). The use of accounting-based financial ratios is also consistent with empirical financial research in Indonesia, where financial indicators are widely used to evaluate firm condition, risk, and performance (Kristanti & Dhaniswara, 2023). Market valuation is measured using PBV and PER, which reflect book value-based and earnings-based market expectations (Koller et al., 2010; Murhadi, 2024). The control variables are SIZE and NPL. SIZE is measured using total assets, while NPL is measured using the gross non-performing loan ratio. The variable measurements are presented in Table 2.

Table 2. Variable Measurement

Variable	Proxy	Measurement	Role
Digital transformation	DTI	Composite index based on usage dimension (MAU and digital product count) and capability dimension (IT expense intensity), normalized and converted into a 0–100 scale	Independent
Financial performance	BOPO	Operating expenses to operating income	Dependent / mediating
Financial performance	NIM	Net interest income to average productive assets	Dependent / mediating
Financial performance	ROA	Net income to total assets	Dependent / mediating
Financial performance	ROE	Net income to total equity	Dependent / mediating
Market valuation	PBV	Market price per share to book value per share	Dependent
Market valuation	PER	Market price per share to earnings per share	Dependent
Control variable	SIZE	Total assets	Control
Control variable	NPL	Gross non-performing loan ratio	Control

Source: Author's construct based on (Atasyadila & Muchlis, 2024; Guo et al., 2019; Koller et al., 2010; Kristanti & Dhaniswara, 2023; Menne, 2023; Murhadi, 2024; Nardo et al., 2005).

The analysis is conducted in four stages: descriptive statistics, PRE–POST difference testing, POST-only panel regression, and stepwise mediation analysis. The mediation test follows the logic of (Baron & Kenny, 1986; Preacher & Hayes, 2008), in which financial performance is evaluated as a potential mechanism linking DTI to market valuation. The first empirical model examines the effect of DTI on financial performance. The model is estimated separately for each performance indicator, namely BOPO, NIM, ROA, and ROE, as follows:

$$y_{(1,iys)}^{(k)} = \alpha_k + \beta_k DTI_{iys} + \gamma' Z_{iys} + \mu_i + \lambda_y + \delta_s + \varepsilon_{iys}^{(k)}, \quad (2)$$

where $y_{(1,iys)}^{(k)}$ represents financial performance indicator $k \in \{\text{BOPO, NIM, ROA, ROE}\}$; DTI_{iys} represents the Digital Transformation Index; Z_{iys} represents the control variables consisting of SIZE and NPL; μ_i denotes bank fixed effects; λ_y denotes year fixed effects; δ_s denotes semester effects; and $\varepsilon_{iys}^{(k)}$ is the error term.

The second empirical model examines the effect of DTI and financial performance on market valuation. The model is estimated separately for PBV and PER, and each financial performance indicator is tested separately as a mediating variable:

$$y_{(2,iys)}^{(m)} = \theta_{(m,k)} + \varphi_{(m,k)} DTI_{iys} + \eta_{m,k} y_{(1,iys)}^{(k)} + \psi' Z_{iys} + \mu_i + \lambda_y + \delta_s + v_{iys}^{(m,k)} \quad (3)$$

where $y_{(2,iys)}^{(m)}$ represents valuation indicator $m \in \{\text{PBV, PER}\}$; $y_{(1,iys)}^{(k)}$ represents each financial performance indicator tested separately; $\varphi_{(m,k)}$ captures the direct effect of DTI on valuation after including the financial performance variable; and $\eta_{m,k}$ captures the effect of financial performance on valuation.

The estimation uses a Two-Way Fixed Effects specification with bank, year, and semester effects. Bank fixed effects control for unobserved bank-specific characteristics, year effects control for common annual shocks, and semester effects capture within-year differences. Inference is based on bank-level clustered standard errors and wild cluster bootstrap-t with Webb weights due to the limited number of bank clusters.

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis and PRE–POST Digital Transformation

The descriptive results indicate a substantial increase in digital transformation intensity after the transformation period. The mean DTI value increased from 8.412 in the PRE to 38.308 in the POST period, with a mean difference of 29.896. The paired difference test confirms that this increase is statistically significant, with a t-statistic of 3.790 and a one-tailed p-value of 0.010. Therefore, H1 is supported, indicating that the level of digital transformation in the sampled banks is significantly higher in the POST than in the PRE period.

Table 3. PRE–POST Difference Test of Digital Transformation Index

Variable	Bank Pairs	PRE Mean	POST Mean	Difference	t-statistic	p-value (two-tailed)	p-value (one-tailed)	Decision
DTI	5	8.412	38.308	29.896	3.790	0.019	0.010	Supported

Source: Data processing results, 2026.

The significant increase in DTI confirms that the POST period represents a more intensive phase of digital transformation among the sampled Indonesian digital banks. This result is consistent with the transformation timeline of the observed banks, which experienced rebranding, acquisition, digital application development, and ecosystem

integration around 2020–2022. The increase is also aligned with evidence that digital business model development and digital payment adoption have become important elements of banking transformation in Indonesia (Octrina et al., 2025; Shanti et al., 2023). Therefore, the POST period reflects a materially different digital transformation stage compared with the PRE period and supports the use of a PRE–POST design in this study.

The composite index captures both usage and capability dimensions of banking digital transformation. Because DTI combines monthly active users, digital product count, and IT expense intensity, the significant increase suggests that the transformation process involved both market-facing adoption and internal capability building. However, this result should be interpreted as evidence of a higher transformation intensity, not as evidence that digital transformation automatically improves all financial and market outcomes. Therefore, the next empirical question is whether the increase in DTI is transmitted into performance and valuation.

4.2 Digital Transformation and Financial Performance

The effect of DTI on financial performance is examined using the POST-only panel regression model. The results show that the impact of digital transformation differs across financial performance indicators. As presented in Table 4, DTI has a negative but insignificant effect on BOPO, a positive but insignificant effect on NIM, a positive and significant effect on ROA, and a positive but insignificant effect on ROE. Therefore, H2 is partially supported, with statistical support found only for ROA.

Table 4. Effect of DTI on Financial Performance

Hypothesis	Dependent Variable	DTI Coefficient	t-statistic (Webb)	p-value (Webb)	Direction	Decision
H2a	BOPO	-0.006976	-1.729850	0.231323	Negative	Not supported
H2b	NIM	0.000245	0.295101	0.765477	Positive	Not supported
H2c	ROA	0.001051	3.981869	0.031803	Positive	Supported
H2d	ROE	0.004173	1.681114	0.207821	Positive	Not supported

Source: Data processing results, 2026.

The negative coefficient of DTI on BOPO is directionally consistent with the expectation that digital transformation may improve operational efficiency. In principle, digital applications, process automation, and ecosystem integration can reduce transaction costs and improve service scalability. However, the insignificant result indicates that the efficiency channel has not yet become statistically strong across the sampled banks during the POST period. This may occur because the transformation phase still requires technology investment, application development, system integration, customer acquisition, and organizational learning, which may temporarily offset potential cost efficiency gains. Therefore, the negative but insignificant BOPO result suggests that digital transformation has begun to move in the expected efficiency direction, but the effect has not yet become sufficiently consistent across banks and semesters.

The positive but insignificant effect on NIM indicates that digital transformation has not yet been strongly transmitted into net interest margin. This result may be explained by the fact that the digital banking model in the sample is not limited to traditional interest-based intermediation. Digital banks often focus on customer acquisition, transaction volume, digital ecosystem integration, and the development of non-interest-based services. As a result, the benefit of digital transformation may not immediately appear in NIM, especially when banks are still expanding their digital customer base and strengthening their

platform infrastructure. This finding supports the argument that digital transformation may affect different performance indicators at different speeds and through different channels.

The significant positive effect of DTI on ROA provides the main statistical evidence that digital transformation has begun to improve financial performance. ROA measures a bank's ability to generate profit from its asset base. Therefore, the positive and significant coefficient indicates that higher digital transformation intensity is associated with better asset productivity during the POST period. This result supports the information technology business value perspective, which holds that technology resources can create performance value when integrated with business processes and organizational capabilities (Bharadwaj, 2000; Kohli & Grover, 2008; Melville et al., 2004). The finding is also consistent with empirical studies showing that digital banking and digital transformation may improve profitability and bank performance in Indonesia (Atasyadila & Muchlis, 2024; Bakkara & Sihotang, 2024; Daeli & Wedari, 2025; Maharani & Daljono, 2023). In addition, evidence on digital payments and bank productivity supports the argument that digital activity can contribute to more productive banking operations when it is integrated into the bank's business processes (Octrina et al., 2025).

However, the positive, albeit insignificant effect on ROE indicates that the improvement in asset productivity has not yet translated into equity profitability. This is plausible in the context of digital banks because the POST period coincides with business expansion, capital strengthening, restructuring, and technology-related investment. Under these conditions, equity may increase faster than realized earnings, causing ROE to respond more slowly than ROA. Therefore, while digital transformation appears to improve asset-level profitability, its effect on returns to shareholders remains statistically limited within the observation period.

Overall, the H2 results indicate that digital transformation has a partial and uneven effect on financial performance. This pattern should be interpreted as evidence that the benefits of digital transformation have not been evenly distributed across all financial indicators. Among the sampled banks, DTI is significantly associated with ROA, but its effect on BOPO, NIM, and ROE remains statistically insignificant. This pattern is consistent with the view that digital transformation in banking is a gradual process involving business model adjustment, digital capability development, and monetization learning (Daeli & Wedari, 2025; Shanti et al., 2023). Therefore, the success of digital transformation should not be evaluated solely by the intensity of digitalization, but also by banks' ability to convert digital capability into greater efficiency, higher quality intermediation, and more consistent profitability.

The implication is that bank management should move beyond digital adoption and focus on the quality of monetization. Digital transformation needs to be translated into lower operating costs, stronger transaction-based income, better asset utilization, and more stable profitability. For investors, the result suggests that ROA may be a more responsive performance indicator in the early POST period, whereas BOPO, NIM, and ROE require more cautious interpretation. For regulators, the finding indicates that digital transformation should be assessed not only from the expansion of digital channels or users, but also from its ability to strengthen the financial resilience and operating performance of digital banks.

4.3 Digital Transformation and Market Valuation

The effect of DTI on market valuation is examined using PBV and PER as valuation proxies. The results show that DTI has a significant effect on PBV, but not on PER. However, the PBV result must be interpreted carefully because the coefficient is negative. As presented in Table 5, DTI significantly affects PBV with a coefficient of -0.697973 and a Webb p-value of 0.027503. Meanwhile, the effect of DTI on PER is also negative but not statistically significant, with a coefficient of -14.688990 and a Webb p-value of 0.101310. Therefore, H3 is

partially supported, but the observed relationship runs in the opposite direction from the expected positive valuation effect.

Table 5. Effect of DTI on Market Valuation

Hypothesis	Dependent Variable	DTI Coefficient	p-value (Webb)	Direction	Decision
H3a	PBV	-0.697973	0.027503	Negative	Supported
H3b	PER	-14.688990	0.101310	Negative	Not supported

Source: Data processing results, 2026.

The negative and significant effect of DTI on PBV indicates that during the POST period, higher digital transformation intensity is associated with lower book value-based market valuation after controlling for bank fixed effects, year effects, semester effects, SIZE, and NPL. This finding should not be interpreted as evidence of value destruction from digital transformation. Instead, it suggests that the market evaluates digital transformation selectively by considering execution risk, monetization quality, sustainable profitability, capital structure, and the ability of banks to convert digital investment into fundamental performance. This interpretation is relevant in the Indonesian digital banking context because digital bank valuation may reflect not only current earnings, but also growth expectations, capital structure, and perceived digital business potential (Avianto et al., 2022).

This result is consistent with the descriptive characteristics of PBV in the POST period. The descriptive statistics show that PBV increased but was highly dispersed, with a mean of 11.853, standard deviation of 23.863, and a wide range from 0.600 to 108.300. The variation across banks was also large, for example Allo Bank and Bank Jago had much higher average PBV than Bank MNC Internasional. This dispersion indicates that market perceptions of digital banks were heterogeneous during the POST period. Therefore, a higher DTI does not automatically generate a valuation premium when investors still perceive uncertainty regarding execution, monetization, and the realization of sustainable profitability.

The negative PBV result should also be read alongside the financial performance findings. DTI significantly affects ROA, but it does not significantly affect BOPO, NIM, and ROE. This pattern indicates that digital transformation has begun to improve asset productivity, but has not yet produced consistent improvements in efficiency, margin, and equity profitability. Under these conditions, the market may respond to digital transformation more cautiously. Higher digital intensity may represent a long-term strategic investment. However, in the short to medium term, investors may still discount valuation when the benefits have not been fully transmitted into broader financial performance.

The insignificant effect of DTI on PER further supports this interpretation. PER is more sensitive to current earnings, while digital banks in the transformation phase may still experience earnings volatility due to technology investment, application development, promotional spending, customer acquisition costs, and ecosystem development. Therefore, digital transformation may affect market perception, but it is not yet sufficiently reflected in earnings-based valuation. In this context, PBV captures the market's reassessment of book value and growth expectations, while PER remains constrained by unstable or still-developing earnings performance.

Theoretically, this finding refines the assumption that digital transformation automatically increases firm valuation. Digital capabilities may create value when they are successfully converted into efficiency, profitability, and credible growth prospects. Digital platform strategies may generate market responses when investors believe that digital capabilities can expand customer reach and support new sources of value (Schrieck et al., 2024). However, when digital transformation is still accompanied by execution uncertainty, valuation normalization, and uneven financial outcomes, the market response may become

selective or even negative. This result is consistent with prior evidence that digitalization does not always immediately increase firm value and that the relationship between digital strategy and market response depends on implementation credibility and financial realization (Avianto et al., 2022; Natsir et al., 2023).

This finding has important implications for digital bank management and investors. For management, digital transformation should not stop at increasing digital intensity, users, or product features. It must be followed by stronger monetization, cost discipline, and sustainable profitability. For investors, DTI can serve as an additional signal of digital transformation maturity, but it should not be mechanically interpreted as a valuation premium. Digital transformation needs to be evaluated alongside earnings quality, asset productivity, operating efficiency, capital structure, and the bank's ability to convert digital capability into long-term value.

4.4 Financial Performance and Mediation Mechanism

The fourth hypothesis examines whether financial performance affects market valuation, controlling for DTI, SIZE, NPL, bank fixed effects, year effects, and semester effects. The results show that BOPO, NIM, ROA, and ROE do not significantly affect either PBV or PER. Therefore, H4 is not supported. In the PBV model, the p-values of BOPO, NIM, ROA, and ROE are 0.650774, 0.407622, 0.513618, and 0.587462, respectively. In the PER model, the p-values are 0.704676, 0.552284, 0.632247, and 0.671057, respectively. These results indicate that financial performance does not become a statistically significant determinant of market valuation during the POST period.

The insignificant relationship between financial performance and valuation suggests that market valuation of Indonesian digital banks during the POST period was not primarily explained by short-term accounting performance. Although accounting-based financial ratios are commonly used to evaluate firm condition, risk, and performance in empirical financial research (Kristanti & Dhaniswara, 2023), their explanatory power may be limited when firms are undergoing digital transformation and business model adjustment. During this period, banks may still experience high technology investment, customer acquisition costs, application development expenses, and organizational learning. These transformation-related costs can make efficiency and profitability indicators unstable, while market valuation may still be influenced by expectations, ecosystem potential, and uncertainty regarding future monetization.

Table 6. Financial Performance and Mediation Summary

Relationship	Valuation Proxy	Main Finding	Decision
Financial performance → valuation	PBV	BOPO, NIM, ROA, and ROE do not significantly affect PBV	H4 not supported
Financial performance → valuation	PER	BOPO, NIM, ROA, and ROE do not significantly affect PER	H4 not supported
DTI → financial performance → valuation	PBV	No financial performance indicator mediates the relationship between DTI and PBV	H5 not supported
DTI → financial performance → valuation	PER	No financial performance indicator mediates the relationship between DTI and PER	H5 not supported

Source: Data processing results, 2026.

The fifth hypothesis examines whether financial performance mediates the relationship between DTI and market valuation. The results show that no financial performance indicator mediates the relationship between DTI and PBV or PER. Although DTI significantly affects ROA in the first-stage model, ROA does not significantly affect PBV

or PER after DTI is controlled. Therefore, the mediation mechanism is not supported. This indicates that the significant DTI–PBV relationship is not transmitted through the tested accounting-based performance indicators.

The absence of mediation does not mean that digital transformation has no economic relevance. Instead, it shows that the benefits of digital transformation have not yet been fully translated into market-recognized financial performance indicators. This finding is consistent with the H2 results, which show that DTI significantly affects only ROA, while BOPO, NIM, and ROE remain statistically insignificant. Therefore, the performance channel remains incomplete: digital transformation has begun to affect asset productivity, but it has not yet generated broad and consistent improvements in efficiency, margins, equity profitability, and valuation.

This result also refines the interpretation of the DTI–PBV relationship. Since financial performance does not mediate the relationship between DTI and PBV, the significant effect of DTI on PBV appears to occur through a direct market reassessment channel rather than through an indirect accounting performance channel. However, because the DTI coefficient on PBV is negative, this direct channel should be interpreted as valuation normalization or selective market reassessment, rather than an automatic valuation premium. In other words, the market recognizes digital transformation but still evaluates whether it can be monetized and translated into sustainable financial outcomes.

Theoretically, the finding indicates that digital transformation is not a linear process from technology adoption to higher valuation. The information technology business value perspective suggests that technology creates value when digital capabilities are embedded in business processes and translated into measurable performance outcomes. In this study, the transmission process is only partially visible through ROA, while the broader pathway from DTI to performance and from performance to valuation is not yet statistically supported. This supports the conclusion that the impact of digital transformation on performance and valuation remains uneven and has not been fully transmitted across all indicators.

The findings imply that digital transformation must be supported by strong execution discipline. Banks need to convert digital applications, user growth, and ecosystem integration into cost efficiency, higher-quality revenue, stable profitability, and sustainable shareholder value. Investors should interpret digital transformation indicators alongside financial fundamentals, while regulators should monitor not only digital banking expansion but also profitability, asset quality, and business model resilience.

4.5 Discussion

Overall, the findings show that digital transformation among Indonesian digital banks increased significantly after the transformation period, but its impact on financial performance and market valuation remains uneven. The significant increase in DTI confirms that the sampled banks underwent measurable digital transformation through application development, product expansion, technology investment, and ecosystem integration. However, the effect of DTI is selective rather than uniform across all outcomes.

The effect of digital transformation on financial performance is only partially supported. DTI significantly improves ROA, suggesting that digital capability has begun to strengthen asset productivity. However, its effects on BOPO, NIM, and ROE are not significant, suggesting that digital transformation has not yet been fully converted into operating efficiency, intermediation margin, and equity profitability. This pattern supports the view that digital transformation in banking is a gradual process involving business model adjustment, technology investment, customer acquisition, and organizational learning before producing stable performance outcomes (Daeli & Wedari, 2025; Shanti et al., 2023).

The valuation results provide a more cautious interpretation. DTI significantly affects PBV, but the coefficient is negative, while its effect on PER is not significant. This finding indicates that the market recognizes digital transformation but does not automatically assign a positive valuation premium. Instead, investors may reassess digital banks more selectively when digital intensity is not yet accompanied by broad and stable financial performance. In this context, market valuation may reflect not only digital growth expectations, but also execution risk, monetization quality, earnings stability, capital structure, and risk differentiation in the banking industry (Avianto et al., 2022; Cao et al., 2022).

The absence of mediation further confirms that the pathway from digital transformation to valuation through financial performance has not yet been established. Although DTI significantly affects ROA, ROA does not significantly affect PBV or PER after controlling for DTI. Therefore, the significant relationship between DTI and PBV is better interpreted as a direct market reassessment channel rather than an indirect accounting performance channel. This refines the information technology business value perspective by showing that digital capabilities create value only when they are embedded in business processes and translated into measurable financial outcomes.

From a managerial perspective, digital banks should move beyond digital expansion and focus on execution quality. User growth, digital product expansion, and ecosystem integration need to be converted into lower operating costs, higher transaction-based income, stable profitability, and sustainable shareholder value. From an investor perspective, DTI can serve as an additional signal of digital maturity, but it should not be interpreted mechanically as a valuation premium. From a regulatory perspective, the findings highlight the importance of monitoring not only digital banking adoption, but also the resilience, risk differentiation, and monetization quality of digital banking business models.

5. CONCLUSION

This study examines the effect of banking digital transformation on the financial performance and market valuation of Indonesian digital banks using a composite Digital Transformation Index (DTI). Based on five listed digital banks during 2017–2024, excluding 2020 as a transition year, the findings show that DTI increased significantly in the POST period. DTI has a significant positive effect on ROA and a significant negative effect on PBV, but does not significantly affect BOPO, NIM, ROE, and PER. These results indicate that digital transformation has begun to influence asset productivity and market reassessment, but its economic impact remains partial and uneven.

Financial performance does not significantly affect market valuation and does not mediate the relationship between DTI and valuation. Although DTI is associated with higher ROA, this improvement does not become a significant channel through which digital transformation affects PBV or PER. Therefore, digital banks should not only expand digital applications, products, and users, but also strengthen monetization, operational efficiency, risk management, and profitability. Investors should interpret DTI together with profitability, asset quality, capital structure, earnings stability, and valuation reasonableness, while regulators should monitor the sustainability and resilience of digital banking business models.

This study is limited to five listed digital banks in Indonesia and covers an early phase of digital transformation. In addition, DTI is constructed from publicly available indicators, which may not fully capture internal digital capabilities, customer quality, transaction intensity, fee-based income, or ecosystem monetization. Future research may extend the sample, use longer observation periods, include more granular digital transaction indicators, and examine alternative mediating

variables such as fee-based income, customer engagement, operating scalability, and ecosystem monetization.

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