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The Effect of Digital Banking, Digital Transformation the Efficiency of Sharia and Conventional Commercial Banks in Indonesia

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Abstract

The purpose of this paper is to assess the efficiency of the general banking industry in Indonesia on the use of digital banking and digital transformation. This paper is a research paper with quantitative methods and uses primary data collected by researchers using questionnaires. As for the data analysis method with PLS software SmartPls. The respondents were employees of commercial banks consisting of ten Islamic commercial banks and eleven conventional commercial banks. Findings - Investigative findings show that the banking industry in Indonesia is generally on a trend of increasing efficiency after implementing digital banking and digital transformation. And Financial Innovation does not moderate digital banking and digital transformation towards efficiency. This study provides a basis for regulators and bankers to improve efficiency in the banking sector by improving services to customers through the application of digital banking and digital transformation in order to improve banking performance. Originality/value – This paper presents new empirical findings on the state of efficiency of Commercial Banks in Indonesia after using digital banking and digital transformation.

Keywords *Digital banking, Digital transformation, efficiency, Financial Innovation*.

INTRODUCTION

Technological advances have had a major impact on the life sector, including the inevitable financial sector. Various technological advancements, starting from the use of Automated Teller Machines (ATMs) by banks and continued with the development of Internet banking services along with the growing use of the internet, and, most recently, the use of mobile banking along with the growing use of smartphones by the public, have had an impact on changes in the financial services sector.

Indonesia is inevitably affected by technological advances in finance. The development of digital transactions is increasing from time to time. The increase in digital banking transactions was increasingly visible when the Covid-19 pandemic hit Indonesia starting in 2020 where there was a significant increase in the number of digital banking transactions by 56.7% in 2021 compared to 2020, from 4.96 million transactions in 2020 to 7.77 million transactions in 2021. Figure 1 shows the development of the number of digital banking transactions which include SMS banking, mobile banking and internet banking transactions.

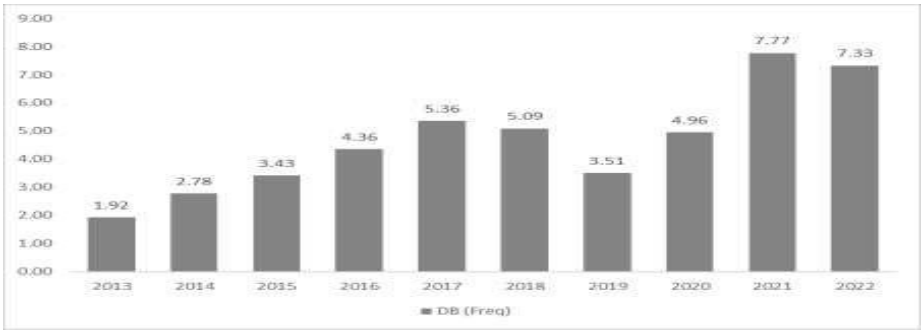

Figure 1. Number of digital banking transactions (in millions of transactions) 2022 data is provisional as of August 2022

Source: www.bi.go.id (data processed).

The increase in internet use by the public (www.statista.com), the dominance of the younger generation or millennials in the demographic structure. where the younger generation is relatively familiar with technological advances, has encouraged the development of digital banking in Indonesia. Nevertheless, compared to the development of financial technology that is increasingly maju, adopsi teknologi digital oleh banks in Indonesia are still relatively slow.

The development of technological advances in the financial sector needs to be addressed appropriately by banks. If banks are late in responding to these changes in technological advances, then banks have the potential to lose potential customers or market share because they are taken over by non-bank companies that utilize financial technology.

Commercial banks in Indonesia are not much different in terms of digital technology adoption where commercial banks face greater challenges related to research weaknesses, human resource development, and information technology development and optimization.4 where this digital technology requires large investments, while commercial banks (conventional banks and Islamic banks) experience budget constraints.

Considering the importance of digital technology and digital transformation by banks, it is important to examine the impact of digital banking services and transformation by banks in Indonesia, to gain a better understanding of the impact of digital banking services and digital transformation on efficiency on banks in Indonesia. Sathye (2005) examined the impact of internet transaction services by credit unions in Australia on bank performance in the form of efficiency.

Using censored regression analysis, his research found no significant association between internet transaction services and credit union performance represented by efficiency measures. Various constraints owned by credit unions such as small size, limited operating areas that have the potential to cause difficulties to take advantage of the advantages of internet transaction technology. The impact of internet banking on bank financial performance was also examined by DeYoung et al (2007) by taking a sample of banks in the United States from 1999 to 2001. DeYoung et al (2007) found that internet banking has an impact on increasing non-interest income derived from commissions (fees) deposit account.

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There is no evidence of the impact of internet banking on lowering bank overhead, even though labor costs are relatively greater for banks that adopt internet banking.

He et al (2020) found evidence of a substantial relationship between online banking adoption and cost-effectiveness in Chinese banks during the 2002 – 2016 observation period, where internet banking adoption tended to decrease cost efficiency. This means that the adoption of internet banking is likely to increase bank costs which is possible for additional marketing and employee costs. While in terms of revenue, the adoption of internet banking tends to significantly increase the efficiency of income from non- interest income. Internet banking increases the bank's profit from commission/service revenue (fees).

Based on the background and research above was conducted in the context of conventional banking systems in China, Australia and America. The results of the study above also found controversy related to the significance of the influence of digital banking on bank efficiency. Sathye (2005) and DeYoung et al (2007) did not find a significant relationship between digital banking and bank efficiency while He et al (2020) found a significant relationship, thus the author is interested in conducting a study entitled "The Effect of Banking Digitalization, Digital Transformation on the Efficiency of Commercial Banks in Indonesia" with moderation of financial innovation. This study will examine whether Banking Digitalization, and Digital Transformation have a positive effect on the productivity of commercial banks in Indonesia. So, it can be concluded that the purpose of this study is to examine how efficiency is affected by Banking Digitalization and Digital Transformation.

There is controversy related to the significance of the influence of digital banking on bank efficiency. Do not found a significant relationship between digital banking and bank efficiency, while found a significant relationship. The existence of independent variables that have a positive impact on dependent variables in commercial banks in Indonesia with moderation of financial innovation is then identified as a research problem.

LITERATURE REVIEW

Digital Banking

Service quality, functional quality, perceived value, service customization, service speed, employee-customer interaction, brand trust, Digital Banking innovation, perceived utility, and perceived risk are elements that impact the experience of using digital banking.

Digital banking is an electronic banking facility designed to maximize the benefit of customer information in an effort to help take care of things needed by customers more easily, agile, tailored to customer needs, and can be done independently by customers while still paying attention to protection considerations in line with the rules of the Financial Services Authority or OJK listed in the number 12 /POJK.03/2018 regarding the regulation of digital banking facilities at commercial banks.

The scope of Digital Banking includes electronic banking facilities via digital devices (for example t-banking, e-banking, mbanking, contactless cards (e.g. tap and go), Automated Teller Machines and point-of-sale), excluding PayPal used by intermediaries (e.g. e-Bay) to

interact with banks. Telephone banking allows customers to transact via telephone, while with internet banking, customers can do banking services via the internet from their homes, M-banking enables the management of financial services through mobile devices.

Digital Transformation

Our digital transformation elements revisit elements of digital capabilities to reflect the opportunities and impact of new digital technologies. Some of the original elements are relatively unchanged, some have been reconfigured, and some new elements have appeared. Elements aimed at improving customer experience and internal operations remain important. The elements of business model innovation have also evolved, with the rise of multi-platform businesses and the increasing dominance of global platform players, such as Alibaba, Amazon, and Google.12 Digital transformation is a holistic approach to renovating strategies and business models through digital technology.

Some related terms such as digitization and digitization should not be misunderstood and often have many different understandings among academics. Therefore, it is necessary to clarify what these words mean. The term 'digitalization' has been used to define the transformation from analog to digital. Broadly, digitalization is considered as the process of converting analogous information into digital information and is associated with the ultimate goal of creating new value for stakeholders. While digitalization is related to changes at the information level, the term digitalization has been used to describe the transformation that occurs at the process level business. Meanwhile, digital transformation is happening at a strategic level, emphasizing the shift to new/innovative business models towards digital technology-based customers, However, very diverse definitions of digital transformation are already appeared. For digital transformation means change based on the basis of digital technology. Arguing that digital transformation is based on the implementation and application of digital technology, ICT transforms existing business operations into new processes, products/services, or new business models, sometimes new digital products.

Efficiency

Efficiency means the determination of how to do something (exert effort, work) and run it without spending energy, time, and money. Efficiency can also lead to the comparison of inputs to outputs or expenses to revenues. Who quoted the explanation of H. Emerson said: "Efficiency is the best ratio between input and output (profit vs. origin of power consumed), and the best result produced with a small amount of resources. In other terms the relation between what has been done."

"Efficiency means determination when doing something (exerting effort, working) and running it without spending time, energy, or funds. Efficiency can also lead to the comparison of inputs to outputs or expenses to revenues." Efficiency is a way of likening the agenda to seeing how to best use the resources that will be made accessible, for example mobile banking will be more agile and more affordable without spending money, energy, and time to produce something desired so that procedures can be reported more efficiently.

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Financial Innovation

Financial innovation is a new process, product, and system. Such things including but not limited to Internet Banking, Mobile lending, Mobile Banking and Banking Agents, debit cards, credit cards, electronic money, value restrictions, banking agents, Real Time Gross Settlement, Cheque Deduction Clearing Systems, utility payment giving, electronic funds transfers, and sales of insurance products can be classified as financial innovations.

Financial innovation as "something new that reduces costs, reduces risk, or provides products/services/instruments that better that can Satisfying better demand of participants of the financial system. Financial innovation encompasses the process of discovery (an ongoing research and development function) and diffusion (or adoption) of a new product, service, or idea. Financial innovation can also be seen as a tool used by the financial system, also called an Economist fog or real economic system (real), to meet targets to improve performance.

METHOD

This research includes descriptive analysis research by applying quantitative methodology in data collection. The respondents were employees of commercial banks in Indonesia, namely BNI, Mandiri, BRI, BTN, BJB, BCA, Mega, Danamon, Panin, May Bank, CIM Niaga. BSI, BJBS, Bukopin Syariah, Muamalat, Danamon Syariah, CIM Niaga Syariah, Panin Dubai Syariah, Mega Syariah, and BTPN Syariah. Based on Hair (2014) respondents are distributed at least 5 x N, where N = number of indicator items so that the total respondents who meet these requirements are 65 respondents (5 x 13). In this study researchers spread a minimum of 10 x N, (10 x 13) so that the total respondents obtained must be 130 respondents. The process of selecting respondent data is:

Table 1. Respondent Selection

NO.	*CRITERION*	*SUM*	*%*
1.	*Total Responds should*	*65*	*100*
2.	*Total Respondents Minimum Researchers*	*130*	*100*
3.	*Total number of respondents who Responded*	*148*	*115%*
4.	*Total data that can be processed*	*148*	*115%*

Respondent Demographics

The characteristics of informants in this study covering gender, status, recent education, and duration of work at banks were explained by the demographics of respondents. As stated in table 2 Characteristics of Respondents:

Table 2. Characteristics of Respondents

NO.	CATEGORY	FREQUENCY	PRESENTED
	GENDER		
1.	*Man*	*62*	*41%*
2.	*Woman*	*86*	*59%*
	Total	*148*	*100%*
	STATUS		
1.	*Marry*	*77*	*52%*
2.	*Unmarried*	*71*	*48%*
	Total	*148*	*100%*
	RECENT EDUCATION		
1.	*D3*	*12*	*8%*
2.	*S-1*	*121*	*82%*
3.	*S-2*	*13*	*9%*
4.	*S-3*	*2*	*1%*
	Total	*148*	*100%*
	TENURE		
1.	*0 – 5 Years*	*67*	*45%*
2.	*6 – 10 Years*	*44*	*30%*
3.	*11 – 15 Years*	*15*	*10%*
4.	*Over 15 years old*	*22*	*15%*
	Total	*148*	*100%*

In table 2, it can be seen that the composition of female respondents compared to men is more, namely 59% or 86 respondents. Meanwhile, when viewed in terms of status, many are married, namely 77 respondents or 52%. In terms of education, many respondents with S-1 education, namely 121 people or 82%, this shows that respondents who responded to the questionnaire had good quality. As for the working period, 0-5 years is the largest respondent, namely 67 respondents or 45%, where during that period of work bank employees are in a state of high enthusiasm and they are a technologically literate millennial group.

This type of research is descriptive analysis research and quantitative methods. When analyzing data, descriptive analysis uses statistics to describe or describe information that has been accumulated, without any attempt to draw conclusions or a level trusted by the global. Independent variables, dependent variables and moderation variables are the three variables that make up the author's research. An explanation of each variable is given below:

1) Exogenous variables (independent variables or independent variables). The independent variable in this study is Digital Banking (X1) with indicators: Service quality, employee and customer engagement, Digital banking innovation. Digital Transformation (X2) with indicators: customer experience, improving operations, discovery of new business models.

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2) Endogenous variable (dependent variable). Efficiency is an endogenous variable in this research. With indicators: ease of time, energy, costs.
3) Variabel Moderasi (variabel independent kedua). Another name for this variable is the second exogenous variable. Financial Innovation (Z) is a moderating variable in this study, with indicators: internet banking, mobile lending, mobile banking, banking agents.

The population of this study is commercial banks in Indonesia. The sample is part of the size and composition of the population, both of which are considered representative. Researchers select a sample of each person in the population to thoroughly explain the variables investigated. This study used primary data. Researchers directly collected research data through questionnaire media distributed to 148 respondents of commercial bank employees in Indonesia.

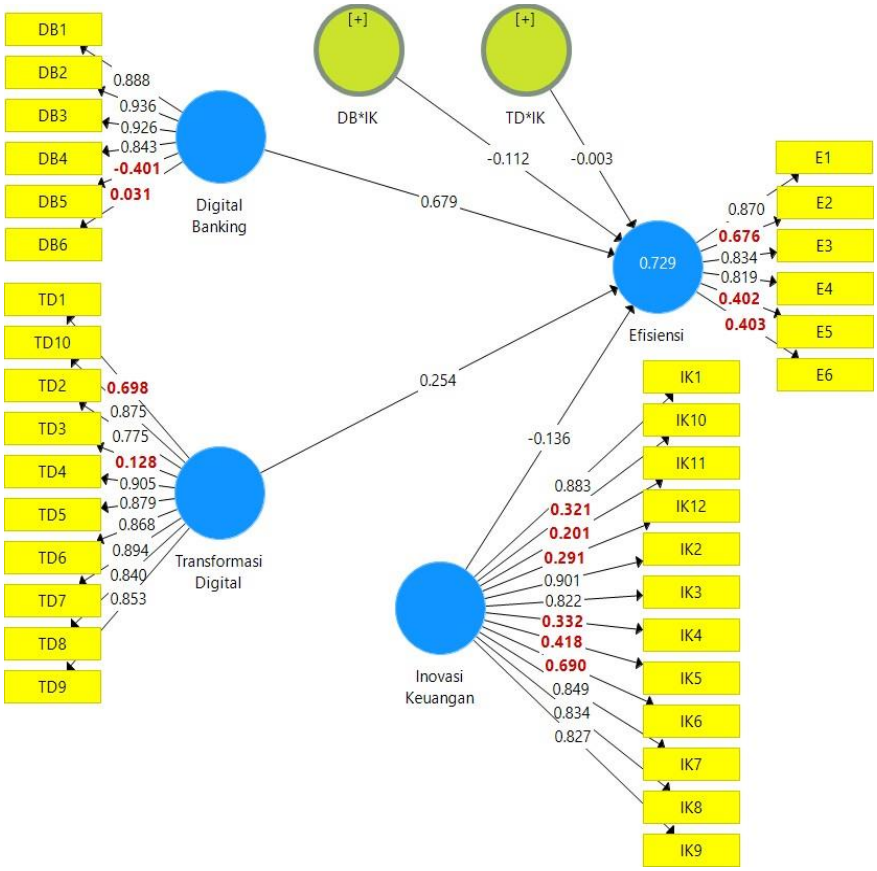
RESULTS AND DISCUSSION

Empirical results

Test the hypothesis in this study using Smart PLS software analysis which functions to test the validity, reliability and structure test of the model.

1. Validity Test consists of:

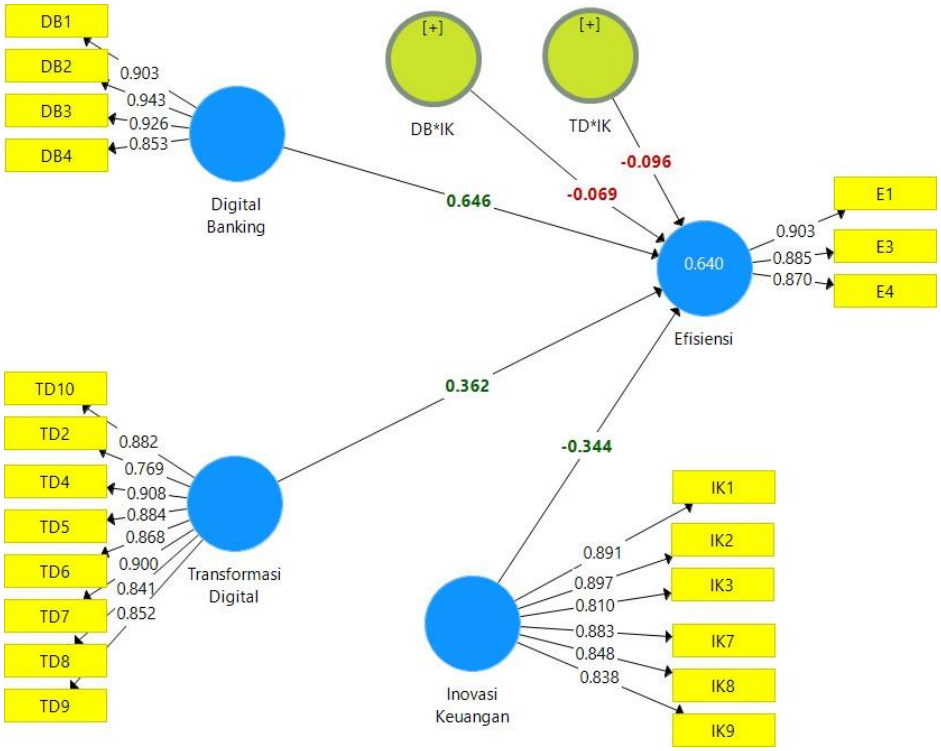
In Figure 2 below the results of the PLS loading factor model estimation (Autor Model testing) where there are 13 indicators whose value is below 0.7 does not meet the validity standard according to experts the standard is 0.7.



The estimation results of the PLS model show that there are several indicators that are not valid in measuring the construct because it has a loading factor value of < 0.7.

Therefore, all these indicators must be removed from the model and model estimationis carried out once again. The findings of the model estimation after all invalid indicators are removed can be seen in figure 3 Convergence Validity Results below:

Figure 3. Convergence Validity Results



As shown by the PLS model estimation results in the figure, currently the remaining indicators in the model are only valid indicators, therefore validity testing is continued by assessing the AVE construct. In this test, the construct is declared to meet the convergent validity criterion if the AVE > 0.5. As table 3:

Tabel 3. Avarage Variance Extracted (AVE)

Matrix	Cronbach's Alpha	rho_A	Compo
	Average Variance Extracted (AVE)		
DB*IK	1.000		
TD*IK	1.000		
TD	0.747		
DB	0.822		
IK	0.743		
E	0.785		

The test results above show that the AVE of all constructs >0.5 indicates that all constructs already meet the establishedconvergent validity benchmark.

Information in the table causes the following:

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DB = Digital Bangking
IK = Financial Innovation
TD = Digital Transformation
E = Efficiency.

2. Discriminant Validity Test

a. A valid condition is Formell Larcker Criterion or HTMT, the entire construct is less than equal to 0.9. The results of the description validity test show that the HTMT of the entire construct is less than 0.9 which means that the validity of the description is met. As table 4 Discriminating Validity:

Table 4. Discriminat Validity

Fornell-Larcker Criterion | Cross Loadings | Heterotrait-Monotrait Ratio (HTMT) | Hete

	DB	DB*IK	E	IK	TD	TD*IK
DB						
DB*IK	0.413					
E	0.842	0.498				
IK	0.789	0.204	0.515			
TD	0.898	0.321	0.735	0.872		
TD*IK	0.342	0.898	0.441	0.225	0.308	

In table 4 there are Formell Larcker Criterion and Cross Loading, dima Formell Larcker Criterion shows that variables with variables themselves have a correlation value and Cross Loading shows there is a correlation value between indicators and variables.

b. The Reliability Test is determined by Composite Reliability and Cronbach's Alpha where the method of assessing it must be > 0.7 as the results in this study in table 5 Constructs of Reliability and Validity below.

Table 5. Construct Reliability and Validity

Matrix | Cronbach's Alpha | rho_A | Composite Reliability | Average Variance Extracte

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance E...
DB	0.928	0.933	0.949	0.822
DB*IK	1.000	1.000	1.000	1.000
E	0.863	0.863	0.916	0.785
IK	0.931	0.937	0.945	0.743
TD	0.951	0.956	0.959	0.747
TD*IK	1.000	1.000	1.000	1.000

In table 5 there are Composite Reliability and Cronbach's Alphashowing that the statements in the variables DB, E, IK, TD, are reliable in accordance with the field.

3. Test the structure of the Model (Inner Model), namely:

a. R. Square is a number that belongs only to the dependent variableor endogenous variable. The value is how much impact the independent or exsogen variable has on the endogenous variable(dependent). In this study R Square is moderate, because it is in the range of 0.33-0.67 as table 6. R Square below.

Table 6. R-Squre

Matrix	R Square	R Square Adjusted
	R Square	R Square Adjusted
E	0.640	0.627

In table 6 there is a value of 0.640 = 64% meaning that the efficiency variable is influenced by 64% by digital banking, digital transformation, and financial innovation where the remaining 36% is influenced by variables that are not taken to affect the efficiency variable.

b. In table 7 is a table of path coefficients (path coefficient) the results of the influence test will show the direction of variable association whether our hypotheses are pointing in a positive ornegative direction.

Table 7. Path Coefficients

Mean, STDEV, T-Values, P-Values	Confidence Intervals	Confidence Intervals Bias Corrected		
	Original Sa...	Sample Me...	Standard D...	T Statistics (|O/STDEV|)	P Values
DB -> E	0.646	0.636	0.128	5.044	0.000
DB*IK -> E	-0.069	-0.095	0.138	0.502	0.616
IK -> E	-0.344	-0.331	0.132	2.601	0.010
TD -> E	0.362	0.357	0.143	2.525	0.012
TD*IK -> E	-0.096	-0.088	0.119	0.805	0.421

The results of table 7 explain that:

1) Digital banking has a positive impact on efficiency, shown by p value = 0.000 which means < 0.05 and a positive path coefficientof 0.646
2) Digital transformation has a positive effect on efficiency, shownby a p value of 0.012 < 0.05 and a positive path coefficient of 0.362.
3) Financial innovation cannot moderate banks' digital influence on efficiency, indicated by p value = 0.616 > 0.05
4) Financial innovation cannot moderate the effect of digital transformation on efficiency, indicated by p value = 0.421> 0.05

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b. T-Statistics (Bootstrapping) is a value to show whether variablesthat have a positive direction have a significant positive effect, based on expert standards, which must be above 1.96. In this study T-statistics are also listed as table 8 below:

Mean, STDEV, T-Values, P-Values | Confidence Intervals | Confidence Intervals Bias Corrected

	Original Sa...	Sample Me...	Standard D...	T Statistics (|O/STDEV|)	P Values
DB -> E	0.646	0.636	0.128	5.044	0.000
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TD -> E	0.362	0.357	0.143	2.525	0.012
TD*IK -> E	-0.096	-0.088	0.119	0.805	0.421

In table 8 in column T Stastik we analyze that there are two variables that have a significant positive influence, namely:

1) Digital banks have a significant positive effect on efficiency, shown T statistic = 5.044 > 1.96.
2) Digital transformation has a significant good impact on efficiency, shown T Statistics = 2.525 > 1.96.

c. Evaluate the structure of the model with predictive relevance, which is a measure of how well the observation value of the resultsis accurate. According to experts, the standard is to have a value of > 0. In this study the results are contained as table 9 Predictive Relevance below.

Table 9. Predictive Relevance Results

Total | Case1 | Case2 | Case3 | Case4 | C

	SSO	SSE	Q^2 (=1-SSE/SSO)
DB	596.000	596.000	
DB*IK	149.000	149.000	
E	447.000	235.997	0.472
IK	894.000	894.000	
TD	1192.000	1192.000	
TD*IK	149.000	149.000	

In table 9, a value of 0.472 is obtained, meaning that accordingto experts, when the value is > 0, it means that the observation value is good.

d. Determining the Fit Model is a measure that shows how well the value of the results studied. According to experts, the standard should be > 0. In this study, the Fit Mode Results are in table 10. Modet Fit Results below.

Table 10. Model Fit Results

Fit Summary | rms Theta

	Saturated Model	Estimated Model
SRMR	0.071	0.071
d_ULS	1.155	1.153
d_G	1.508	1.507
Chi-Square	1049.767	1048.445
NFI	0.731	0.731

In table 10 there is an NFI with a value of 0.731 or = 73%, meaning that the value studied is Fit or good, even perfect fit, because SRMR < 0.8.

CONCLUSION

Testing the influence of intervariables resulted in the following conclusions based on the results of data analysis carried out to test the proposed hypothesis, namely the Effect of Digital Banking (DG) on the Efficiency (E) of Commercial Banks in Indonesia. Based on the findings of the hypothesis test, the P-Values representing the impact of DG on E are known to be 0.000 and positive T-Statistics values are known to be 5.044, thus it can be said that DG significantly increases the efficiency of Commercial Banks in Indonesia. As Digital banking channels and financial services have provided benefits to customers, digital banking can improve customer experience, satisfaction, and loyalty, the impact of Digital Banking on bank financial performance is positive, and customers experience a good experience with Digital Banking. (Lyuba Alboul and Martin Beer, 2018).

The Effect of Digital Transformation (TD) on Commercial Bank Efficiency in Indonesia. According to the results of the path coefficient test on the basis of the T-Statistics value, it shows that the impact of TD on Efficiency is shown by P-Value = 0.012 and T-Statistics = 2.525, thus the efficiency of commercial banks in Indonesia is greatly improved by TD. This is consistent with the aforementioned opinion on the elements of digital transformation, we are revisiting elements of digital capabilities to reflect the opportunities and impact of new digital technologies. Some of the original elements are relatively unchanged, some have been reconfigured, and some new elements have appeared. (See "New Elements of Digital Capabilities"). Elements aimed at improving customer experience and internal operations remain important. The elements of business model innovation have also evolved, with the emergence of multi-platform businesses and the increasing dominance of global platform players, such as Alibaba, Amazon, and Google.

Financial Innovation strengthens the influence of digital banking on the efficiency of commercial banks in Indonesia. Based on the findings of the hypothesis test, the resulting value of P-Value = 0.616 > 0.05 means that financial innovation cannot moderate the influence of digital banks on efficiency bank general in Indonesia, which is partly due to indicators in variables financial innovations such as bank agents and mobile loans have not been widely practiced in commercial banks in Indonesia. For example, in the process of

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applying for loans until disbursement, most of the manuals are not online and sometimes even double, both manual and online, so they cannot help reducing bank operational costs or increase efficiency. Another reason is also based on the results of the PLS model estimation shows that there are several invalid indicators in estimating the construct because it has a loading factor value of < 0.7. Among them are indicators of bank agents and mobile loans. As the opinion of financial innovation indicators, namely new processes, products, and systems. The foregoing which includes but is not limited to Internet Banking, Mobile lending, Mobile Banking and Banking Agents, debit cards, credit cards, electronic money, value restrictions, banking agents, Real Time Gross Settlement, Cheque Deduction Clearing Systems, utility bill payments, electronic funds transfers, and sales of insurance products can be classified as financial innovations. Thus, the Financial Innovation Hypothesis of strengthening the influence of digital banking on the efficiency of commercial banks in Indonesia, is not accepted.

Financial Innovation strengthens the impact of digital transformation on the efficiency of commercial banks in Indonesia. Based on the findings of the hypothesis test, the resulting value of P-Value = 0.421 > 0.05 means that financial innovation cannot moderate the effect of digital transformation on the efficiency of commercial banks in Indonesia, which is partly due to indicators in financial innovation variables such as bank agents and mobile loans have not been widely practiced in commercial banks in Indonesia. For example, in the process of applying for loans until disbursement, most of the manuals are not online and sometimes even double, both manual and online, so they cannot help reducing bank operational costs or increase efficiency. Another reason is also based on the estimation results of the PLS model shows that there are several invalid indicators in estimating its construct Because it has a loading factor value of< 0.7. Among them are indicators of bank agents and mobile loans. As argued (weru mwangi, 2022) indicators of financial innovation are new processes, products, and systems. The foregoing is the including but not limited to Internet Banking, Mobile lending, Mobile Banking and Banking Agents, debit cards, credit cards, electronic money, value restrictions, banking agents, Real Time Gross Settlement, Check Cutting Clearing Systems, utility bill payments, electronic funds transfers, and sales of insurance products can be classified as financial innovations. Thus, the Financial Innovation Hypothesis reinforces the influence of digital transformation on the efficiency of commercial banks in Indonesia, is not accepted.

This research provides a basis for regulators and bankers to improve efficiency in the banking sector by improving services to customers through the application of digital banking and digital transformation in order to improve banking performance.

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