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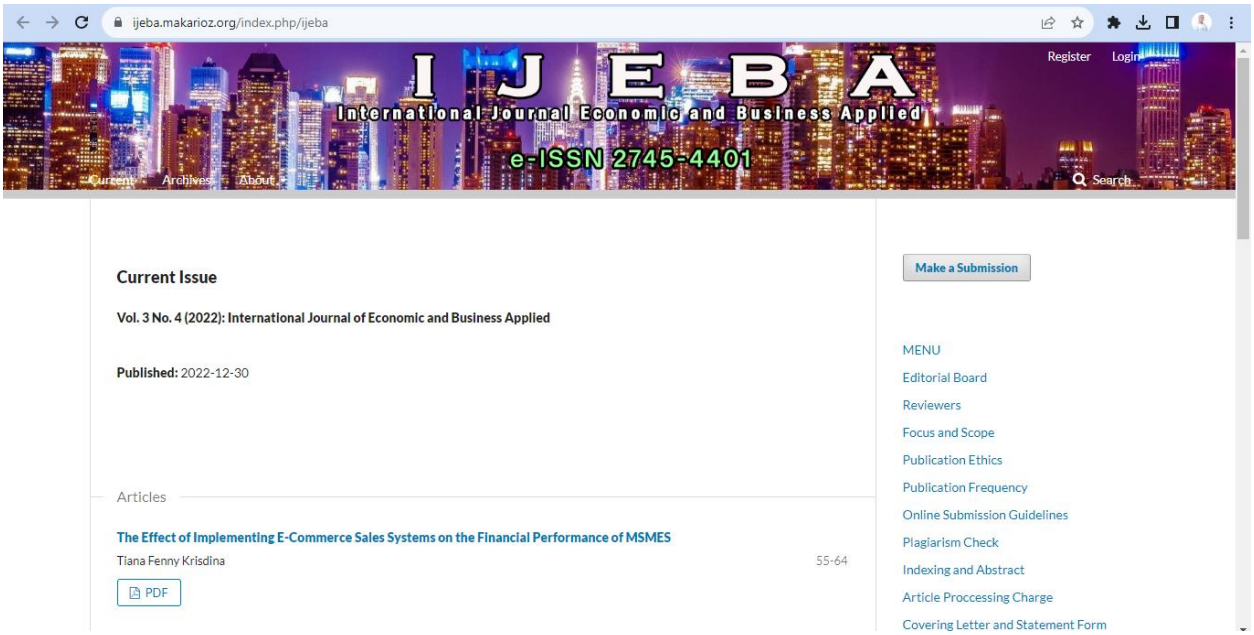

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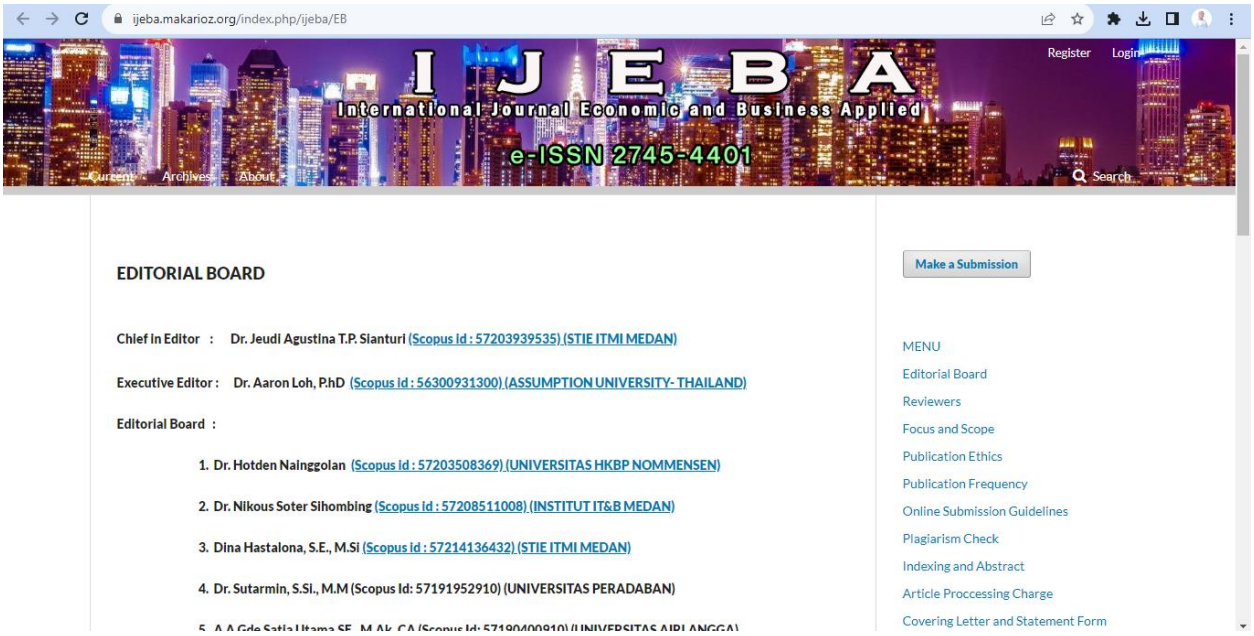

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THE EFFECT OF DIGITAL BANKING INNOVATION ON THE PERFROMANCE OF CONVENTIONAL COMMERCIAL BANKS IN INDONESIA

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THE EFFECT OF DIGITAL BANKING INNOVATION ON THE PERFROMANCE OF CONVENTIONAL COMMERCIAL BANKS IN INDONESIA

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Abstract

This study aims to see the effect of digital banking innovation as proxied by internet banking, mobile banking, and the numbers of Automatic Teller Machine (ATM) on the performance of conventional commercial banks illustrated by ROA in Indonesia 2013-2019. This study used a multiple linear regression method with fourteen conventional commercial banks in Indonesia as the population, consisting of 7 BUKU 3 banks and 7 BUKU 4 banks. The sample of this study was five conventional commercial banks in Indonesia, consisting of 1 BUKU 3 bank and 4 BUKU 4 bank during the year 2013-2019. This study stated that, partially, internet banking and ATMs have a significant and positive effect on bank performance. In contrast, mobile banking has no significant in bank performance partially. Furthermore, this study stated that, simultaneously, Internet Banking, mobile banking, and ATMs affect bank performance.

Key words : Digital Banking Innovation, Bank Performance, Return on Assets (ROA)

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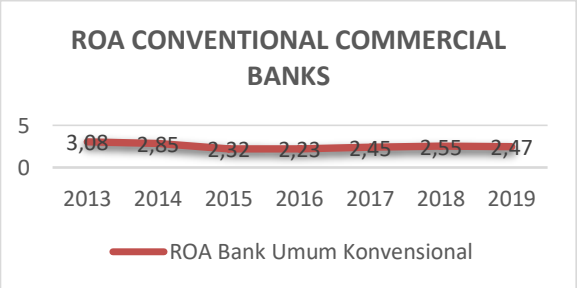
INTRODUCTION

Technological developments are felt by almost all levels of society and institutions, including the banking world. The banking world is required to innovate in the field of information technology. Banking services, especially in Indonesia, are becoming more varied along with the rapid development of technology. The rapid growth of technology offers convenience for customers to access various services provided by banks.

Banking services are carried out through electronic media where customers can make transactions, communicate, register, open accounts, and obtain information independently. This is also known as Digital Banking (POJK 12-2018). The application of information technology and digital transformation in digital banking services is expected to minimize time, distance, space, and costs to expand access to affordable financial services. In Kenya, the increase in the use of information technology led to an increase in the number of branches and banks' efficiency value (Mutisya & Atheru, 2019).

Based on several previous studies, it shows that digital banking innovation can contribute to increasing profits and carrying out operational efficiency, including research conducted by Susanti (2019), Scott et al. (2017), Gust & Marquez (2004), Oliner & Sichel (2000). Conversely, not all digital banking innovations positively influence a bank's performance, as seen in profitability and described by ROA (Akhisar et al., 2015). However, the ROA data on the performance of Indonesian conventional commercial banks issued by the OJK shows that ROA from 2013 to 2019 has experienced uos and downs even though digital banking innovation continues to develop in Indonesia.



This fluctuating ROA value is quite different from the results of research that say that digital banking positively affects bank performance. Therefore further research is needed to reveal how digital banking affects bank performance in Indonesia.

LITERATURE REVIEW

Banking Financial Performance

Bank financial performance illustrates the level of success achieved by a bank in its operational activities. Hamidi (2019) adds that an increase in bank performance can be realized through an increase in sales and increasing profitability. In this study, ROA will describe bank profitability, which is supported by several previous

studies. ROA is used to measure the performance of bank profitability by seeing how effectively bank assets are used to generate profits. The greater ROA, the greater the level of profit achieved by the Bank and the better the Bank's position in the use of assets.

$$Return\ On\ Assets = \frac{Laba\ Bersih}{Total\ asset} \times 100$$

Digital Banking

According to PJOK Chapter 1 General Provisions Article 1 point 4, Digital Banking Services are Electronic Banking Services, which are developed by optimizing customer data to serve customers more quickly, easily, and according to their needs (customer experience) can be carried out independently by customers.

POJK Number. 12 / POJK.3 / 2018 Chapter II concerning Electronic Banking Services in Article 3 states that Banks operate Electronic Banking Services by utilizing distribution channels (delivery channels). Examples of distribution channels (delivery channels) for Electronic Banking Services include Automated Teller Machines (ATM), Cash Deposit Machines (CDM), phone banking, Short Message Services (SMS) banking, Electronic Data Capture (EDC), Point of Sales (POS), internet banking, and mobile banking.

Types of Digital Banking

In this study, the authors used three types of digital banking, including :

1. Internet Banking
   Internet banking is one service offered by the Bank, which allows customers to obtain information, communicate and conduct banking transactions using the internet network. Internet-only bank activities are not allowed because it is not a bank that only provides banking services via the internet (Bank Indonesia, 2013). By utilizing internet banking, customers can carry out banking transactions (financial and non-financial) through a computer connected to the Bank's internet network. Types of transactions in internet banking, namely: a) Balance information, account mutations, exchange rate information b) Fund transfers c) Purchases (for example: top-up credit, airplane tickets, and shares) d) Bill payments (for example: EDC, telephone, handphone , and electricity).
2. Mobile Banking
   Mobile banking is a banking service that can be accessed directly via a GSM (Global for Mobile Communication) cellular phone/cellphone by utilizing the SMS (Short Message Service) feature. Types of services that can be obtained through mobile banking include: a) Transfer of funds; b) Information on balance, account mutation, and exchange rate information; c) Payment (PLN, telephone, electricity, mobile phone, insurance, and EDC); d) Purchasing (top up, stock) (Margaretha, 2015).
3. Automatic Teller Machine (ATM)
   ATM is an electronic device that allows banking customers to withdraw money and check their savings accounts without the need to be served by a "Teller" at the Bank. Many ATMs also function for depositing money or checks, transferring money and other banking transactions (Mustafa, 2018). The benefits of using

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an ATM are that customers can make cash and non-cash banking transactions without visiting a bank branch. Service with an ATM can also be done without limitation of time and place because this service is online for 24 hours (Marliza, 2017).

Research Hypothesis

One of the digital banking innovation factors that affect Bank Performance is Internet Banking. Internet Banking has a significant positive relationship with bank performance described by ROA, leading to better financial performance (Mutisya & Atheru, 2019). Based on the description above hypothesis as follows: H1: Internet Banking affects the Bank's performance.

Another factor in the distribution channel that is the next most widely used is Mobile Banking. Mobile banking has a significant influence on Bank Performance. Mobile Banking significantly explains the variation in corporate financial performance in Kenya (Chipeta & Muthinja, 2018). Based on the description above hypothesis as follows: H2: Mobile Banking affects the Bank's performance.

The next factor in the most widely used distribution channels is Automatic Teller Machine (ATM). According to Mutisya & Atheru (2019), ATM has a significant positive relationship with ROA, leading to better financial performance. Based on the description above hypothesis as follows: H3: ATM affects the Bank's performance.

This study will also examine the effect of Internet banking, Mobile banking, and ATMs on bank performance as described by ROA. Based on the description above hypothesis as follows: H4: Internet banking, Mobile banking, and ATM affect the Bank's performance simultaneously.

Model of Framework

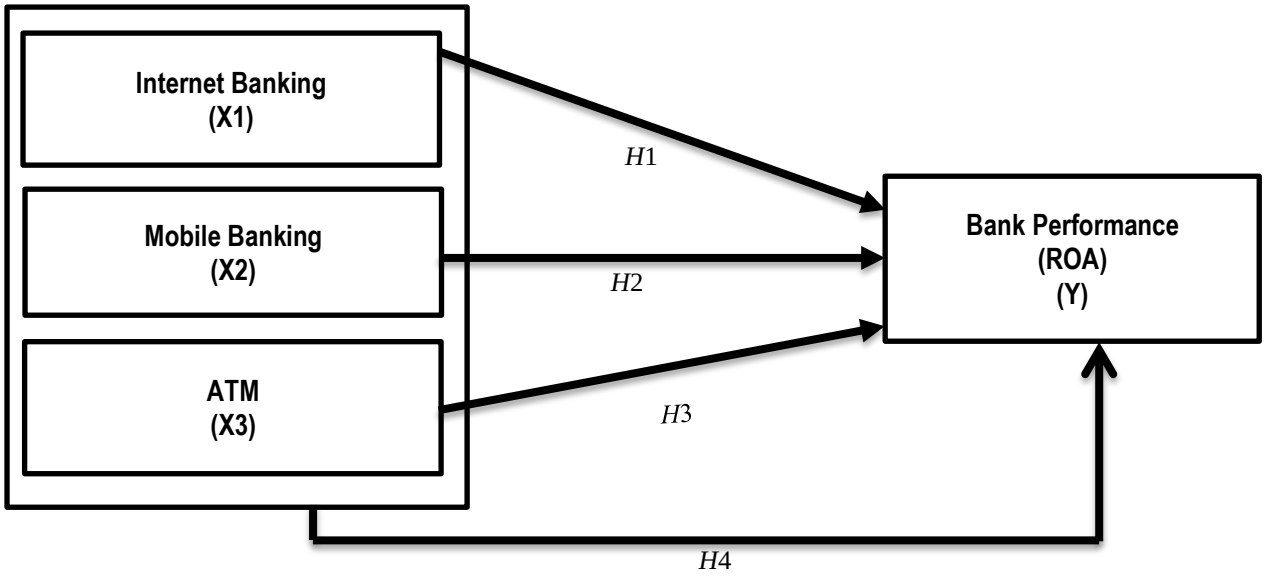

Figure 1. Theoretical Framework Scheme

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RESEARCH METHODS

Population, Sample and Data Sources

The population in this study is the annual reports of BUKU 3 and 4 banks. BUKU 3 banks are banks with a core capital of IDR 5 trillion - IDR 30 trillion, while BUKU 4 banks are banks with a core capital of more than IDR 30 trillion or at least IDR 30 trillion. While the sample of the population is banks that have complete digital banking innovation data and have limited annual reports that will be studied, namely the 2013-2019 period. Then the banks that fall into the criteria are 5 banks including Bank BTN, BRI, Mandiri, BCA and CIMB Niaga. The data collection method in this research is document review method. The documents examined in this study are the BUKU 3 and 4 Bank's annual financial reports.

Definition of Operational Variables

There are four variables used in this study contain one dependent variable and three independent variables. The description of such variables are as follows :

a. Bank Performance

The dependent variable is bank performance that measured with the ROA formula.

$$Return\ On\ Assets = \frac{Laba\ Bersih}{Total\ asset} \times 100$$

b. Internet Banking

Internet banking is one of the independent variables. This variable was measured by its transaction volume than can be seen from the Bank's annual report.

c. Mobile Banking

Mobile banking is one of the independent variables. This variable was measured by its transaction volume than can be seen from the Bank's annual report.

d. ATM

ATM is one of the independent variables. This variable was measured by the number of standing units that can be seen from the Bank's annual report.

Empirical Model

This study uses multiple linear regression. The multiple linear analysis models have the following equation:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + e$$

Explanation :

Y : Bank Performance

a : Constanta

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X_1 : Internet banking
X_2 : Mobile banking
X_3 : ATM
b_1, b_2, b_3 : Regression coefficient
e : Error.

Data Analysis

This study used the Classical Linear Regression Model (CLRM) to determine that the estimation model has met the econometric criteria. There is no severe deviation from the assumptions that must be met in the Ordinary Least Square (OLS) method (Ghozali, 2011). Several classical assumptions test are carried out, which includes: a) Normality Test, which is conducted to see whether the data is normally distributed or not (Ghozali, 2011); b) Multicollinearity test, to test whether the regression model found a correlation between the independent variables (independent); c) Heteroscedasticity test, which aims to test whether in the regression model there is an inequality of variance from the residuals of one observation to another; d) Autocorrelation Test, to test whether in the linear regression model there is a correlation between the error period t and the error period t-1 (previous).

RESULTS AND DISCUSSION

Table 1. Multiple Linear Analysis Results

Dependent Variable: Y
Method: Least Squares
Date: 01/30/21 Time: 14:48
Sample: 1 35
Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.336449	0.191251	6.987926	0.0000
X1	4.18E-10	2.04E-10	2.045122	0.0494
X2	-2.19E-10	1.95E-10	-1.119478	0.2715
X3	0.000113	1.47E-05	7.734672	0.0000

R-squared	0.740516	Mean dependent var	2.797143
Adjusted R-squared	0.715404	S.D. dependent var	1.172151
S.E. of regression	0.625313	Akaike info criterion	2.006083
Sum squared resid	12.12153	Schwarz criterion	2.183837
Log likelihood	-31.10646	Hannan-Quinn criter.	2.067444
F-statistic	29.48925	Durbin-Watson stat	1.128126
Prob(F-statistic)	0.000000		

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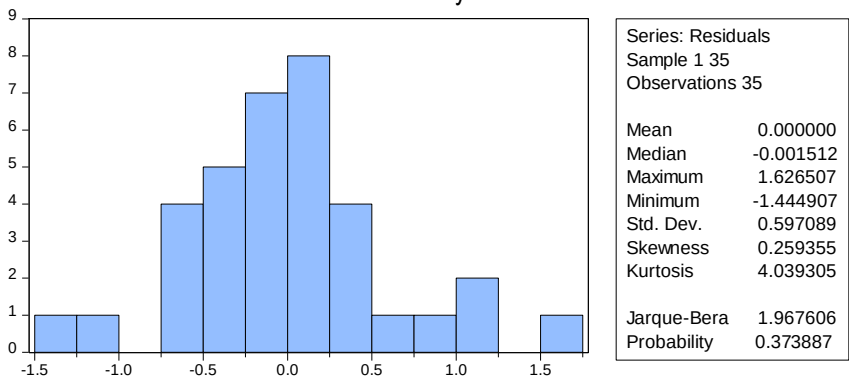
From the results of the multiple linear analysis, it can be concluded :

1. The constant value (C) is obtained at 1.336449, which means that if the Independent variable (Internet Banking, Mobile Banking, and ATM) is 0, then the Bank's performance is 1.336449.
2. The X1 coefficient, namely Internet Banking, is positive at 4.18E-10 and has a unidirectional relationship between Internet Banking and the bank performance variables. It can be concluded that when the internet banking variable has increased by 1 million transactions, the Bank's performance will increase by 0.000418.
3. The X2 coefficient, namely Mobile Banking, is negative at -2.19E-10, which means that Mobile Banking does not have a unidirectional relationship with Bank Performance. It can be concluded that when the mobile banking variable has increased by 1 million transactions, the Bank's performance will decrease by 0.000219.
4. The X3 coefficient, namely the number of ATMs, is positive at 0.000113, which means that the number of ATMs has a unidirectional relationship with bank performance. It can be concluded that when the variable number of ATMs has increased by 1 unit, the Bank's performance will increase by 0.000113.

Classical Linear Regression Model (CLRM)

Normality Test

Table 2. Normality Test Result



From the results of the Normality test above, it can be seen that the probability has a value of 0.373887, which means that this probability value is > 0.05, so accept H0 reject H1, which means that the sample in this study is normally distributed.

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.**Multicollinearity Test**

Table 3. Multicollinearity Test Result

Variance Inflation Factors

Date: 01/30/21 Time: 14:54
Sample: 1 35
Included observations: 35

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.036577	3.274016	NA
X1	4.18E-20	2.624328	1.938343
X2	3.81E-20	2.786142	1.990644
X3	2.15E-10	4.145569	1.266430

The VIF value is <10 (1.938343, 1.990644, 1.266430) from the multicollinearity test results above. It means that there is no multicollinearity problem in the regression model.

Heteroskedasticity Test

Table 4. Heteroskedasticity Test Result

Heteroskedasticity Test: Glejser

F-statistic	0.795965	Prob. F(3,31)	0.5055
Obs*R-squared	2.503193	Prob. Chi-Square(3)	0.4747
Scaled explained SS	2.941308	Prob. Chi-Square(3)	0.4008

Test Equation:
Dependent Variable: ARESID
Method: Least Squares
Date: 01/30/21 Time: 14:58
Sample: 1 35
Included observations: 35

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.375388	0.127952	2.933817	0.0062
X1	-1.42E-10	1.37E-10	-1.037317	0.3076
X2	-2.53E-11	1.31E-10	-0.193808	0.8476
X3	9.91E-06	9.81E-06	1.009385	0.3206
R-squared	0.071520	Mean dependent var		0.423524

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Adjusted R-squared	-0.018333	S.D. dependent var	0.414568
S.E. of regression	0.418351	Akaike info criterion	1.202219
Sum squared resid	5.425548	Schwarz criterion	1.379973
Log likelihood	-17.03884	Hannan-Quinn criter.	1.263580
F-statistic	0.795965	Durbin-Watson stat	1.356298
Prob(F-statistic)	0.505512		

From the Heteroscedasticity test results above, the Chi-square probability value > 0.05 (0.4747). It means there is no variance inequality from one residual to another, or the model in the regression model is free from one residual heteroscedasticity problem.

Autocorrelation Test

Table 5. Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.323260	Prob. F(2,29)	0.2819
Obs*R-squared	2.926964	Prob. Chi-Square(2)	0.2314

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 01/30/21 Time: 15:03
Sample: 1 35
Included observations: 35
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.015566	0.189648	-0.082078	0.9351
X1	2.15E-11	2.03E-10	0.105519	0.9167
X2	6.25E-12	1.95E-10	0.032107	0.9746
X3	-3.59E-07	1.46E-05	-0.024518	0.9806
RESID(-1)	0.328977	0.204321	1.610101	0.1182
RESID(-2)	-0.121903	0.206884	-0.589231	0.5603

R-squared	0.083628	Mean dependent var	0.000000
Adjusted R-squared	-0.074368	S.D. dependent var	0.597089
S.E. of regression	0.618893	Akaike info criterion	2.033037
Sum squared resid	11.10783	Schwarz criterion	2.299668
Log likelihood	-29.57814	Hannan-Quinn criter.	2.125078
F-statistic	0.529304	Durbin-Watson stat	1.682464
Prob(F-statistic)	0.752202		

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From the results of the autocorrelation test above, it can be seen that Prob. Chi-square> 0.05 is equal to 0.2314, so the regression model does not experience autocorrelation problems.

DATA ANALYSIS AND DISCUSSION

Based on the analysis table, the R Square value is 0.740516 (see Table 1). It means that the independent variables, namely internet banking, mobile banking, and ATM, can explain 74.05% of the dependent variable, namely bank performance. While other variables outside research can explain 25.95% of bank performance.

F-Test

The F test is a simultaneous (joint) test to determine the effect of each independent variable on the dependent variable, namely digital banking innovations (internet banking, mobile banking, and ATM), on bank financial performance. Based on the analysis Table 1, the value of Fcount (29.48925) > Ftable (2.91) and the probability value (0.000000) < 0.05 so that H4 can be accepted. It means the independent variable (Internet Banking, Mobile Banking, and ATM) has a simultaneous effect on bank performance.

t-Test

From the analysis table (see Table 1), it can be concluded that the results of the analysis are as follows :

1. The influence of the Internet Banking on bank performance results in a t_{count} of (2.045122) > t_{table} (2.03951), and the probability value is smaller than 0.05, which is 0.0494. So from the results of the t-test analysis above, it can be concluded that H1 is accepted, which means that the Internet Banking variable partially has a significant effect on bank performance.
2. The influence of Mobile Banking on bank performance results in t_{count} (-1.119478) < t_{table} (2.03951), and the probability value is greater than 0.05, which is equal to 0.2715. Then the results of the t-test analysis above can be concluded that H0 is accepted, which means the mobile banking variable partially does not have a significant effect on bank performance.
3. The Influence of the ATM on bank performance results in t_{count} (7.734672) > t_{table} (2.03951), and the probability value is less than 0.05, which is 0.0000. So from the results of the t-test analysis above, it can be concluded that H3 is accepted, which means that the ATM variable partially has a significant effect on bank performance.

The results of this study are supported by previous research. The first results of the partial test analysis conducted between internet banking variables on bank performance indicate that internet banking variables significantly affect bank performance. The results of this analysis are supported by research that has been conducted by Mutisya & Atheru (2019), Stoica et al. (2015), Margaretha (2015), Akhisar et al. (2015), Kingoo (2011), and Susanti (2019). Their stated research that Internet Banking has a significant effect on bank performance as described by ROA.

Second, the partial test analysis results conducted between the mobile banking variable on bank performance show that the mobile banking variable partially does not have a significant effect on bank performance. No previous research states that partially mobile banking has no significant impact on bank performance. Even so, the research conducted by Mutua (2013) stated that there is a weak positive relationship between the number of users and the monthly transfer value of mobile banking on the financial performance of banks in Kenya.

Third, the partial test analysis results conducted between the number of ATM variables on bank performance indicate that the number of ATM variables has a significant effect on bank performance. The results of this study are supported by research conducted by Le & Ngo (2020), Mutisya & Atheru (2019), Susanti (2019), and Kingoo (2011), which stated that ATMs has a positive and significant effect on bank performance as described by ROA, so that leads to the better bank performance.

Fourth, from the research results, it can be concluded that the independent variables, namely Internet Banking, Mobile Banking and the number of ATMs, simultaneously influence the dependent variable, namely bank performance. This analysis is obtained by looking at the value of F_{count} (29.48925) > F_{table} (2.91) and the probability value is 0.000000, which is lesser than 0.05. The results of this study are also supported by research which states that the variables of Internet Banking, mobile banking, and ATM have a significant positive relationship with ROA, leading to better financial performance (Mutisya & Atheru, 2019).

CONCLUSION

Furthermore, the Mobile Banking variable partially does not have a significant and negative effect on bank performance as described by ROA. This can be because this study uses data on the number of Mobile Banking transactions per year for the last seven years, while many variables influence bank performance. Bank performance described by ROA can be influenced by many variables such as third-party funds and other variables outside the scope of this study.

The ATM variable partially has a significant and positive effect on bank performance as described by ROA. With a larger number of ATM units, you can generate a higher income from the interest charged on each transaction. ATMs also encourage the possibility of a cashless banking system in the future that will be used by customers so that there will be fewer transactions in cash.

The analysis results also state that the independent variables (Internet Banking, Mobile Banking, and ATM) have a simultaneous effect on bank performance. The independent variable can explain 74.05% of the dependent variable, namely the Bank's performance, while other variables explain 25.95%.

SUGGESTIONS

The results of this study state that simultaneously, the digital banking innovation variable can improve bank performance as described by ROA. So competition in the banking world cannot be avoided. From this, the authors suggest that the banking world continues to innovate while still paying attention to what the community needs.

The development of technology provides many conveniences for society, but these conveniences also come with certain risks. As in digital banking, which requires personal data from customers, the authors suggest that customers more careful and alert to the risk of personal data security that can be misused.

As for further research, it is hoped that more proxies can be used, such as the transaction value of digital banking innovation. Because the digital banking innovation in this study only uses three proxies, namely the number of internet banking transactions, the number of mobile banking transactions, and the number of ATM units.

REFERENCES

Aprianingsih, Astri, and Amanita Novi Yushita. "Effect of Good Corporate Governance, Ownership Structure, and Company Size on Banking Financial Performance." Jurnal Profita: Accounting Studies 4.4 (2016).

Akhisar, Ilyas, K. Batu Tunay, and Necla Tunay. "The effects of innovations on bank performance: The case of electronic banking services." *Procedia-Social and Behavioral Sciences* 195 (2015): 369-375.

Chipeta, Chimwemwe, and Moses M. Muthinja. "Financial innovations and bank performance in Kenya: Evidence from branchless banking models." *South African Journal of Economic and Management Sciences* 21.1 (2018): 1-11.

Del Gaudio, B. L., Porzio, C., Sampagnaro, G., & Verdoliva, V. (2020). How do mobile, internet, and ICT diffusion affect the banking industry? An empirical analysis. *European Management Journal*.

Fernandes, Lidya, Lili Syafitri, and Usniawati Keristin. "ANALYSIS OF THE EFFECTIVENESS OF THE USE OF EDC (ELECRONIK DATA CAPTURE) MACHINES OF PT BANK BUKOPIN AGAINST THE LEVEL OF SALES OF XYZ STORES." (2015).

Gupta, S. D., Raychaudhuri, A., & Haldar, S. K. (2018). Information technology and profitability: evidence from Indian banking sector. *International Journal of Emerging Markets*.

Jannah, Rauzatul. Factors Influencing Customers in Using Digital Banking Services using Unified Theory Of Acceptance And Use Of Technology (UTAUT) Model at PT Bank Mandiri Syariah Banda Aceh Branch. Diss. UIN Ar-Raniry Banda Aceh, 2019.

Kingoo, Nancy. *Relationship between electronic banking and financial performance of commercial banks in Kenya*. Diss. University of Nairobi, Kenya, 2011.

Le, Tu DQ, and Thanh Ngo. "The determinants of bank profitability: A cross-country analysis." *Central Bank Review* (2020).

Mabwai, Felix. *Effects of mobile banking on the financial performance of commercial banks in Kenya*. Diss. University of Nairobi, 2016.

Margaretha, Farah. "The impact of electronic banking on Indonesia's banking performance." Journal of Finance and Banking 19.3 (2015): 178702.

Mbama, Cajetan Ikechukwu, et al. "Digital banking, customer experience and financial performance." *Journal of Research in Interactive Marketing* (2018).

Mueni, M.M, Atheru, G (2019). Electronic Banking and Financial Performance of Commercial Banks in Kenya. International Journal of Current Aspects. Vol. 3. PP 293-304.

Mustafa, A. J., Mubarak, A., &Rosihan, R. (2018). GEOGRAPHIC INFORMATION SYSTEM FOR LOCATION OF BANKS AND ATMS IN TERNATE CITY IS WEB-BASED. JIKO (Journal of Informatics and Computers), 1(2), 48-55.

Mutua, Rachael W. *Effects of mobile banking on the financial performance of commercial banks in Kenya*. Diss. University of Nairobi, 2013.

Financial Services Authority. (2018, 08 08). Implementation of Digital Banking Services by Commercial Banks. Retrieved from www.ojk.go.id: https://www.ojk.go.id/id/regulasi/Pages/Penyelenggaraan-Layanan-Perbankan-Digital-oleh-Bank-Umum.aspx

Scott, Susan V., John Van Reenen, and Markos Zachariadis. "The long-term effect of digital innovation on bank performance: An empirical study of SWIFT adoption in financial services." *Research Policy* 46.5 (2017): 984-1004.

Shaikh, Aijaz A., and Heikki Karjaluoto. "Mobile banking adoption: A literature review." *Telematics and informatics* 32.1 (2015): 129-142.

Sukarno, K. W., &Syaichu, M. (2006). Analysis of factors affecting the performance of commercial banks in Indonesia. Journal of Organizational Management Studies, 3(2), 46-58.

Stoica, Ovidiu, Seyed Mehdian, and Alina Sargu. "The impact of internet banking on the performance of Romanian banks: DEA and PCA approach." *Procedia Economics and Finance* 20 (2015): 610-622.

Sudaryanti, Dedeh Sri, Nana Sahroni, and Ane Kurniawati. "Analysis of the Influence of Mobile Banking on the Performance of Banking Sector Companies Listed on the Indonesia Stock Exchange." Journal of Management Economics 4.2 (2019): 96-107.

Tunay, K. B., Tunay, N., & Akhisar, I. (2015). Interaction between Internet banking and bank performance: The case of Europe. *Procedia-Social and Behavioral Sciences*, *195*, 363-368.