The Impact of Banking Digital Transformation on Financial Performance With Firm Size as A Moderating Variable

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Abstract.

This study aims to analyze the impact of digital transformation on banking financial performance with firm size as a moderating variable. Banking financial performance in Indonesia shows a fluctuating trend with a decrease in Return on Assets (ROA) from 2.47% in 2019 to 1.59% in 2020, although experiencing an increase in 2022 to 2.01%. Digital transformation has become a strategic solution through reducing operational costs by up to 50-70%, creating new revenue streams, and increasing customer lifetime value. This study uses panel data from 29 banking companies listed on the Indonesia Stock Exchange for the period 2020-2024 with a total of 145 observations. The analytical method employed is Moderated Regression Analysis (MRA) with a Fixed Effects Model. The results show that digital transformation has a significant positive effect on financial performance (β = 0.0089; p = 0.029). Firm size is proven to moderate the relationship between digital transformation and financial performance positively and significantly (β = 0.0004; p = 0.047), indicating that larger banks obtain more optimal benefits from digital transformation compared to small and medium-sized banks. This study contributes theoretically to the Resource-Based View (RBV) in the context of digital transformation and provides practical implications for banking management in designing digitalization strategies tailored to firm size.

Keywords: *Digital Transformation; Financial Performance; Firm Size; Banking and Moderation.*

I. INTRODUCTION

The Indonesian banking industry faces significant challenges in maintaining financial performance amid increasingly fierce competition dynamics. The Financial Services Authority (2024) recorded a decline in the banking industry's Return on Assets (ROA) from 2.47% in 2019 to 1.59% in 2020, and although experiencing an increase in 2022 to 2.01%, this figure still has not reached pre-pandemic levels. Operational efficiency reflected in the BOPO ratio (Operating Expenses to Operating Income) also showed an increase from 79.39% to 85.63%, indicating declining banking operational efficiency.Digital transformation has become a strategic solution in improving banking financial performance through several mechanisms. First, digitalization of banking services can reduce operational costs by up to 50-70% (McKinsey & Company, 2024) through process automation, physical branch reduction, and labor efficiency. Second, digital innovation enables banks to create new revenue streams through fee-based services such as payment gateways, digital lending, and digital wealth management.

Bank BCA, for example, successfully increased fee-based income by 35% after implementing comprehensive digital transformation (Bank Central Asia, 2022). Third, increasing customer lifetime value by up to 2.5 times (Deloitte, 2023).However, empirical findings from various studies regarding the impact of digital transformation on banking financial performance remain inconsistent and paradoxical. Fiordelisi et al. (2021) found a positive impact of digitalization on the profitability of large banks in Europe, while Liu et al. (2022) found negative effects on small banks in Asia due to high technology investment costs. This difference in findings indicates that firm size can strengthen or weaken the effectiveness of digital transformation in improving financial performance.This study aims to bridge this gap by specifically examining the role of firm size as a moderating variable in the relationship between digital transformation and banking financial performance in Indonesia. By positioning firm size as a moderator, this study attempts to provide more detailed and contextual explanations for the inconsistencies in previous research results.

II. LITERATURE REVIEW

2.1 Digital Transformation

Digital transformation is defined as a fundamental process that not only adopts new technology but transforms the organizational control structure, business models, and stakeholder relationships holistically (Vial, 2019; Verhoef et al., 2021). This process involves a shift from traditional control hierarchies toward more flexible and networked organizational structures. In the banking context, digital transformation encompasses service digitalization, process automation, and development of digital platforms that enable banks to interact with customers more efficiently.

2.2 Banking Financial Performance

Banking financial performance can be measured through various indicators, with Return on Assets (ROA) as one of the main proxies reflecting a bank's ability to generate profit from owned assets. ROA is an important indicator because it describes management efficiency in utilizing assets to generate profit (Brigham & Houston, 2019).

2.3 Resource-Based View (RBV)

This study uses the Resource-Based View (RBV) as the main theoretical foundation. According to RBV theory, firms can create superior organizational performance through the utilization of their business resources and capabilities, including developing and allocating resources to information technology. Large firms have advantages in terms of financial resources, technological infrastructure, and the ability to absorb the risk of digital implementation failure.

2.4 Research Hypotheses

Based on the literature review above, the research hypotheses are formulated as follows:

H1: Digital transformation has a positive effect on banking firm financial performance.

H2: Firm size moderates the positive effect of digital transformation on banking firm financial performance.

III. METHODS

3.1 Research Design and Sample

This study employs a quantitative approach with a causal-comparative research design. The research population consists of all banking companies listed on the Indonesia Stock Exchange (IDX). The sampling technique uses purposive sampling with criteria: (1) banking companies listed on the IDX for the period 2020-2024, (2) consistently publishing audited financial statements, and (3) having complete data related to research variables. Based on these criteria, 29 banking companies were obtained with a total of 145 panel data observations.

3.2 Operational Definition and Variable Measurement

The dependent variable in this study is financial performance proxied by Return on Assets (ROA), calculated with the formula: ROA = Net Income / Total Assets.

The independent variable is digital transformation (DT) measured using the digital asset ratio, which is the ratio between digital assets and total company assets.

The moderating variable is firm size (SIZE) measured using the natural logarithm of total assets: SIZE = Ln(Total Assets).

3.3 Data Analysis Method

The data analysis method uses Moderated Regression Analysis (MRA) with a panel data approach. Analysis stages include: (1) model specification tests (Chow Test, Hausman Test, Breusch-Pagan LM Test) to select the best model, (2) descriptive statistics, (3) classical assumption tests (normality, multicollinearity, heteroscedasticity, autocorrelation), and (4) hypothesis testing using t-test and F-test.

The regression model used is:

$$ROA = \beta_0 + \beta_1 DT + \beta_2 SIZE + \beta_3 (DT \times SIZE) + \varepsilon$$

IV. RESULT AND DISCUSSION

4.1 Descriptive Statistics

Descriptive statistics show that the average banking industry ROA is 1.14% with a standard deviation of 2.65%, indicating high performance variation among banks. The average digital transformation intensity is 83.35% with a fairly wide variation (standard deviation 31.52%), marking a digital divide in the banking sector. Firm size shows a relatively normal distribution with an average of 20.59.

4.2 Model Specification Test Results

Based on a series of model specification tests, this study determines that the Fixed Effects model is the most appropriate specification for panel data analysis. This decision is supported by Chow test results (p-value = 0.0000) which reject the Pooled OLS model and Hausman test (p-value = 0.0000) which reject the Random Effects model.

4.3 Classical Assumption Test Results

Classical assumption test results show that all assumptions are met. The normality test (Jarque-Bera p = 0.433), multicollinearity test (maximum VIF = 2.89), heteroscedasticity test (White Test p = 0.121), and autocorrelation test (Durbin-Watson = 1.876) all meet the required criteria.

4.4 Hypothesis Testing Results

Model 1 tests the direct effect of digital transformation on financial performance. Fixed Effects Model estimation results show that digital transformation has a significant positive effect on ROA with a coefficient of 0.0089 (t = 2.17; p = 0.029). The R-squared value of 0.1857 indicates that the model can explain 18.57% of ROA variation. These results support Hypothesis 1 stating that digital transformation has a positive effect on banking financial performance.Model 2 tests the moderating effect of firm size. Analysis results show that the interaction coefficient between digital transformation and firm size of 0.0004 is significant at $\alpha = 5\%$ (p = 0.047). The positive sign on the interaction coefficient indicates that firm size acts as a moderator that strengthens the relationship between digital transformation and financial performance. The R-squared value increases to 0.2458, showing an increased ability of the model to explain ROA variation. These results support Hypothesis 2.

4.5 Discussion

The finding that digital transformation has a positive effect on financial performance is consistent with the conceptual framework proposed by Vial (2019) and Verhoef et al. (2021). In the Indonesian banking context, digital transformation serves as an adaptive mechanism that enables banks to reduce operational costs through process automation, service digitalization, and optimization of information technology use. Digitalization also drives increased non-interest income through digital transactions, electronic payment services, and platform-based financial products.The moderating role of firm size shows that the impact of digital transformation is not universal. Larger banks obtain more significant benefits because they have financial flexibility to make large-scale technology investments, more mature technological infrastructure, and human resources with higher digital competencies. Conversely, small and medium-sized banks face a strategic dilemma between digitalization needs and resource constraints. These findings are consistent with research by Hermuningsih et al. (2023), Liu et al. (2022), and Fiordelisi et al. (2021) which emphasize the importance of firm size as a contingency factor in the success of digital transformation.

V. CONCLUSION

Based on the analysis results, it can be concluded that digital transformation has a positive effect on banking financial performance in Indonesia. Increased implementation of digitalization has proven capable of driving efficiency and strengthening banks' ability to create economic value. This study also finds that firm size moderates the relationship between digital transformation and financial performance, where larger banks tend to obtain more optimal benefits.The managerial implication of this study is that digital transformation needs to be positioned as a business strategy tailored to firm characteristics and scale. Large banks can optimize digital transformation as a means to strengthen competitive advantage, while small and medium-sized banks need to implement a more selective and gradual digitalization approach.

5.1 Limitations and Suggestions for Further Research

This study has several limitations. First, the measurement of digital transformation using the digital asset ratio proxy may not comprehensively capture the dimensions of digital transformation. Second, the observation period is limited to 2020-2024 which includes the COVID-19 pandemic period, so the results may be influenced by these extraordinary conditions. Further research is suggested to: (1) use a more comprehensive digital transformation proxy such as a digital maturity index, (2) extend the observation period, and (3) test other moderating variables such as capital structure, corporate governance, or macroeconomic conditions.

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