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Digital Banking Balanced Scorecard

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Abstract

Technological developments change the characteristics of customers and banking business processes. This is a challenge for banks to continue to serve customers with excellence. This phenomenon certainly has an impact on banking performance. In order for bank operations to continue running, leaders need to analyze performance for strategic decision making. Therefore, proper measurement or indicators of banking performance are needed. The purpose of this study is to find the right banking performance indicators by developing the concept of a balanced scorecard. The research method used is literature review and measurement quality testing through validity and reliability tests using SmartPLS 3.0. This study resulted in 21 indicators called Digital Banking Balanced Scorecard. The contribution of this research are (1) the development of the balanced scorecard concept which has four perspective and 21 indicators, (2) banks can use the Digital Banking Balanced Scorecard measurement to measure their performance, especially banks that have implemented banking digitalization, (3) further researchers can use this as a reference indicator of banking performance variables.

Keywords : Balanced scorecard, bank performance, banking digitalization.
JEL Classification : F65, G21

1. INTRODUCTION

The industrial revolution 4.0 has made the business competition in the banking sector become increasingly fierce. It has got even tougher as of a change in customer behaviors while making financial transactions using the technology. The technology has given facilitation to the customers to make financial transactions without the necessity of a face-to-face interaction with the tellers to deposit money, check balances, make bank transfer, or even open bank account. Nearly all of the banking activities can be done through the smartphones and growing number of facilities offered. McKinsey survey (2019) showed that the percentage of Indonesia's banking consumers who are digitally active has grown 2.5 times since 2014 and they now comprise 32% of the bank population (Barquin, et al, 2019). The banking digitalization segment has been a critical importance for the banks in

Indonesia that are sustaining growth as those digitally active consumers are twice more loyal than that of the non-digital consumers.

Banking service has had a roadmap for Bank 4.0. (King: 2020). King gave further explanation: Bank 1.0 occurred in 1472-1980. It's a traditional banking focusing on physical offices as a place for providing service to the customers. The customers had to meet physically. Bank 2.0 occurred in 1980-2007. At that time, ATM machines and internet banking had started to appear. The service was available outside the bank office hours. Bank 3.0 occurred in 2007-2017. Smartphones has started to appear, and anytime anywhere services via smartphones are directly accessible by the customers (mobile banking). Bank 4.0 (2017 to present) is a customer oriented banking service. The services are accessible real time through various technologies relying on *artificial intelligence*. The computer will study the bank customers' daily life patterns, the risks that customers face, and give the best set of answers to financial services for the customers. Banking advisory service is no longer based on officer's face-to-face interaction with customers. The banks no longer collect the data of customer identity as they do now. The bank will later on only make verification of the customer data based on the identity that has been stored in the blockchain. Banking and financial technology (fintech) will be highly adaptive for developing new skills through the application of programming interfaces and cloud computing.

Several banks have currently implemented digital banking as a service improvement for their customers. *Digital Banking* is a banking service through electronic media owned by the banks, and/or electronic media belonging to the prospective customers and/or independent bank customers. The activity or service provides facilities for the prospective customers and/or bank customers to obtain information, communicate, register, open and close accounts, make banking transactions, and even serve as financial advisor for investments, electronic-based trading system transactions (*e-commerce*), and other customer needs (www.ojk.go.id).

A survey on the banking industry concluded that 66% of respondents stated that one of the company's strategies is to develop a digital strategy. The main focus area for digital strategy is customer service. Ninety percent of respondents said that in the next two to three years the banks would make investments in the digital banking platforms (PWC, 2018). The implementation of digital banking is expected to improve the banking financial performance. The banks have begun using *artificial intelligence* in their business operations, especially in the customer service department. The questions about bank products posed by the customer can be answered by the intelligent assistants, chatbots.

Based on the background, changes in the business environment, customer characteristics, technology developments, increased business risk, have an impact on the bank performance. To ensure continuity of the bank operations, the management needs to make an analysis on the performance required for a strategic decision making. The accurate measurement or indicators for banking performance is, therefore, needed in accordance with the current conditions. The problem formulation that the research will address is How to make an accurate measurement of the bank performance in the current digitalization era? The contribution that this research will make is that banks can use the new indicators developed in this research to measure the banking performance known as *Digital Banking Balanced Scorecard*. The *Digital Banking Balanced Scorecard* measurement is developed from the *Balanced Scorecard* indicator proposed by Kaplan and Norton (1996) and developed by a number of previous researchers. The existing measurements were then added up with new indicators on the basis of the results of survey and measurement quality testing

through validity and reliability tests in this study. It is the novelty of the research. Previous research had generally used the *balanced scorecard* concept to measure company performance (Eskandari, et al, 2013; Rostami, et al, 2015; Abofaied, 2017; A. K. Gupta et al., 2018; (Akinbowale, Klingelhöfer, & Zerihun, 2020), but it remained limited to general indicators, not specific to banking digitalization. The development of digital banking has shifted the performance measurement of a bank. Banking services, which were originally mostly served by humans, have shifted to services that have made use of more information technology. For example, the front office is currently starting to use chatbots that utilize artificial intelligence. The measurement of banking performance that is commonly used has not considered this aspect. Thereby, the research purpose is to make an accurate measurement to rate the bank performance taking into consideration of the development of information technology in the banking. The concept of the Balanced Scorecard is used as the performance measurements is viewed from four comprehensive perspectives and have a cause and effect relationship. It is deemed appropriate to measure the bank performance in the current era of technology disruptions which have a major impact on the banking business operations, human resource competencies, customer satisfaction with bank services, incurring of new risks, and it ultimately has impact on banking financial performance.

The article writing systematics begins with an introduction conveying the phenomenon of the developments of digital banking services. It is followed by a literature review discussing the concept of the Balanced Scorecard, including its dimensions and measurements in detail. The following discussion is on the research methodology which is continued with results and discussion, and closed with conclusions.

2. LITERATURE REVIEW

Balanced Scorecard

The *balanced scorecard* is a strategic management system or the so-called *"Strategic based responsibility accounting system"* which formulates the mission and strategy of an organization into operational objectives and uses four different perspectives in measuring performance. The *Balanced Scorecard* represents an external balance related to shareholders and consumers, as well as the internal balance related to internal business processes and learning and growth. Not only does the *Balanced Scorecard* focus on the issues to increase growth, but also on the cost reduction and efficiency improvement. The *Balanced Scorecard* provides a complex and complete analysis of performance. The four perspectives are as follows (Kaplan and Norton, 1996):

1. Financial perspective analyzes and compares the company's financial performance. The financial perspective can be measured using net income and some financial ratios such as ROI (*Return on Investment*).
2. Consumer perspective focuses on how the organization gives its attention or provides service to its customers to gain satisfaction.
3. Internal business process perspective is an identification of various processes sped up by the managers. The Internal business process is critical to achieving customer and shareholder goals.
4. Learning and growth perspective develops the goals and measurements driving learning and growth of the company, focusing on the human resource competencies.

As the time passes, the concept of balanced scorecard has been developing thanks to the inputs from practitioners and academicians. The initial concept of the balanced scorecard had four perspectives that had separate systems and had yet to be integrated. The four perspectives were developed from the company's internal point of view: learning and growth perspective, and internal business process perspective; as well as from the company's external perspective: customer and financial perspectives. In the second generation, the balanced scorecard was developed in the form of strategy maps and linkage diagrams, where its various strategic objectives have a cause effect relationship. This gives continuity of strategic objectives in each perspective. In addition, every objectives coming from the four perspectives has its interrelation. It means if the objectives from the most basic perspective, i.e. learning and growth perspectives are not achieved, the higher perspective is impossible to achieve. The concept of second generation balanced scorecard focuses more on management. The success of measurement lies in the commitment of management. It is slightly different from the first generation which focuses purely on measurement of performance. The management needs to make Plan, Do, Check, and Act (PDCA). The third generation of balanced scorecard concept places more emphasis on human, information, and organizational resources.

The following is the measurement of the *Balanced Scorecard* performed by previous researchers to measure the bank performance

Table 1. Measurement of Balanced Scorecard for Banks from Previous Research

Reseacher	**Indicator**
Akinbowale et al (2020)	Return on capital invested, growth in revenue, earnings per share, acquisition of new customer, customer complaints, labour turnover rate, Percentage of income generated by new products and services, Average time taken for product and services development
Zahoor and Sahaf (2018)	Net profit, sales, ROA, customer satisfaction, customer loyalty, Service standards communication, Employee empowerment, Employee training
Rostami et al (2015)	Revenue/sales, ROE, Leverage Ratio, Asset utilisation, NPL, Deposits, Investment, Spread rate, P/E, Market Share, Customer loyalty, Customer satisfaction, Customer acquisition, Growth rate of customer complaint, Availability, Long term deposit, Update services, No of new service items, Management performance, Management performance, New product developed, Sales chanels development, Improvements in facilities, Number of issued cards, Improved Employee Efficiency and Effectiveness, Training cost per employee, Employee Turnover Rate, Employee satisfaction, Employee experience
Eskandari et al (2013)	Revenue/sales, ROI, Profit Margin, Debt ratio, ROA, EPS, Market Share, Customer satisfaction, Customer retention, Customer growth, Profit per customer, Profit per online customer, Transaction efficiency, No of new service items, Customer complaints, Rationalized forms & processes, Sales performance, Management performance, Improved Employee Efficiency and Effectiveness, Employee Turnover Rate, Responses of customer service, Employee satisfaction, Organization competence
Al-Najjar and Kalaf (2012)	Liquidity ratio, Customer satisfaction, Customer growth, Growth of Current Accounts, Growth of Saving Accounts, Deposits growth, Productivity Growth, Growth of Banking Services/service development,

Reseacher	Indicator
	Credit Growth, Growth in Software Applications, Front Office Employees, Employee Productivity, Employee Turnover Rate, Growth of the Bank's Branches, Employee Participation in Development Programs, The Number of Employees Using IT
Abofaied (2017)	Liquidity ratio, ROI, ROE, Profit Margin, Leverage Ratio, Customer satisfaction, Customer growth, Growth of Current Accounts, Growth of Saving Accounts, Deposits growth, Productivity Growth, Growth of Banking Services/service development,Credit Growth, Growth in Software Applications, Front Office Employees, Employee Productivity, Employee Turnover Rate, Growth of the Bank's Branches, Employee Participation in Development Programs, The Number of Employees Using IT
Upadhaya et al (2014)	Liquidity ratio, CAR, Asset utilisation, NPL, Deposits, Investment, Dividend and share prices, Marketing and advertising cost, Wages and salary, Customer satisfaction, Customer acquisition, Number of customers returned , Number of complaints from customers, Productivity Growth, New product developed,Quality of service, Cycle time of service, Improvements in facilities, Investment in automation and computerisation, Improved Employee Efficiency and Effectiveness, Number of complaints from staff, Number of complaints resolved
Alidade and Ghasemi (2015)	Liquidity ratio, Financial ratio, Income, Profitability, Market Share, Customer loyalty, Customer satisfaction, Customer acquisition, Customer acquisition, Innovate loan and deposit process/innovation, Growth of Banking Services/service development, Management performance, Quality of service, Resources equipment, Improved Employee Efficiency and Effectiveness, Employee satisfaction, Quality of service
Balkovskaya and Filneva (2016)	ROI, ROE, Profit Margin, Leverage Ratio, ROA, Operating income to asset ratio, Market Share, Customer retention, Customer growth, Profit per customer, Profit per online customer, Number of active products/services per customer, Transaction efficiency, No of new service items, Customer complaints, Rationalized forms & processes, Improved Employee Efficiency and Effectiveness, Training cost per employee, Employee Turnover Rate, Number of incentives programs
Dincer et al (2016)	ROE, ROA, CAR, NPL, Net profit growth, NIM, Market Share, Customer growth, Deposits growth, Profit per customer, Deposits/total liabilities, Credit Growth, Customer complaints,Profit per employee, Training cost per employee, Employee Turnover Rate, Growth of the Bank's Branches

Source: Managed Data, 2021

The *balanced scorecard* measurement created by Kaplan & Norton in 1996 to measure company's performance, has been widely used and has undergone various developments. Based on Table 1 above, the measurements were analyzed and summarized to generate 4 dimensions with a total of 17 *balanced scorecard* indicators as follows:

Table 2. Balanced Scorecard Indicators

Dimension	Indicator	Reference
Finance	*Return* on capital	(Abofaied, 2017)
	Return on asset	(A. K. Gupta et al., 2018)

Dimension	Indicator	Reference
Customer	Capital adequacy for credit risk	(A. K. Gupta et al., 2018)
	Amounts of non-performing loan	(Rostami et al., 2015)
	Capacity to pay off short-term loan	(Abofaied, 2017)
	Customer loyalty	(Rostami et al., 2015)
	Customer satisfaction	(Abofaied, 2017)
	Growth in number of customer	(Abofaied, 2017)
	Resolved customer's complaint ratio	(A. K. Gupta et al., 2018)
Internal Business Process	New product and service development	(Abofaied, 2017)
	Quality of digital product and service	(Abofaied, 2017)
	Company's security of data, information, and business process	(ISACA, 2012)
	Security of customer data	(ISACA, 2012)
Learning and growth	Improvement in skill and competency of IT employees	(Abofaied, 2017)
	Employee's productivity	(Abofaied, 2017)
	Rasio of employee turnover	(Abofaied, 2017)
	Number of complaints filed by employees	(Upadhaya et al., 2014)

Source: Managed Data, 2021

3. METHOD, DATA, AND ANALYSIS

This research is qualitative adopting a literature review method. It is the development of performance measurement concept known as the *balanced scorecard*. The object of this research is banking, so that the search for literature is only focused on the bank as the object of research. The concept of *balanced scorecard* measurement is associated with the phenomenon of banking digitalization whose development is still underway recently. Previous research articles using keyword *balanced scorecard* were found and specifically filtered using *balanced scorecard* which was used to measure bank performance. Based on the collection of *Balanced Scorecard* indicators used to measure bank performance in the previous research, 248 indicators were found. Of the 248 indicators, the same indicators were eliminated and combined for indicators with similar characteristics. At this stage, 4 dimensions are generated with a total of 17 indicators. Of the 17 indicators, five new indicators were added: Indicators for Return on Information Technology Investment, Increase in the Use of Digital Products by Customers, Digital Branch Growth, Speed of Cybercrime Handling, and Application of Digital Culture which were analyzed in this study. There are some 22 indicators measured using six Likert scales ranging from absolutely strongly agree, strongly agree, agree, disagree, strongly disagree, to absolutely strongly disagree. The unit of analysis is the individual. Data was collected by filling out questionnaires. Questionnaires were distributed either through printed forms or via google forms. One hundred and twenty printed forms were distributed, 78 printed forms were returned. This number was added by 92 respondents who filled out the google form using the snowball sampling method that met the respondent's criteria. The respondents' criteria are bank employees who have worked at least two years at banks that have implemented

banking digitalization. Based on the data collection, there are 170 data that can be processed.

The data was then put to the validity and reliability tests using the SmartPLS 3.0 program. The indicators are considered feasible for use to measure a variable if they pass the validity and reliability tests. The parameter can be used for the validity test if the outer loading value is above 0.7, but it is still acceptable if it is above 0.5 (Hair et al, 2019). The Average Variance Extracted (AVE) value must be above 0.5 (Hair et al, 2019). Meanwhile for the reliability test in PLS there are two methods, namely *Cronbach's alpha* and *Composite reliability*. *Rule of thumbs* for *alpha* value or *composite reliability* must be higher than 0.7 even though the value of 0.6 is still acceptable.

4. RESULT

The following are descriptive statistics on the distribution of respondents' answers.

Table. 4. Descriptive Statistics

Indicator	N	Min.	Max	Frequency						Mean
				1	2	3	4	5	6	
KP1	170	4	6	0	0	0	31	59	80	5,29
KP2	170	4	6	0	0	0	35	63	72	5,22
KP3	170	3	6	0	0	3	29	67	71	5,21
KP4	170	1	6	1	0	6	48	63	52	4,93
KP5	170	3	6	0	0	2	30	61	77	5,25
KP6	170	2	6	0	1	4	47	66	52	4,96
KP7	170	3	6	0	0	1	16	62	91	5,43
KP8	170	4	6	0	0	0	18	66	86	5,40
KP9	170	3	6	0	0	1	15	60	94	5,45
KP10	170	3	6	0	0	3	22	63	82	5,32
KP11	170	3	6	0	0	3	13	61	93	5,46
KP12	170	2	6	0	3	15	32	58	62	4,95
KP13	170	3	6	0	0	3	19	66	82	5,34
KP14	170	3	6	0	0	1	20	64	85	5,37
KP15	170	3	6	0	0	2	23	60	85	5,34
KP16	170	3	6	0	0	1	22	53	94	5,41
KP17	170	3	6	0	0	3	32	63	72	5,20
KP18	170	2	6	0	3	3	32	64	68	5,12
KP19	170	3	6	0	0	1	36	65	68	5,18
KP20	170	1	6	3	4	12	60	52	39	4,59
KP21	170	1	6	1	6	21	65	50	27	4,40
KP22	170	2	6	0	2	4	30	68	66	5,13

Source: Output of SPSS, 2022

Based on the statistical data in the table above, it shows that the average respondent's answer is 4,40 to 5,46. Respondents' answers varied, but the majority answered on a Likert scale of 4 (agree) to 6 (absolutely strongly agree).

The following is the results of validity and reliability test comprising 22 indicators with 5 new indicators i.e. Indicators for return on information technology investment (KP6), increase in the use of digital products by customers (KP11), digital branch growth (KP17), speed of cybercrime handling, and the application of digital culture (KP22).

Table 5. Validity and Reliabily Test for Instrument Variable of Banking Performance

Indicator	**Loading factor**	**Indicator**	**Loading factor**
KP1	0,779	KP12	0,665
KP2	0,751	KP13	0,767
KP3	0,745	KP14	0,826
KP4	0,649	KP15	0,727
KP5	0,735	KP16	0,715
KP6	0,707	KP17	0,720
KP7	0,710	KP18	0,750
KP8	0,771	KP19	0,785
KP9	0,700	KP20	0,363
KP10	0,782	KP21	0,547
KP11	0,786	KP22	0,744
AVE Value		0,539	
Composite Reliability		0,961	

Source: Output of SmartPLS 3.0, 2021

Based on the results of the validity test for some of these indicators, there is one indicator with a loading factor value of 0.363 < 0.5. Since the loading factor value is below the validity criterion limit, KP20 indicator is excluded from the measurement of banking performance variables. Meanwhile, the AVE value of the banking performance variable is 0.539 > 0.5. The composite reliability value is 0.961 > 0.7 so that the banking performance variable is declared reliable. The following are 21 indicators developed in this study:

Table 6. Measurement of Banking Performance

Dimension	**Indicator**
Financial	Return on capital
	Return on asset
	Capital adequacy for credit risk
	Amounts of non-performing loan
	Capacity to pay off short-term loan
	Return on IT investment
Customer	Customer loyalty
	Customer satisfaction
	Growth in number of customer
	Ratio of resolved customer complaints
	Increase in digital product use

Dimension	Indicator
	Growth of digital branch
Internal Business Process	Digital product development
	Quality of digital product and service
	Company's security of data, information, and business process
	Security of customer data
	Speed of *cybercrime* handling
Learning & Growth	Improvement in skill and competency of IT employees
	Number of employees using IT at work
	Number of Complaints lodged by employees
	Implementation of digital culture

Source: Managed Data, 2021

Measurement performed in this research is then named **Digital Banking Balanced Scorecard**. This measurement is specifically made for banks that have implemented digitalization.

5. DISCUSSION

The following is the need analysis for additional new indicators in the *balanced scorecard*, especially for banks in the era of banking digitalization.

a. ***Return* on information technology investment.** Those technology-oriented companies have had a commitment to the application of new technologies and response to changes in technology (Khin & Ho, 2018). The adoption of technology in banking digitalization had a significant effect on the technical efficiency of banking in Indonesia (Wirdiyanti, 2018). The low ratio between information technology related costs and total operating costs will exert positive effect on the bank performance, but this positive effect can turn into negative if the ratio is too high. The bank that are too aggressive in implementing and adopting digital banking technology tended to have lower score for performance efficiency (stability problems) during the period of research analysis performed by (Wirdyanti, 2018). However, the bank's aggressive decision on application of digital banking technology could increase funding efficiency and liquidity. In other words, the adoption of digital banking technology could improve efficiency of bank performance due to the effect of business expansion, but when the information technology related cost ratio is too high, it could reduce the bank's financial efficiency. The additional indicators for return on information technology investment aim to see how much efficiency or portion in sales or company profits achived by company in relation to the investments. By calculating the return on information technology investment, banks could perform an analysis on the efficiency of using working capital in the information technology sector, efficiency of the digital products, and efficiency of sales at the *digital branch*. By performing an analysis on the return, banks could also make decision whether or not it is necessary now or later to open a new digital branch (expansion). Therefore, the indicator of return on investment in information technology is a measurement that needs to be included in the assesment of banking performance.

b. **Increase in digital product uses by customers.** The banking service is now faced with a challenge to providing services anywhere and anytime with their digital products.

The success of digital product development is highly dependent on how well a company can manage its digital technology. Every step taken in the digital innovation from adopting digital technology to developing new digital solutions requires a high level of competence shown by its professionals. The fact that more customers are increasingly interested in the digital product use means the banks have given satisfaction, comfort, and security to their customers. That's why; they are willing to use them. This means that it is also an indicator for the company's success in providing digital product services to its customers. Therefore, the indicator for increase in the use of digital products by the customers is a measurement that needs to be included in the assessment of the banking performance.

c. **Growth of Digital branch.** The Financial Service Authority has given its support for the digital branches with the issuance of Guideline for the Operation of Digital Branches by Commercial Banks with orientation on meeting the customer needs by fully utilizing digital technology through devices and applications (software) as *delivery channels*. Digital banking services can be accessed anytime and anywhere, and minimize direct interaction with the bank's employees with the aim of increasing the efficiency of operational activities and the quality of the bank's services to its customers. Taking into account of the bank's readiness, OJK has come to a decision that the implementation of digital banking service in Indonesia shall start with the implementation of "*digital branch*", namely the availability of bank's facility that has specific function of processing customer registration and independent account opening (OJK, 2016). The increase in number of digital branches indicates that the need for consumer services for digital products is on the rise. Digital product service can no longer be provided by only one or several existing digital branches. The fact suggests that company's performance is on increase. Therefore, the digital branch growth indicator is a measurement that needs to be included in the assessment of the banking performance.

d. **Speed of cybercrime handling**. The company whose business process adopts information technology could not avoid the threat of fraud or fraud in information technology. (Akinbowale, et al, 2020) conducted a literature study on the impact of cybercrime in banking sector. Cybercrime attacks have significant effect on the company's finances, customer relationships and indirectly on the company's reputation. PWC (2018) delivered a report that 48% of companies offering financial services were vulnerable to economic crime. Several previous studies concluded that the transition of banking services to digital, needed to place emphasis on the customer aspects of security and privacy (Alwan & Al-Zu'bi, 2016; Sujata T. Lata, 2017). Even most users were not aware of cybercrime (Ali, et al, 2017). Tariq (2018) classified in his research two categories of losses due to cybercrime, namely: direct loss and indirect loss. Direct loss is in the form of money theft and data breaches while indirect loss is like customer frustration and damage to reputation or relationships with the public. (Tariq, 2018) also found prevention methods to minimize cybercrime attacks in the financial institutions: they are strict internal security, cyber security assessment, cyber security training, and cyber security audit. He conducted a research on the effect of *cybercrime* on *stock returns*. As a result, many market returned were negative following the announcement of *cybercrime* cases. Capability to minimize the risks by way of delicate handling before and after the cybercrime is also a measurement of the company's success. Therefore, the indicator of speed of cybercrime handling is a measurement that needs to be included in the assessment of banking performance.

e. **Application of digital culture.** When the company implements digital culture, the employees will have a *digital mindset*. The employees must have a digital mindset, how to help customers digitally, and be agile in making quick and accurate decisions. If digital mindset is there, digital talents will appear to develop digital products and services. Companies that have expressed readiness to adopt technology are those of which have skills to use new technology, and have commitment to using the technology to develop new products. Likewise, those digitally capable companies also need to have commitment and readiness to embrace new technologies in developing new products bringing competitive advantages. Companies with digital orientation and strong digital capabilities will be in a better position to make innovative offerings to satisfy customers, thereby increasing sales and financial returns (Khin & Ho, 2018). In other words, implementing digital culture will help improve the company performance. Therefore, the indicator of the implementation of digital culture is a measurement that needs to be included in the assessment of the banking performance.

6. CONCLUSION, LIMITATIONS, AND SUGGESTIONS

Conclusion

This study aims to create a measurement of banking performance adopting the literature review method and validity and reliability testing instrument with development of *Balanced Scorecard* concept adapted to the era of banking digitalization in Indonesia. Based on the results of literature review and validity and reliability tests, four perspectives or dimensions are gained with 21 *Balanced Scorecard* indicators named *Digital Banking Balanced Scorecard*.

The theoretical implication of this research is development of the *Balanced Scorecard* theory which is adjusted to the conditions of the banking sector which has been disrupted by information technology in the era of the industrial revolution 4.0. The practical implication for companies is that banks could use indicators developed in this study to measure bank performance in the current era of banking digitalization. This study also offers benefits to other young researchers who are interested to examine variables affecting bank performance by using four dimensions and 21 indicators for *Digital Banking Balanced Scorecard* measurement.

Limitation and Suggestions

The limitation in this study is the survey was carried out using a questionnaire to test the validity and reliability without interviews with the related parties. For further research, deeper information can be obtained through interviews with key informants who occupy high positions in the company as an additional method to confirm the results. Some variables that are possible for study are (1) variable of using *artificial intelligence*. Many business processes have made use of *artificial intelligence* so that it is interesting to conduct further study on company performance; (2) variables of business risk, where changes in business will certainly have an impact on the emergence of new business risks; and (3) variable of banking digitalization regulation.

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