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Do Digital Innovation and Risk Disclosure Control Performance? Evidence from Banking in ASEAN-6

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Abstract

The aim of this study to explain the influence of digital innovation and risk disclosure on bank performance in ASEAN countries. The research sample was 70 banks in ASEAN from Indonesia, Malaysia, Thailand, Philippines, Singapore, and Vietnam in the 2015-2018 period in which the annual reports used dual language or English. The study used regression panel analysis. Digital innovation and risk disclosure used content analysis. Indicators of digital innovation used digital branches and mobile banking. The results of the study found that the higher the digital innovation, the greater the bank profitability. However, only mobile banking has a significant effect. The next finding is the disclosure of potential risks in the annual report gave a negative signal to ASEAN banking, resulting in lower bank profitability. The uniqueness of the ASEAN setting is dominated by a very large, dynamic, and rapidly adapting population of productive age to digital technology.

Keywords: ASEAN banking, banking performance, digital branch, mobile banking, risk disclosure.

INTRODUCTION

Digital technology has changed the banking industry in developing ASEAN countries with six countries having the highest gross domestic product in the region, namely Indonesia, Thailand, the Philippines, Singapore, Malaysia, Vietnam (Trading Economics, 2020) ASEAN also has the potential for strong digital innovation, making this difference one of the banking strategies to increase opportunities by penetrating new market shares (Gupta & Xia, 2018) which in turn increases banking profitability. Research conducted by (Gupta & Xia, 2018) in the ASEAN region, stated that digitalization provides opportunities for banks to differentiate, especially in customer

behavior and desires. Another ASEAN digital potential can be seen in its demographic structure which provides profitable opportunities to develop digital innovation. The progress of digital innovation is also driven by the dominance of the millennial generation which is shown by the high level of the young population (between 15 and 59 years) in the ASEAN region, which is 61.8% (ASEAN Secretariat, 2019) which results in differences in behavior, attitudes, and requests from the community. The millennial generation is closely related to digital innovation, this is marked by the presence of technological advances, especially mobile devices that result in independence and become a necessity in everyday life (Zhowa & Worku, 2019) Table 1 shows digital penetration in ASEAN by respondents based on the age group which is dominated by the 21 to 49 age group. Therefore, banks need to innovate to be able to meet the wants and needs of today's customers (Paulet & Mavoori, 2019) which will increase the profitability of ASEAN banking.

Table 1. Respondents Based on Age Group Who Use Internet Banking via PC or Smartphone

Age group	Singapore	Indonesia	Malaysia	Philippines	Thailand	Vietnam
1-29	100%	52%	57%	18%	22%	60%
30-39	98%	39%	44%	15%	26%	48%
40-49	95%	33%	35%	12%	13%	35%
50-64	81%	18%	35%	7%	5%	39%

Source: McKinsey Survey (2015)

Digital innovation in research uses two indicators, namely digital branches and mobile banking. Digital branches are measured by the disclosure of digital branches listed in the annual report. Digital branches have a broader concept where banks have few physical branch offices (ASEAN Post, 2020) The concept of mobile banking is generally limited to online payment services that can be accessed via the internet (ASEAN Post, 2020) However, this study expands the scope of the current mobile banking concept (2015-2018 period), not only with regard to online payments, but also to online lending,

open accounts, savings deposits, and time deposits.

The progress of banking innovation in each ASEAN country does not go hand in hand. This phenomenon is a unique condition for banking research in ASEAN where not all banks in ASEAN have used digital branch or branchless banking technology. Consistent with (McKinsey, 2018) who conducted a digital banking survey in six ASEAN countries, he stated that ASEAN countries have a heterogeneous market with different customer behavior. Singapore, with the highest developmental innovation compared to other ASEAN countries, has outlier customer behavior, in which nearly 94% of customers have made routine online banking transactions, while in Indonesia, the Philippines, Vietnam only 20-27% and 70% in Malaysia and Thailand use banking services (World Bank, 2014).

Apart from digital innovation, risk disclosure is also the main determinant that controls banking profitability. Risk disclosure can lead to reduced profits and a decrease in expected earnings because disclosing too many potential risks can damage the profitability of some banks (Goncharenko et al., 2018). Consistent with (S Nahar et al., 2016) he stated that higher disclosure is associated with worse performance. The effect of risk disclosure has been analyzed in several pieces of literature, however, there are limitations in research conducted in ASEAN. In addition, ASEAN is an ideal place to encourage risk disclosure (Arena et al., 2018). Skepticism is also strengthened by the number of articles released by the press about banking risk disclosure (Arena et al., 2018) so that excessive risk disclosure can make stakeholders skeptical and may respond negatively to these disclosures (Nier & Baumann, 2006).

Research on digital banking innovations in ASEAN is still limited and only focuses on mobile banking and does not include digital branches (Gupta & Xia, 2018) Several previous studies related to mobile banking were also carried out in addition to the ASEAN region (Zhowa & Worku, 2019);(Harris & Wonglimpiyarat, 2019);(Malaquias & Hwang, 2018). In addition, in contrast to the research of (S Nahar et al., 2016) which uses bank data archives in data collection, this study uses an annual report. This research is expected to contribute to filling the research gap, because previous existing research on banking has mostly only focused on developed countries, such as America and Europe (Malafronte et al., 2018; Malaquias & Hwang, 2018; Oino,

2019). Demographic differences between developed and developing countries lead to different customer behavior, so banking research in ASEAN can fill this still limited gap.

The contribution of this research is that this study combines analysis of digital branches and mobile banking in ASEAN and their impacts on banking profitability that has never been done in previous research. The mobile banking indicators used also include online lending, open accounts, saving deposits, and time deposits through online applications or ATMs that do not use cards so that the concept of mobile banking in this study more describes the current real conditions, namely 2015 to 2018. Risk disclosure in this study uses a broader scope, namely 147 disclosure items from the research of (S Nahar et al., 2016) so that it is able to bridge heterogeneous market differences in ASEAN countries that may have different stakeholder expectations.

This study found that digital innovation has varied impacts on bank profitability. The existence of digital branches in ASEAN banking has no effect on banking performance, while mobile banking has a positive effect on bank performance. This means that more banking services through mobile banking have an impact on increasing bank profitability. Another finding is that risk disclosure has a negative effect on bank performance.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Legitimacy Theory

Suchman (1995) divided Legitimacy Theory into two approaches, namely the strategic approach and the institutional approach. The strategic approach emphasizes legitimacy as an operational resource managed by the organization. The institutional approach emphasizes the strength of external, cultural, and contextual factors in building organizational values in the eyes of society. Both approaches are used in this study. In this case, the strategic approach is more directed at the company's ability to meet customer needs with existing resources and an institutional approach that emphasizes the interaction between the company and the community, this is because a company is part of society so it must pay attention to social norms, especially in terms of transparency of potential risks experienced by banks.

Resource Based Perspective Theory

In line with the Resource-Based Perspective Theory, digital branches can become resources or assets for

companies by meeting the criteria of value, rareness, inimitability, and non-substitutability (VRIN). This is shown when many people begin to reduce and even leave physical branches and switch to using digital branches in their daily lives (Harris & Wonglimpiyarat, 2019; Shahabi & Razi, 2019). Digital innovation, especially digital branches, which is still little applied in ASEAN can be a value-creating for banks. In addition, the high costs as well as the barriers and failures when adopting a digital branch (Shahabi & Razi, 2019) make this innovation even more difficult to imitate.

Risk disclosure is in line with the Resource-Based Perspective Theory, which can be a competitive company resource by meeting the VRIN criteria. (Elamer et al., 2019) found that bank efforts to increase risk disclosure informativeness have a positive impact on the company. This is shown when management can improve the quality of risk disclosure to gain access to important resources, such as finance and business contracts (Ntim et al., 2013). Increasing the quality of risk disclosure can also improve the reputation of banks (Ntim et al., 2013) and provide information to the public regarding current and future bank risk exposure and performance (Ntim et al., 2013).

The concept of Digital Branch, Mobile Banking, and Risk Disclosure

The digital branch is a bank branch that specializes in providing and serving fully digital transactions while increasing market profitability and differentiation because physical branches require high costs (Shahabi & Razi, 2019). Quoted from the Asian Post (2020), digital branches have a broader meaning where banks have fewer physical branches, a minimum number of employees, employees who have more free time for higher-value assignments, and bank relations managers can spend more time to provide customer advice rather than collecting customer details. This causes digital branches to be one of the banking innovation products that can change customer behavior with fully digital technology, with no or few physical branches. Not only that, digital branches also help differentiate one banking institution from other banks and to better cope with market competition (Paulet & Mavoori, 2019) so that companies can improve efficiency and more optimal performance.

One of the technologies and applications that are aggressively developed is mobile banking (Zhowa & Worku, 2019). Mobile banking is a banking service that can be accessed

via the internet, either with a PC or smartphone, with the help of certain application software (ASEAN Post, 2020). Mobile banking in the 2015 to 2018 period has also made very significant progress, not only with regard to online payments but also covering other banking services that can be accessed via the internet such as online lending, open accounts, saving deposits, and time deposits. Mobile banking services are often used by the younger generation because they can be transferred freely and easily (Harris & Wonglimpiyarat, 2019) and make online payments safer than traditional payment systems (Thompson, 2017). This study uses the Global Findex 2017 indicator (World Bank and ASEAN, 2019) in the form of banking services including mobile banking which consists of four types of services, namely Lending, Funding, Wealth Management, and Daily Life which is mobile wallet payments. Four types of services are breakdown into nine item of mobile banking disclosure, namely online lending, open account, savings deposit through ATM without card, time deposit, withdrawal without a card, and e-money top-up, insurance and other instruments of investment, mobile wallet payments.

Risk disclosure is also the main determinant that controls bank profitability. Risk disclosure can lead to a decrease in expected profitability if there are too many potential risks in the annual report (Goncharenko et al., 2018). Consistent with S Nahar et al. (2016), he stated that higher disclosure is associated with worse performance. In addition, with the existence of skepticism in the society which is reinforced by the number of articles released by the press about banking risk disclosure (Arena et al., 2018), excessive risk disclosure can make stakeholders skeptical and may respond negatively to these disclosures (Nier & Baumann, 2006).

The risk disclosure index developed in this study consists of 147 disclosure items under ten categories (S Nahar et al., 2016). The risk disclosure index is prepared based on International Financial Reporting Standards [IFRS] 7: Financial Instruments: Basel II Banking Regulatory Standards and Disclosures: Market Discipline (S Nahar et al., 2016). Basel standards are banking regulatory standards issued by the Basel Committee on Banking Supervision (BCBS). BCBS is a committee that sets banking regulatory standards (OJK, 2020). In this study, the risk disclosure index is categorized into ten categories, namely market risk, credit risk, liquidity risk, operational risk, equity risk, capital

disclosure, internal corporate governance, strategic decision risk, general risk information, and government regulation. (Basel Committee, 2010) defines market risk as the risk that the value of an investment will decrease due to the movement of market factors. Credit risk is defined as a potential loss if the borrowing bank or counterparty fails to fulfill its obligations in accordance with the agreed terms and conditions. Liquidity risk in banks occurs when the bank experiences difficulties in fulfilling obligations related to financial liabilities (IASB, 2007). Operational risk is direct and indirect losses from an inadequate internal process or system, or from external events (Basel Committee, 2010). Equity risk arises from ownership of certain equity investments through the purchase of common or preferred stock (S Nahar et al., 2016). Capital disclosure is defined as a disclosure of paid-in capital, minority rights, capital instruments, and investments (S Nahar et al., 2016). Internal corporate governance is defined as the disclosure of internal banking activities in carrying out its activities (S Nahar et al., 2016). Strategic decision risk is a disclosure of banking strategies in fulfilling their obligations (S Nahar et al., 2016). Meanwhile, general information disclosure is the definition of general risk information (S Nahar et al., 2016). Government regulation is defined as disclosure related to compliance with government regulations (S Nahar et al., 2016).

Hypothesis Formulation

The ASEAN region has strong digital potential, rapid economic expansion, a young population, and low-cost smartphones and tablets creating opportunities for cashless payment systems in Southeast Asia (Gupta & Xia, 2018). Therefore, the banking industry needs to adapt to the digital transformation trend (Harris & Wonglimpiyarat, 2019).

Digitalization in banking can be interpreted as the sequential use of digital technology to simplify banking transactions and minimize banking operational costs (Fontin & Lin, 2019). Digitalization is one of the most powerful sources for banks to increase profitability and market differentiation (Paulet & Mavoori, 2019). Consistent with research by Gupta & Xia (2018) and in the ASEAN region, digitalization provides opportunities for banks to differentiate, particularly in customer behavior and desires. When banks can meet the expectations of customers who want to change to digital, banking acceptance will also increase (Gupta &

Xia, 2018) in line with increasing banking efficiency. In this case, banks use technology to meet customer needs and improve bank performance (Paulet & Mavoori, 2019). The needs of customers, especially young people, tend to shift towards being more independent for basic banking transactions and more demanding for a more advanced bank role (Paulet & Mavoori, 2019). In line with our research, the young population (15-59 years) in ASEAN itself is high, namely 61.8% in 2018 (ASEAN Secretariat, 2019). This is what drives the growth of digitalization in ASEAN, especially in the banking sector. Therefore, banks should consider this new situation to improve their efficiency in a more competitive environment, especially in technology. This technological advantage is a resource for companies to survive and continue to develop their potential to provide satisfaction to customers (Harris & Wonglimpiyarat, 2019). Banks compete by investing heavily in technology in an effort to increase the efficiency of the financial innovation system (Harris & Wonglimpiyarat, 2019). Existing innovations are able to reduce operating costs to increase cost efficiency (Fontin & Lin, 2019) especially in ASEAN. Digital innovation products in the banking world include digital branches and mobile banking. Digital branch as a banking innovation with a broader concept where the bank has few physical branch offices, minimum staff, frees employees with more free time for higher-value tasks (ASEAN Post, 2020) as well as mobile banking with a narrower scope where services banking is accessed via the internet, either with a PC or smartphone, with the help of certain application software (ASEAN Post, 2020) being able to reduce costs so that efficiency can be achieved. Cost efficiency is what can reduce the number of existing competitors, thereby increasing bank performance (Fontin & Lin, 2019).

In line with the Legitimacy Theory strategic approach and Resource-Based Perspective Theory, the existence of a wider digital branch and mobile banking services including online lending, open accounts, saving deposits and time deposits is one of the resources that has a competitive advantage because by improving the quality of digital services. then customer satisfaction can increase (Valenduc & Vendramin, 2017). Given that not all banks in ASEAN have digital branches, the mobile banking services of several banks are also limited to payment transactions, so that digital branches and new mobile banking technologies are able to meet

the VRIN criteria, fulfill the young generation's desire for digitalization and can increase bank profitability. Consistent with Wang & Cardon (2019) when companies can adjust to society, then the company can build legitimacy or banking reputation as an objective resource or asset for the company and as a competitive advantage in efforts to increase bank profitability. Based on the above explanation, then the research hypothesis is:

H_{1a}: The use of digital branches will increase bank profitability.

H_{1b}: The improvement of mobile banking services will increase bank profitability.

This study aims to determine the relationship between risk disclosure and bank financial performance. Based on the Legitimacy Theory institutional approach, the company's reputation can be increased by emphasizing the importance of interaction between the company and the community. Meanwhile, the Resource-Based Perspective Theory emphasizes that the bank's efforts to increase the informativeness of risk disclosure have a positive impact on the company (Elamer et al., 2019). Thus, bank management can use risk disclosure to obtain a supply of important resources, such as financial capital, as an instrument to support the legitimacy and reputation of the bank, thereby strengthening their existence and ultimately maintaining their ability to grow sustainably in the long term (Elamer et al., 2019).

Previous research has shown that risk disclosure can result in reduced profits and a decrease in expected earnings because disclosing too much potential risk can damage risk disclosure (Goncharenko et al., 2018). Consistent with S Nahar et al. (2016) he stated that higher disclosure is associated with worse performance. Research study by Goldstein & Leitner (2018) stated that there is no optimal disclosure. This is supported by the risk disclosure policy of banks which shows that disclosing too much information can destroy risk-sharing opportunities for banks. This can also reduce the expected bank performance due to risk disclosure. In addition, banks will experience a higher negative disclosure effect (as a result of information) on the risk of disclosure. Too much risk disclosure can also make bank customers worry about bank risk-taking strategies and may respond negatively to excessive risk exposure by shifting their deposits to be smaller (Nier & Baumann, 2006). ASEAN is an ideal place to encourage risk disclosure. Skepticism is also strengthened by the number of

articles released by the press about banking risk disclosure (Arena et al., 2018). Therefore, excessive risk of the disclosure can make the ASEAN community skeptical and may respond negatively to such disclosure (Nier & Baumann, 2006). Based on the above explanation, then the second hypothesis is:

H_2: A high level of risk disclosure reduces bank profitability.

METHOD

Sample and Sampling Criteria

The establishment of the AEC (Asean Economic Community) in 2015 aims to establish economic equity for all people in the ASEAN region. The sustainability of economic liberalization in the ASEAN region is broader in various ways, especially in the banking sector (OECD, 2019). Liberalization has two impacts, namely having a lot of available funds to finance business activities and can increase stability (OECD, 2019). Maintaining this stability also affects the banking business in the ASEAN region. With the enactment of the AEC in 2015, competitiveness in the ASEAN region will increase, so that the banking industry needs to maintain its stability by conducting digital innovation which will also have an impact on improving bank performance. Therefore, this study aims to determine the impact of AEC on ASEAN banking in the 2015 to 2018 observation period. The data used in this research are banks in six ASEAN countries, namely Indonesia, Malaysia, Philippines, Singapore, Vietnam, Thailand during the 2015-2018 observation period which have published annual reports in English or dual language. The research data used in this study used a balanced panel that has complete data for four years of the observation period. The sample consists of 70 banks consisting of 29 Indonesian banks, 8 Malaysian banks, 14 Philippine banks, 3 Singaporean banks, 5 Vietnamese banks, and 11 Thai banks. Sources of information were obtained from the Bloomberg database and the annual report which are accessed through the stock exchanges of each country. Annual reports of Indonesian banks are accessed through the Indonesia Stock Exchange (idx.co.id), Malaysia through the Kuala Lumpur Stock Exchange (bursamalaysia.com), Philippine banks through the Philippines Stock Exchange (pse.com.ph), Singaporean banks through the Singapore Exchange (sgx.com), Vietnamese banks through the Hanoi Stock Exchange (hnx.vn), and Thai banks through the Stock Exchange of Thailand (ser.or.th).

Measurement and Indicators

Bank Performance.

The indicators used to measure performance are return on assets (ROA), the rate of return on assets which is calculated as the ratio of net income divided by total assets (Karyani et al., 2019; Lafuente & Vaillant, 2019). This performance indicator has been used in research (Lafuente & Vaillant, 2019) to measure bank performance.

Digital Innovation

Analysis of digital innovation disclosure items using content analysis. The indicators used are the disclosure of digital branches and mobile banking owned by banks to measure the level of digital innovation. Digital branch is branchless banking that provides and serves banking services digitally, as seen from the existence of a digital branch or branchless banking in the disclosure in the annual report. Mobile banking is a banking service that can be accessed via the internet with the help of application software. The mobile banking indicator is analyzed from nine disclosure items (World Bank and ASEAN, 2019) in the annual report, which is calculated using the disclosure index of the nine items. Of the nine indicators of mobile banking using a dummy variable, number 1 if disclosing and 0 if not disclosing. The indicator for the digital branch and mobile banking can be seen in Table 2.

Risk Disclosure

This study uses a risk disclosure index to measure the risk disclosure score for each bank per year. The risk disclosure indicator uses 147 items in the study (Shamsun Nahar, 2015). The risk disclosure index was assessed based on the amount of risk information disclosed by the company from the annual report.

The 147 items of risk disclosure are regulated in ten main categories: market risk, credit risk, liquidity risk, operational risk, equity risk, capital disclosure, internal corporate governance, strategic decision risk, general risk information, government regulation. The analysis of risk disclosure items used content analysis. Of the 147 items of risk disclosure indicators using dummy variables, number 1 if disclosing and number 0 if not disclosing. Researchers of (Nier & Baumann, 2006), (Nahar et al., 2016) also used a risk disclosure index. The indicator for risk disclosure can be seen in Table 3.

Table 2. Digital Innovation Disclosure Indicator

Variable	Disclosure items	Indicators
Digital Branch	Branchless banking	Dummy variable, given the number 1 if it has a digital branch, and number 0 if it does not.
Mobile banking	Online Lending Open Account Saving Deposit through ATM without card Time Deposit Withdraw Without Card E - Money Top Up Insurance Other Instrument of investment Payment Mobile Wallet	Index mobile banking disclosure = the number of items disclosed/total item disclosure

Table 3. Indicators of Risk Disclosure

Variable	Disclosure items	Indicators
Risk disclosure	Market Risk (39 items) Credit Risk (38 items) Liquidity Risk (31 items) Operational Risk (7 items) Equities Risk (6 items) Capital Disclosure (4 items) Internal Corporate Governance (10 items) Strategic Decision Risk (6 items) General Risk Information (4 items) Government Regulation (2 items)	Index mobile banking disclosure = the number of items disclosed/total item disclosure

Control Variables

This study also uses several control variables, namely CAR, bank size, liquidity ratio, and asset quality ratio (AQR). The capital adequacy ratio (CAR) is calculated as (equity plus risk-weighted reserve) divided by total assets (Lafuente & Vaillant, 2019). Bank size is measured using Ln total assets (Lafuente & Vaillant, 2019). The liquidity ratio is measured by total loans to total funds collected (Suryanto, 2021). AQR is the ratio of the provision for loan losses to total gross loans (Ahamed, 2017). Indicators for control variables can be seen in Table 4.

Table 4. Control Variable Indicator

Variable	Operational definition & Reference	Formula
CAR	Equity plus risk-weighted reserve divided by total assets (Lafuente & Vaillant, 2019)	(Equity + risk-weighted reserved)/total assets
Liquidity Ratio	Total loan to total funds collected (Supriyono & Herdhayinta, 2019)	(Total loan/total deposit)
Bank Size	Total assets at the end of year t (Lafuente & Vaillant, 2019)	Ln total assets
AQR	The ratio of provision for loan losses to total gross loans (Ahamed, 2017)	Non-performing loan/total loan

Data Analysis Technique

The technique used for this research is panel data regression to find the best model that shows the effect of digital innovation and risk disclosure on bank profitability. The appropriate regression model for the following empirical models.

Empirical Model:

$$ROA_{it} = \beta 0 + \beta 1 DigitalBranch_{it} + \beta 2 mbankingAV_{it} + \beta 3 RiskDisc_{it} + \beta 4 CAR_{it} + \beta 5 Liqudity_{it} + \beta 6\ BankSize_{it} + \beta 7 AQR_{it} + \varepsilon$$

RESULTS AND DISCUSSION

The first step in the research was sample selection, our sample is the banking industry in ASEAN. The sample consisted of 70 banks including 29 Indonesian banks, 8 Malaysian banks, 14 Philippine banks, 3 Singaporean banks, 5 Vietnamese banks, and 11 Thai banks. Sample selection criteria can be seen in table 5.

Table 5. Criteria for Selection of Sample

No	Description	The number of companies
1.	Banking industry listed on the Exchange in ASEAN-6 in the 2015 - 2018 period	94
2.	Banking Industry that does not use international languages in the annual report for the period 2015 - 2018	(13)
3.	Banking Industry that does not publish the 2018 annual report	(2)
4.	The Banking Industry has just IPO between the period 1 January 2015 - 31 December 2018	(9)
	Number of companies observed	70

Table 6. Descriptive Statistics

Variable	Mean	Median	Min	Max	The Standard Deviation
ROA	0.009	0.010	-0.064	0.031	0.011
MBanking	0.391	0.444	0	1	0.292
RiskDisc	0.379	0.390	0.064	0.660	0.098
CAR	0.183	0.173	0.093	0.664	0.061
Liquidity	0.968	0.904	0.193	7.615	0.643
BankSize	43.696	44.056	30.889	47.851	2.248
AQR	1.006	0.979	0	11.996	0.664

Note: ROA is the rate of return on assets calculated as the ratio of net income divided by total assets; DigitalBranch is a dummy variable, 1 if there is a digital branch, 0 otherwise; MBanking and RiskDisc use a disclosure index; CAR is the capital adequacy ratio which is calculated as equity plus the weighted risk reserved divided by total assets; Liquidity ratio is measured by cash and maturity from the bank in relation to the total funds deposited; BankSize is Ln's total assets; AQR is the ratio of loan loss provision to total gross loan.

In our studies, in Table 7, the residual data are assumed to be normally distributed based on the Central Limit Theorem (CLT).

According to (Gujarati & Porter, 2009) CLT states if the research data has a population with a mean μ and standard deviation σ and takes a fairly large random sample (more than 100 observations) from that population with replacement, then the distribution of the sample mean will be normally distributed. Collinearity has met the standard, namely, the VIF value is below 10. The collinearity value of all variables is between 1.022 and 1.459. In statistical testing, this heteroscedasticity test is used in order to test whether the regression model used has inequality of variance from the residuals of one observation to another. In this study, the

Table 7. Summary of Panel Effect Tests

Dependent variables	ROA (p-value)
The Fixed effect estimator	0,0000***
Result	Fixed
Random effect estimator	
Breusch-Pagan test statistic	0,0000***
Result	Random
Hausman test statistic	0,0069***
Result	Fixed

Significant at alpha level 1% ***, 5% **, 10% *

heteroscedasticity test showed a p-value of 0.0006 or there was a heteroscedasticity problem in the pooled OLS model.

Gretl software is used in determining models and testing hypotheses, where the data will go through a data panel test consisting of the F-test, Breusch-Pagan Test, and Hausman test. The F-test shows a fixed effect, because it's smaller than 0.05. Furthermore, the Breusch-Pagan test shows a random effect, because it's smaller than 0.05. The last test result of the Hausman test shows a fixed effect model, because it's less than 0.05.

Table 8 represents the estimation of the Pooled OLS, Fixed Effect, and weighted least square (WLS) models in the relationship between digital branches, mobile banking, and risk disclosure with banking performance in the year of observation. The results shown by Pooled OLS and Fixed Effect show biased results because they still contain heteroscedasticity, so WLS is used as a solution to the heteroscedasticity problem in the model. Therefore, the best model of this study uses the WLS model. Table 9 shows the results of testing the panel data model. The result of the Weighted Least Square Model test is the final model or the best model to answer the hypothesis.

Table 8. Comparison of Test Results

	Pooled OLS		Fixed effect	WLS		Collinearity
	Coef (p-value)		*Coef (p-value)*	*Coef (p-value)*		
const	−0,0810	***	0.0148	−0,0485	***	
DigitalBranch	−0,0004		0.0002	−0,0001		1.268
Mbanking	0.0053	**	0.0011	0.004	***	1.406
RiskDisc	−0,0055		0.0008	−0,0071	***	1.139
CAR	0.0429	***	0.0167	0.0378	***	1.136
Liquidity	0.0006		0.0003	0.0003		1.022
BankSize	0.0019	***	−0,0002	0.0012	***	1.459
AQR	0.00008		0.0001	0.0001		1.026
Adjusted R-Square	0.1586		0.0096	0.4284		
R-Square	0.1798		0.6997	0.4427		
P-value(F)	0.0000		0.0000	0.0000		
Heteroskedasticity	0.0006		0	-		

Significant at alpha level 1% ***, 5% **, 10% *

Table 9. The Final Model with WLS

	Coefficient	Std. Error	p-value
const	−0.0485	0.0056	<0.0001 ***
DigitalBranch	−0.0001	0.0004	0.7369
Mbanking	0.0040	0.0006	<0.0001 ***
RiskDisc	−0.0071	0.0023	0.0031 ***
CAR	0.0378	0.0049	<0.0001 ***
Liquidity	0.0003	0.0003	0.3364
BankSize	0.0012	0.0001	<0.0001 ***
AQR	0.0001	0.0001	0.2230

Significant at alpha level 1% ***, 5% **, 10% *

Hypothesis Test Result

H_{1a} revealed that the existence of a digital branch will increase bank profitability. Our test results show that the existence of a digital branch at banks in ASEAN does not have a services at banks in ASEAN have a positive effect on bank profitability with a coefficient value of 0.0040 at p-value <0.01.

H_2 reveals that a high level of risk disclosure reduces bank profitability (H_2 is accepted). Our test results show that the effect of risk disclosure on the financial statements of banks in ASEAN has a negative effect on bank profitability with a coefficient of -0.0071 at a p-value less than 0.01.

Discussion

This study found that the existence of a digital branch in banks in ASEAN does not have a significant effect on bank performance. Based on significant effect on the bank performance (H_{1a} is rejected). H_{1b} revealed that the existence of mobile banking will increase bank profitability (H_{1b} accepted). Our test results show that mobile banking 280 observations, there were 94 observations (33.6%) or as many as 32 out of 70 banks that had digital branches during the 2015 to 2018 period. However, out of the 32 banks, 17 new banks had digital branches within one to three years of the observation period, while the rest had digital branches for four full years.

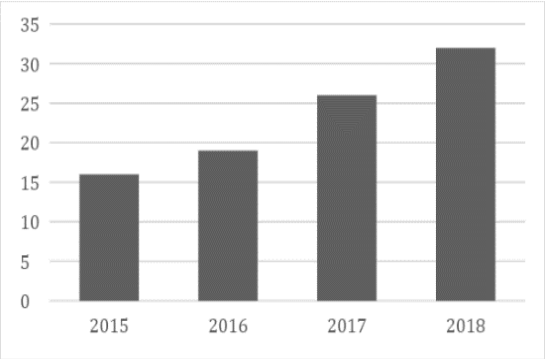

Figure 1. Number of ASEAN Banks with Digital Branches in Period 2015 - 2018

Figure 1 shows a significant growth in the number of ASEAN banks with digital branches. The culture of the ASEAN community greatly affects the speed of the transformation process towards a digital branch. Regarding investment banking services such as mortgages and investment products, ASEAN people tend to prefer to visit branch offices to conduct consultations and purchase products, such as the results of a survey by (McKinsey, 2018) of Singaporeans who have made 94% of online banking transactions, but still choose to visit branch offices, while 36% of customers in other ASEAN countries still visit a branch office at least once a month on average. This is consistent with the Forbes Financial Services Survey, which found that 55% of customers in Singapore banks stated that they would not open accounts with banks that do not have branch offices.

The existence of a traditional branch and the transformation process to a digital branch that runs simultaneously causes inefficient banking. Costs associated with traditional branches, such as human resource costs and fixed asset purchase costs, increase the overall costs of the bank, thereby reducing bank efficiency (Shahabi & Razi, 2019). In addition, digital innovation raises the risk of innovation, namely the cost of innovation that is greater than the benefits obtained (Shahabi & Razi, 2019).

The finding related to mobile banking is that there is a positive influence between the expansion of mobile banking services on bank profitability. Based on sample data, the studied banks had various mobile banking services, some did not have mobile banking services (indicated by the absence of any disclosure items related to mobile banking) and there were also banks that had all types of mobile banking services (indicated by the disclosure of the nine service items. mobile banking). The most disclosed mobile banking service is "payment mobile wallet" with a disclosure index of 0.7, meaning that 70% of the sample banks have a "payment mobile wallet" service. Other services that many banks in ASEAN have been “e-money top up”, “open account”, and “online lending” (figure 2). This finding is consistent with the researches of Gupta & Xia, 2018 and that the existence of mobile banking can provide opportunities for banks to differentiate, especially in customers' behavior and desires. Thus, when the bank can meet the expectations of the customers who want to change to digital, it can improve bank performance. Therefore, it can be

concluded that mobile banking is a resource or asset that allows banks to better satisfy their customers or be customer-centric so that it can make banks more profitable.

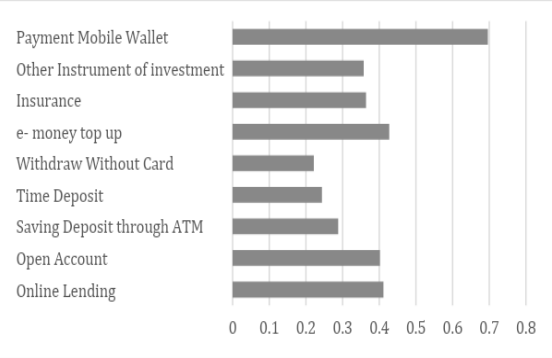

Figure 2. Mobile Banking Disclosure Index Per Disclosure Item

The effect of risk disclosure on profitability shows a negative association. This result confirms the research hypothesis (H2) which states that a high level of risk disclosure reduces bank performance. This finding is also in line with (Goncharenko et al., 2018) who stated that risk disclosure can result in reduced profits and a decrease in expected earnings because disclosing too many bad things can damage disclosure risk. So that risk disclosure has a significant negative impact on bank performance. This is in line with research conducted by (Nahar et al., 2016)which showed that higher disclosure is associated with worse performance.

CONCLUSION, IMPLICATION, AND LIMITATION

In conclusion, digital innovation is one of the most powerful sources for banks to increase profitability and market differentiation, especially in the ASEAN region. This is because the ASEAN region is dominated by the millennial generation, which is 61.8%, so that digital innovation can provide opportunities for banks to differentiate, especially in customers' behavior and desires. Two indicators were used in this research, namely digital branches and mobile banking. Digital branches are not proven to affect bank profitability, but mobile banking indicators are found to affect bank profitability in ASEAN. The existence of digital branches in ASEAN is still low, namely 33.6 percent in the 2015 to 2018 period. Mobile banking is also a banking innovation product that is often used by young people because it only requires an internet and an application software and can be transferred freely and easily. This is also supported by research by McKinsey (2018) which stated that 65% of people in ASEAN use mobile banking services so that they can improve bank performance.

Another finding is that risk disclosure has a negative effect on bank profitability in ASEAN. We found

a significantly lower bank disclosure risk for high profitability banks. Banks are inherently risky endeavors and less risk disclosure can create ambiguity for potential stakeholders.

The implication of this research is that banks in ASEAN can increase their profitability through the existence of digital innovation, especially mobile banking by expanding the scope and types of banking services that can be accessed online. The demographics of the ASEAN population which are dominated by the Millennial generation and Z, who prefer digital technology, is a potential for banks in ASEAN for the digital branch system. However, further research on digital branches and their impacts on bank performance in the future need to be investigated in the next few years considering the process of transformation of ASEAN banking into a digital branch system is still ongoing. The limitation of this study is fully based on the disclosure items in the annual report. However, banks also use other media, such as press releases, prospectuses, conferences, and websites to disclose information. Future studies may investigate disclosure items from other sources.

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