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The Effect of the Intensity of Internet Banking, Mobile Banking, and Automated Teller Machine (ATM) Usage on the Return on Assets of Banking Companies Listed on the Indonesia Stock Exchange (IDX)

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ABSTRACT

The development of Financial Technology (FinTech) has driven digital transformation in the banking industry through the use of Internet Banking, Mobile Banking, and Automated Teller Machine (ATM) services. Although the use of digital services continues to increase, the results of previous studies on their impact on banking profitability remain inconsistent. This study aims to analyze the impact of Internet Banking, Mobile Banking, and ATM transactions on banking profitability as proxied by Return on Assets (ROA) among banking companies listed on the Indonesia Stock Exchange for the period 2019–2024. The study employs a quantitative approach with an explanatory design and utilizes secondary data obtained from the companies' annual reports. The sample was selected using purposive sampling, resulting in five banking companies with a total of 30 observations. Data analysis was conducted using multiple linear regression with the aid of IBM SPSS. The results indicate that Mobile Banking has a positive and significant effect on ROA, whereas Internet Banking and ATMs do not have a significant effect on ROA. These findings suggest that an increase in transactions via Mobile Banking can enhance operational efficiency and fee-based income, thereby contributing to improved profitability. Conversely, Internet Banking and ATMs have not yet made a significant contribution due to the high investment and operational costs associated with the development of these two services. This study provides an empirical contribution in explaining the effectiveness of each digital service channel on banking profitability and serves as input for bank management in determining priorities for digital technology investments.

Keywords: Financial Technology, Internet Banking, Mobile Banking, Automated Teller Machine, Return on Assets.

1. INTRODUCTION

Digital transformation has changed the way people access various services, including financial services. Advances in information technology during the Fourth Industrial Revolution are driving financial institutions to adopt digital innovations to improve operational efficiency, service quality, and competitiveness. One rapidly growing innovation is Financial Technology (FinTech), which involves the use of modern technology in the provision of financial services. According to the National Digital Research Center (NDRC), Financial Technology is an innovation in the financial services sector that integrates modern technology to create financial services that are more effective, efficient, and accessible to the public.

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The development of Financial Technology is supported by the increasing use of the internet in Indonesia. Based on a survey by the Indonesian Internet Service Providers Association (APJII), the number of internet users has continued to rise, from 196.71 million users in 2020 to 221.56 million users in 2024. This increase reflects the public's growing readiness to utilize digital services, including technology-based banking services. In line with this, the Financial Services Authority (OJK) reported that the value of digital banking transactions reached approximately Rp87 quadrillion in 2024, a 50.6% increase compared to the previous year. In addition to technological advancements, the COVID-19 pandemic also accelerated the adoption of digital services due to restrictions on public activities during the Large-Scale Social Restrictions (PSBB) period (Fithriyyah & Puspita, 2024).

In response to these changes, the banking industry continues to develop various electronic banking (e-banking) services, including Internet Banking, Mobile Banking, and Automated Teller Machines (ATMs). These three services have distinct characteristics. Internet Banking is generally accessed through a bank's website to support both administrative transactions and high-value transactions. Mobile Banking is an application operated via a smartphone, enabling customers to conduct transactions conveniently anytime and anywhere. Meanwhile, ATMs are self-service facilities primarily used for cash withdrawals, fund transfers, bill payments, and various other banking transactions. These differing characteristics indicate that each digital channel has distinct functions, usage patterns, and contributions to the bank's operational activities (Tazza & Sari, 2024).

Differences in the implementation of digital services are also evident among the five banks that are the subject of this study: PT Bank Central Asia Tbk., PT Bank Negara Indonesia (Persero) Tbk., PT Bank Rakyat Indonesia (Persero) Tbk., PT Bank Mandiri (Persero) Tbk., and PT Bank CIMB Niaga Tbk. These five banks have provided Internet Banking, Mobile Banking, and ATM services as part of their digital transformation strategies to improve service quality and meet customers' increasingly diverse transaction needs.

The use of Financial Technology is expected to boost banking profitability through operational efficiency, improved service quality, expanded service reach, and increased fee-based income. Bank Indonesia notes that the value of digital banking transactions grew by 13.48% in 2023 and is projected to continue rising in 2024 (Prabawati, 2024). Shifts in public behavior with an increasing preference for cashless transactions indicate that digital services have become an integral part of daily financial activities. Mobile banking facilitates transactions via mobile devices, internet banking supports various administrative transactions, while ATMs continue to serve as the primary alternative for cash transactions (Tazza & Sari, 2024).

However, increased use of digital services does not necessarily lead to improved bank profitability. The implementation of digital technology requires significant investment in information technology infrastructure, cybersecurity, application development, system maintenance, and human resource development. As a result, the economic benefits of these investments are often only realized in the medium to long term. Therefore, high usage of Internet Banking, Mobile Banking, or ATMs does not necessarily directly increase a company's profitability.

A number of previous studies have shown inconsistent results regarding the impact of financial technology on banking profitability. Yulastri and Negara (2024) and Sinambela (2017) found that internet banking did not have a significant effect on ROA. Tangiduk et al. (2024) reported that mobile banking has a positive effect on ROA, whereas internet banking and ATMs do not have a significant effect. Conversely, Chaarani and Abiad (2018) demonstrated that internet banking and ATMs have a positive effect on banking performance in Lebanon. Research by Sudaryanti et al. (2018) indicates that the use of mobile banking actually has a negative effect on ROA, whereas Ayuningtyas and Sufina (2023) found that mobile banking and Internet banking have no effect on financial performance, while ATMs have a positive effect. On the other hand, Maslakhah (2020) concluded that ATMs, Internet Banking, and Mobile Banking do not affect Return on Assets. Contrary to these findings, Meihami et al. (2013), Itah and Ene (2014), and Saluja and Wadhe (2015) stated that ATMs make a positive contribution to banking profitability.

These differing research results indicate that there remains a research gap regarding the impact of Financial Technology on banking profitability. Most previous studies used only one type of digital service as a proxy for Financial Technology or measured digitalization based on the number of service users. This study offers several innovations: it uses the actual number of Internet Banking, Mobile Banking, and ATM transactions as a proxy for Financial Technology; integrates all three digital service channels into a single research model; and employs the 2019–2024 observation period, which reflects the acceleration of digital transformation following the COVID-19 pandemic. Thus, this study is expected to provide more comprehensive empirical evidence regarding the impact of each digital service channel on banking profitability as proxied by Return on Assets (ROA) among banking companies listed on the Indonesia Stock Exchange.

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2. RESEARCH METHODS

This study employs a quantitative approach with an explanatory research design aimed at analyzing the impact of internet banking, mobile banking, and Automated Teller Machine (ATM) transactions on Return on Assets (ROA) at banking companies listed on the Indonesia Stock Exchange (IDX). The study utilizes secondary data obtained from annual reports and financial statements of the companies for the period 2019–2024.

The study population consists of all banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2024 period, totaling 48 companies. Sample selection was conducted using purposive sampling, which involves selecting samples based on specific criteria to align with the research objectives. Table 1 presents the number of selected samples based on these criteria.

Table 1. Sample Selection Based on the Specified Criteria

No.	Sample Criteria	Total Banks
1	Banks listed on the Indonesia Stock Exchange during the 2019–2024 period.	48
2	Banks that published annual reports for the 2019–2024 period on their official websites.	48
3	Banks that disclosed the number of transactions through *Internet Banking*, *Mobile Banking*, and ATMs during the 2019–2024 period.	5

Based on the above sample criteria, there are 5 banking companies that meet the requirements, as shown in Table 2 below.

Table 2. Sample of Banking Companies for the 2019–2024 Period

No.	Company Name	Code
1	Bank Central Asia Tbk.	BBCA
2	Bank Negara Indonesia (Persero)	BBNI
3	Bank Rakyat Indonesia (Persero)	BBRI
4	Bank Mandiri (Persero) Tbk.	BMRI
5	Bank CIMB Niaga Tbk.	BNGA

Source: Data processed by the author, 2025.

Based on the criteria in Table 1, five banking companies were selected as the research sample, namely PT Bank Central Asia Tbk. (BBCA), PT Bank Negara Indonesia (Persero) Tbk. (BBNI), PT Bank Rakyat Indonesia (Persero) Tbk. (BBRI), PT Bank Mandiri (Persero) Tbk. (BMRI), and PT Bank CIMB Niaga Tbk. (BNGA). The observation period spanned six years (2019–2024), resulting in a total of 30 observations analyzed in this study.

This study utilized secondary data obtained through documentation. Data were collected from annual reports and financial statements of banking companies published on the official website of the Indonesia Stock Exchange (IDX) as well as on each company's official website. The data collected included the number of internet banking transactions, mobile banking transactions, Automated Teller Machine (ATM) transactions, net income after tax, and total assets.

This study uses three independent variables and one dependent variable. The independent variables consist of internet banking (X_1), mobile banking (X_2), and Automated Teller Machines (ATMs) (X_3). Internet banking is measured based on the number of internet banking transactions conducted by customers over the course of one year. Mobile banking is measured using the number of mobile banking transactions reported in the companies' annual reports. Meanwhile, Automated Teller Machines (ATMs) are measured based on the number of transactions conducted through the ATM network each year. The dependent variable in this study is Return on Assets (ROA), which is a measure of a company's profitability. ROA is calculated by comparing net income after taxes to total assets, then multiplying by 100 percent. All variables in this study are measured using a ratio scale.

Data analysis was conducted using IBM SPSS software. The initial stage of the analysis involved descriptive statistics to provide an overview of the research data characteristics based on the minimum, maximum, mean, and standard deviation. Next, classical assumption tests were conducted, including tests for normality, multicollinearity, heteroscedasticity, and autocorrelation, to ensure the regression model met the basic assumptions and was therefore suitable for hypothesis testing. Hypothesis testing was performed using multiple linear regression analysis to examine the effects of internet banking, mobile banking, and Automated Teller Machine (ATM) transactions on Return on Assets (ROA). The regression model used in this study is formulated as follows:

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$$ROA = \alpha + \beta_1 IB + \beta_2 MB + \beta_3 ATM + \varepsilon$$

where ROA is Return on Assets, α is the constant, β_1, β_2, and β_3 are the regression coefficients for each independent variable, IB is internet banking transactions, MB is mobile banking transactions, ATM is Automated Teller Machine transactions, and ε is the error term.

Furthermore, the model's ability to explain the variation in the dependent variable was evaluated using the coefficient of determination (Adjusted R^2). Hypothesis testing was conducted using the (partial) t-test at a 5% significance level to determine the effect of each independent variable on Return on Assets (ROA). The hypothesis is accepted if the significance value is less than 0.05, while the hypothesis is rejected if the significance value is equal to or greater than 0.05.

3. RESULTS AND DISCUSSION

Result

Descriptive Statistics

This section presents the results of the empirical analysis, beginning with descriptive statistics to provide an overview of the characteristics of the data and the distribution of each research variable during the 2019–2024 period. These statistics serve as an initial foundation for understanding the data on internet banking, mobile banking, Automated Teller Machine (ATM), and Return on Assets (ROA) of banking companies before conducting further panel data model estimations.

Table 3. Descriptive Statistics

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
Internet Banking (Ln IB)	30	14.40	22.83	17.9950	2.69692
Mobile Banking (Ln MB)	30	17.85	23.97	21.0323	1.58442
Automated Teller Machine (Ln ATM)	30	13.85	22.01	17.1707	2.92037
Return on Assets (ROA)	30	0.37	3.78	2.1613	0.83708
Valid N (listwise)	30				

Source: Data processed by the author, 2025.

The Internet Banking variable (Ln IB) has a minimum value of 14.40, a maximum value of 22.83, a mean value of 17.9950, and a standard deviation of 2.69692. The mean value, which is higher than the standard deviation, indicates that the distribution of Internet Banking data is relatively good and the data tend to be concentrated around its average value. This finding suggests that the utilization of Internet Banking among the five sampled banking companies during the research period was relatively stable, although variations existed across banks and over different periods.

The Mobile Banking variable (Ln MB) has a minimum value of 17.85, a maximum value of 23.97, a mean value of 21.0323, and a standard deviation of 1.58442. The standard deviation value, which is lower than the mean value, indicates that the Mobile Banking data have a relatively low level of variation. Therefore, the utilization of Mobile Banking among the five sampled banking companies in this study was relatively evenly distributed and demonstrated consistent growth throughout the research period.

The Automated Teller Machine (ATM) variable (Ln ATM) has a minimum value of 13.85, a maximum value of 22.01, a mean value of 17.1707, and a standard deviation of 2.92037. The mean value being higher than the standard deviation indicates that the ATM data distribution remains relatively adequate. This result suggests that ATM-based transactions among the five sampled banking companies remained relatively high, although differences existed in transaction volumes among banking companies.

The Return on Assets (ROA) variable has a minimum value of 0.37%, a maximum value of 3.78%, a mean value of 2.1613%, and a standard deviation of 0.83708. The mean value, which is higher than the standard deviation, indicates that the ROA data of banking companies during the research period were relatively stable. The average ROA value of 2.1613% indicates that, in general, the sampled banks were able to generate relatively good profits from their available assets.

Hypothesis Testing Results

Hypothesis testing was conducted using Multiple Linear Regression analysis with the assistance of SPSS to examine the effect of Internet Banking, Mobile Banking, and Automated Teller Machine (ATM) variables on the Return on Assets (ROA) of banking sector companies. Table 4 presents the regression coefficients, t-values, significance levels, and interpretations of the influence relationships between each independent variable and the dependent variable.

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Table 4. Hypothesis Testing Results

Variable	Coefficient (β)	t-value	Sig.	Interpretation
Constant (α)	-7.180	-6.129	0.000	Significant
Internet Banking (Ln IB)	0.007	0.177	0.861	Not Significant
Mobile Banking (Ln MB)	0.429	6.038	0.000	Significant
Automated Teller Machine (Ln ATM)	0.010	0.284	0.779	Not Significant

Dependent Variable: Return on Assets (ROA)
Source: Data processed by the author, 2025.

The regression test results show that the constant value is -7.180, which indicates that if the independent variables, namely Internet Banking (X1), Mobile Banking (X2), and Automated Teller Machine (X3), are assumed to be constant or equal to zero (0), then the dependent variable, namely Return on Assets (ROA), will have a value of -7.180.

The test results regarding the effect of Internet Banking on Return on Assets (ROA) indicate that there is no significant effect. The statistical test shows that the coefficient value of the relationship between Internet Banking and Return on Assets (ROA) is 0.007, with a t-value of 0.177 and a significance level of 0.861 (> 0.05). Therefore, Hypothesis 1 is rejected, meaning that Internet Banking (IB) does not have a significant effect on Return on Assets (ROA) in banking companies listed on the Indonesia Stock Exchange (IDX).

The test results regarding the effect of Mobile Banking on Return on Assets (ROA) indicate that there is a significant effect. The statistical test shows that the coefficient value of the relationship between Mobile Banking and Return on Assets (ROA) is 0.429, with a t-value of 6.038 and a significance level of 0.000 (< 0.05). Therefore, Hypothesis 2 is accepted, indicating that Mobile Banking (MB) has a significant positive effect on Return on Assets (ROA).

The test results regarding the effect of Automated Teller Machine (ATM) on Return on Assets (ROA) indicate that there is no significant effect. The statistical test shows that the coefficient value of the relationship between Automated Teller Machine (ATM) and Return on Assets (ROA) is 0.010, with a t-value of 0.284 and a significance level of 0.779 (> 0.05). Therefore, Hypothesis 3 is rejected, meaning that Automated Teller Machine (ATM) does not have a significant effect on Return on Assets (ROA) in banking companies listed on the Indonesia Stock Exchange (IDX).

Discussion

The Effect of Internet Banking (IB) on Return on Assets (ROA)

Hypothesis 1 proposed in this study was formulated to examine the effect of Internet Banking (IB) on Return on Assets (ROA). The findings indicate that Internet Banking does not have a significant effect on Return on Assets (ROA). This finding contradicts the argument presented by Leviani and Wiyono (2023), who stated that the implementation of Internet Banking is expected to improve bank operational efficiency, accelerate customer services, and increase bank revenue through higher transaction volumes. However, this finding is consistent with the research conducted by Faudi and Munawar (2022), which found that the Internet Banking variable does not have a significant effect on financial performance. This indicates that Internet Banking has not yet provided a positive contribution in improving banking financial performance.

The results of this study are inconsistent with the theoretical perspective and previous studies conducted by Hernando and Nieto (2007) and Margaretha and Letty (2017), which stated that Internet Banking has a positive impact on banking financial performance, particularly for banks that adopt Internet Banking services. This finding indicates that this study does not fully support the Technology Acceptance Model (TAM), as technological advancement and convenience do not always guarantee that customers will adopt and actively use Internet Banking services.

Empirically, the data in this study show that the development of Internet Banking transactions does not demonstrate a uniform pattern among the five sampled banks. PT Bank Central Asia Tbk experienced a significant increase in Internet Banking transactions during the 2019–2024 period. In contrast, several other banks, such as Bank Negara Indonesia (BNI), experienced a decline in Internet Banking transactions over time, while Bank Rakyat Indonesia (BRI), Bank Mandiri, and CIMB Niaga showed fluctuating trends. These differences indicate that Internet Banking is no longer the primary digital channel used equally by all customers.

Currently, most retail customers tend to prefer Mobile Banking rather than Internet Banking because smartphone-based transactions are more practical and can be accessed anytime and anywhere. Meanwhile, Internet Banking is more commonly utilized by corporate customers or for specific administrative transactions. In addition to

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changes in customer behavior, an increase in Internet Banking transactions does not necessarily improve profitability because banks must continue to bear substantial technology investment costs, including server maintenance, cybersecurity improvements, digital infrastructure development, and other operational expenses.

The Effect of Mobile Banking (MB) on Return on Assets (ROA)

Hypothesis 2 proposed in this study was developed to examine the effect of Mobile Banking (MB) on Return on Assets (ROA). The findings indicate that Mobile Banking has a significant effect on Return on Assets (ROA). Mobile Banking represents a form of financial technology (fintech) that facilitates customers in conducting financial transactions. When banks utilize fintech-based services, the increasing number of transactions through Mobile Banking can contribute to improved Return on Assets (ROA).

This finding indicates that Mobile Banking enables customers to conduct banking transactions anytime and anywhere. Mobile Banking services help banks improve operational efficiency, enhance customer satisfaction, and optimize cost effectiveness, which ultimately supports and influences Return on Assets (ROA). Hakim (2021) supports this finding by demonstrating that an increase in Mobile Banking transactions is associated with an increase in Return on Assets (ROA).

The results of this study are consistent with previous research conducted by Patricia et al. (2023) and Nuzula (2024), which found that Mobile Banking has an effect on Return on Assets (ROA). This finding also strengthens Davis's (1989) perspective in the Technology Acceptance Model (TAM), which explains that technology adoption and usage are influenced by perceived ease of use and perceived usefulness.

The significant influence of Mobile Banking on Return on Assets indicates that this service has become the primary digital transaction channel utilized by customers during the 2019–2024 period. Based on the research data, the number of Mobile Banking transactions among the five sampled banks generally experienced significant growth from year to year. This increase reflects changes in customer behavior, where customers increasingly prioritize smartphone-based transactions because they are more practical, faster, easily accessible, and provide various features such as fund transfers, bill payments, digital product purchases, QRIS payments, and investment services within a single application.

This condition encourages increased transaction intensity, which ultimately contributes to higher fee-based income and improves bank operational efficiency because many transactions can be completed without visiting physical branch offices. Therefore, increased Mobile Banking usage not only improves service quality for customers but also enhances the effectiveness of bank asset utilization in generating profits, resulting in a positive impact on Return on Assets (ROA).

The Effect of Automated Teller Machine (ATM) on Return on Assets (ROA)

Hypothesis 3 proposed in this study was formulated to examine the effect of Automated Teller Machine (ATM) on Return on Assets (ROA). The results indicate that Automated Teller Machine (ATM) does not have a significant effect on Return on Assets (ROA). This finding illustrates that fintech services utilized by banks in the form of ATM facilities have not been able to significantly influence changes in Return on Assets (ROA).

This condition may occur because customers increasingly prefer conducting real-time transactions through Mobile Banking from any location without having to visit ATM locations. Consequently, investments made by banking companies in ATM facilities have not generated optimal returns. Research conducted by Firmansyah et al. (2022) stated that the assets invested in ATM services are relatively substantial, while the income generated from ATM services does not sufficiently compensate for the assets utilized, resulting in an insignificant effect on banking Return on Assets.

The findings of this study are inconsistent with previous research conducted by Meihami et al. (2013), which found that ATM services have an effect on banking profitability. The insignificant effect of ATM on Return on Assets indicates that although ATMs remain an important component of banking services, their contribution to increasing bank profitability has become increasingly limited.

Based on the development of ATM transaction volumes among the five sampled banks during the research period, ATM usage did not experience substantial growth compared with Mobile Banking. This condition indicates a shift in customer behavior from ATM-based transactions toward digital transactions through Mobile Banking applications. Various transactions previously conducted through ATMs, such as fund transfers, bill payments, mobile credit purchases, and balance inquiries, are now increasingly performed through Mobile Banking applications because they are more convenient and do not depend on ATM locations.

Furthermore, managing an ATM network requires relatively high operational costs, including machine maintenance expenses, cash replenishment, security costs, communication networks, and equipment maintenance. Therefore, although ATMs remain widely used, particularly for cash withdrawal transactions, an increase in ATM transactions has not been able to provide a significant contribution to improving company profitability.

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Thus, this study demonstrates that in the era of digital transformation, ATMs function more as supporting facilities within banking services rather than as the primary factor capable of improving banks' Return on Assets (ROA).

5. Conclusion and Suggestion

Based on the research findings and discussion presented in the previous sections, the conclusions of this study are as follows:

1) Internet Banking (IB) does not have an effect on profitability, as measured by Return on Assets (ROA), in banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2024 period.
2) Mobile Banking (MB) has an effect on profitability, as measured by Return on Assets (ROA), in banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2024 period.
3) Automated Teller Machine (ATM) does not have an effect on profitability, as measured by Return on Assets (ROA), in banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2024 period.

Based on the results of the analysis, several practical implications can be provided as recommendations for banking companies in the future. The findings indicate that Internet Banking (IB) and Automated Teller Machine (ATM) do not have a significant effect on banking profitability, whereas Mobile Banking (MB) has a positive and significant effect on Return on Assets (ROA). Therefore, Mobile Banking (MB) can be considered as an important factor in strategic decision-making related to improving profitability, as measured by Return on Assets (ROA), among banking companies listed on the Indonesia Stock Exchange (IDX).

Meanwhile, Internet Banking (IB) and Automated Teller Machine (ATM) cannot yet be considered as the main factors in increasing banking profitability because the results of this study demonstrate that both variables do not provide a significant influence on Return on Assets (ROA). Nevertheless, banking institutions should continue to evaluate and develop Internet Banking and ATM services to improve service quality, enhance customer convenience, and increase operational efficiency.

For future researchers, it is recommended to add or replace independent variables related to Financial Technology (FinTech) and other financial factors, such as digital banking, electronic wallets (*e-wallets*), fee-based income, operational efficiency (BOPO), company size, or asset quality. This approach may provide further insights into other variables that potentially influence banking profitability. In addition, future studies may expand the number of samples and extend the research period to obtain more comprehensive and accurate findings.

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