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

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Evidence from Banking in ASEAN-6

ABSTRACT

This study aims 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 and the annual reports used dual language or English. The study used regression panel analysis. Digital innovation and risk disclosure used content analysis. Measurement of digital innovation used digital branches and mobile banking. The study found that only mobile banking is associated with bank performance. The other finding is that the risk disclosure negatively signals 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, a digital branch, mobile banking, risk disclosure.*

ABSTRAK

Penelitian ini bertujuan menjelaskan pengaruh inovasi digital dan pengungkapan risiko terhadap kinerja bank di negara-negara ASEAN. Sampel penelitian adalah 70 bank di ASEAN dari Indonesia, Malaysia, Thailand, Filipina, Singapura, dan Vietnam pada periode 2015-2018 dan laporan tahunannya menggunakan dua bahasa atau bahasa Inggris. Teknik analisis menggunakan regresi panel. Inovasi digital dan pengungkapan risiko menggunakan analisis konten. Pengukuran inovasi digital menggunakan *digital branch* dan *mobile banking*. Hasil penelitian menemukan hanya *mobile banking* yang berasosiasi terhadap kinerja perbankan. Temuan selanjutnya adalah pengungkapan potensi risiko yang abnormal tinggi dalam laporan tahunan memberikan sinyal negatif pada perbankan ASEAN sehingga mengakibatkan profitabilitas bank menurun. Keunikan latar belakang ASEAN adalah dominasi penduduk usia produktif yang sangat besar, dinamis, dan cepat beradaptasi dengan teknologi digital.

Kata kunci: Perbankan ASEAN, kinerja perbankan, *digital branch*, *mobile banking*, pengungkapan risiko.

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, 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 and Xia, 2018), increasing banking profitability. Research conducted by Gupta and Xia (2018) in the ASEAN region stated that digitalisation provides opportunities for banks to differentiate, especially in client behaviour and demands. 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) results in differences of behaviour, attitudes, and demands from the community. The millennial generation is closely related to digital innovation. This is marked by the presence of technological advances, specifically mobile devices, that result in independence and become a necessity in everyday life (Zhowa and Worku, 2019). Table 1 shows digital penetration in ASEAN by respondents based on the age group, dominated by the 21 to 29 age group. Therefore, banks need to innovate to meet the demands of today's clients (Paulet and Mavoori, 2020), 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
21-29	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: (Barquin, HV and Yip, 2015)

Digital innovation in the study uses two indicators, namely digital branches and mobile banking. Digital branches are measured by the disclosure of digital branches in the annual report. Digital branches have a broader concept where banks have few physical branch offices (The ASEAN Post, 2020). The concept of mobile banking is generally limited to online payment services that can be accessed via the internet (The ASEAN Post, 2020). This study expands the scope of the current mobile banking concept concerning online payments and 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 unique for ASEAN banking study, where not all banks in ASEAN have used digital branches or branchless banking technology. Consistent with (Barquin, HV and Yip, 2015), who conducted a digital banking survey in six ASEAN countries, he stated that ASEAN countries have a heterogeneous market with different customer behaviour. For example, Singapore, with the highest developmental innovation compared to other ASEAN countries, has outlier client behaviour, in which nearly 94% of clients have made routine online banking transactions, while in Indonesia, the Philippines, Vietnam, only 20-27% and 70% in Malaysia and Thailand use online banking services (World Bank, 2014).

Risk disclosure is also the main determinant that controls banking profitability, apart from digital innovation. Risk disclosure can lead to reduced profits and a decrease in expected earnings since disclosing abnormally high potential risks can damage the profitability of some banks (Goncharenko, Hledik and Pinto, 2018). Consistent with (Nahar, Azim and Jubb, 2016), they stated that higher risk disclosure is associated with poor performance. The effect of risk disclosure has been analysed in several works of literature. However, there are limitations in research conducted in ASEAN.

ASEAN is an ideal place to encourage risk disclosure. The study of Bouteska and Mili (2021) describe some of the unique ASEAN banking risk characteristics. First, ASEAN is the most dynamic region in the world. Second, ASEAN banks have weaknesses in the regulatory framework and global risk interconnection between banks in the region. ASEAN had also experienced a systematic banking crisis for two decades. Third, there is economic instability in most ASEAN countries due to the sensitive political environment. Zimmerman and Stone (2018) stated that the development of banking policy in ASEAN tends to follow the Asian-style compared to the western-style, such as focusing more on strengthening collective resilience and commitment to the ASEAN interbank network or ASEAN centrality. Fan and Liu (2021) find that countries with high intermediary and proximity centrality have a higher systemic risk.

Another risk disclosure related to scepticism is also strengthened by the number of articles released by the press about banking risk disclosure so that excessive risk disclosure can make stakeholders sceptical and may respond negatively to these disclosures (Nier and Baumann, 2006).

This study uses legitimacy and resource-based theories to explain the relation between digital innovation and risk disclosure on banking profitability. The legitimacy theory refers to the company's ability to meet client needs with existing resources, whereas a resource-based theory explains that digital innovation can be a value-creating for banks.

Research on digital banking innovations in ASEAN is limited and only focuses on mobile banking (Gupta and Xia, 2018), and still very limited in discussing digital branches. There are several previous studies related to mobile banking carried out in the ASEAN region (Malaquias and Hwang, 2018; Harris and Wonglimpiyarat, 2019; Zhowa and Worku, 2019). In contrast to the research of (Nahar, Azim and Jubb, 2016),

which uses bank data archives in data collection, this study uses a content analysis. This research is expected to fill the research gap since previous research on banking has mostly only focused on developed countries, such as America and Europe (Malafronte, Starita and Pereira, 2018; Malaquias and Hwang, 2018; Oino, 2019). Demographic differences between developed and developing countries lead to different client behaviour, so banking research in ASEAN can fill this limited gap.

Geographical and country aspects contribute to different traditional and non-traditional income and bank stability (Sudrajad and Hübner, 2019). In ASEAN countries, the main income of banks is still focused on traditional income derived from interest income compared to non-traditional income such as commission income, trading and derivatives, and other non-interest income (Nguyen, Skully and Perera, 2012). Traditional income is strongly influenced by the quality of services provided to clients (Paulet and Mavoori, 2020), whereas banks that provide better services earn higher interest income. The ASEAN population, which is identic by young people, has a high preference for digital innovation and (Paulet and Mavoori, 2020) digitalisation has become the most powerful resource for banks to increase profitability and market differentiation.

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 limited studied in previous research. Furthermore, the mobile banking proxies used also include online lending, open accounts, saving deposits, and time deposits through online applications or ATMs without cards so that the concept of mobile banking in this study more describes the current digital environment. In addition, risk disclosure in this study uses a broader scope, namely 147 disclosure items from the research of (Nahar, Azim and C.

Jubb, 2016), 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. Digital branches in ASEAN banking do not affect banking performance, while mobile banking has a positive effect on bank performance. This means that more mobile banking services impact increasing bank profitability. Another finding is that abnormally high-risk disclosure harms bank performance.

LITERATURE REVIEW AND HYPOTHESIS

Legitimacy Theory

Legitimacy Theory is divided into two approaches: the strategic approach and the institutional approach (Suchman, 1995). The strategic approach emphasises legitimacy as an operational resource managed by the organisation. The institutional approach emphasises the strength of external, cultural, and contextual factors in building organisational 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 client needs with existing resources. The institutional approach emphasises the interaction between the company and the community since a company is part of society, so it must pay attention to social norms, specifically regarding 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 and Wonglimpiyarat, 2019; Shahabi and Razi, 2019). Therefore, digital branches, which

is still little applied in ASEAN, can be value-creating for banks. However, the high costs, barriers and failures when adopting a digital branch (Shahabi and 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.* (2021) found that bank efforts to increase risk disclosure informativeness positively impact 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, Lindop and Thomas, 2013). Increasing the quality of risk disclosure can also improve the reputation of banks (Ntim, Lindop and Thomas, 2013) and provide information to the public regarding current and future bank risk exposure and performance (Elamer *et al.*, 2021).

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

The digital branch is a bank that specialises in providing and serving fully digital transactions and gain increasing market profitability and differentiation since physical branches require high costs (Shahabi and Razi, 2019). Quoted from (The ASEAN Post, 2020), digital branches have a broader meaning where banks have several 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 client advice rather than collecting client details. The concept causes digital branches to be one of the banking innovation products that can change client behaviour with fully digital technology, with no or few physical branches. Digital branch also helps differentiate one banking institution from other banks and better cope with market competition (Paulet and Mavoori, 2020) so that companies can improve efficiency and more optimal performance.

One of the technologies and applications that are aggressively

developed is mobile banking (Zhowa and 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 (The ASEAN Post, 2020). In the period of 2015 to 2018, mobile banking has made very significant progress concerning online payments and other banking services, such as online lending, open accounts, saving deposits, and time deposits. Mobile banking is often used by the younger generation since it can be transferred freely and easily (Harris & Wonglimpiyarat, 2019) and make online payments safer than traditional payment systems (Thompson, 2017; Drasch, Schweizer, & Urbach, 2018). This study uses the Global Findex 2017 indicators (Trujillo, Sitorus and Aviles, 2018) in mobile banking services, 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 a 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 decrease expected profitability if there are too many potential risks disclosed in the annual report (Goncharenko, Hledik and Pinto, 2018). Consistent with (Nahar, Azim and Jubb, 2016), he stated that higher disclosure is associated with poor performance. In addition, with the existence of scepticism in society, which is reinforced by the number of articles released by the press about banking risk disclosure, excessive risk disclosure can make stakeholders sceptical and may respond negatively to these disclosures (Nier and Baumann, 2006).

The risk disclosure index developed in this study consists of 147 disclosure items under ten categories (Nahar, 2015). 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 (Nahar, 2015). Basel standards are banking regulatory standards issued by the Basel Committee on Banking Supervision (BCBS) that sets banking regulatory standards (BIS, 2020). In this study, the risk disclosure index is categorised 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 to the risk that an investment's value 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 fulfil its obligations following the agreed terms and conditions. Liquidity risk in banks occurs when the bank experiences difficulties fulfilling obligations related to financial liabilities (IASB, 2007). Operational risk is direct and indirect losses from an inadequate internal process or system or external events (Basel Committee, 2010). Equity risk arises from ownership of certain equity investments through the purchase of common or preferred stock (Nahar, 2015). Capital disclosure is defined as a disclosure of paid-in capital, minority rights, capital instruments, and investments (Nahar, 2015). Internal corporate governance is defined as disclosing internal banking activities in carrying out its activities (Nahar, 2015). Strategic decision risk is a disclosure of banking strategies in fulfilling their obligations (Nahar, 2015). Meanwhile, general information disclosure is the definition of general risk information, and government regulation is defined as disclosure related to compliance with government regulations (Nahar, 2015).

Hypothesis Development

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 and Xia, 2018). Therefore, the banking industry needs to adapt to the digital transformation trend (Harris and Wonglimpiyarat, 2019).

Digitalisation in banking can be interpreted as the sequential use of digital technology to simplify banking transactions and minimise banking operational costs (Fontin and Lin, 2019). Digitalisation is one of the most powerful sources for banks to increase profitability and market differentiation (Paulet and Mavoori, 2020). Consistent with research by (Gupta and Xia, 2018) and in the ASEAN region, digitalisation provides opportunities for banks to differentiate, particularly in client behaviour and desires. When banks can meet clients' expectations who want to change to fully digital, banking acceptance will also increase (Gupta and Xia, 2018) in line with increasing banking efficiency. In this case, banks use technology to meet client needs and improve bank performance (Paulet and Mavoori, 2020). Clients' needs, especially young people, tend to shift towards being more independent for basic banking transactions and more demanding for a more advanced bank role (Paulet and Mavoori, 2020). In line with our research, ASEAN's young population (15-59 age) is very high, about 61.8% in 2018 (ASEAN Secretariat, 2019). This drives the growth of digitalisation in ASEAN, especially in the banking sector. Therefore, banks should consider this new situation to improve their efficiency in a more competitive technological environment. This technological advantage is a resource for companies to survive and continue to develop their potential to provide satisfaction to clients (Harris and Wonglimpiyarat, 2019). Banks compete by investing heavily in technology to increase the efficiency of the financial innovation system (Harris &

Wonglimpiyarat, 2019). Existing innovations can reduce operating costs and increase efficiency (Fontin and Lin, 2019), specifically in ASEAN.

Digital branch with a broader concept has characterised as the bank with few physical branch offices and minimum staff, frees employees with more free time for higher-value tasks (The ASEAN Post, 2020). Mobile banking services is where banking services are accessed via the internet network, either with a PC or smartphone, with the help of certain application software (The ASEAN Post, 2020), being able to reduce costs so that efficiency can be achieved. Cost efficiency can reduce the number of existing competitors, thereby increasing bank performance (Fontin and 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 by improving the quality of digital services, then increase client satisfaction (Valenduc and Vendramin, 2017). Given the fact 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 can meet the VRIN criteria, fulfil the young generation's desire for digitalisation and can increase bank profitability. Consistent with (Wang and Cardon, 2019), when companies can adjust to society, the company can build legitimacy or banking reputation as a competitive advantage to increase bank profitability. Based on the above explanation, then the research hypothesis is:

H1a: The use of digital branches will increase bank profitability.

H1b: The improvement of mobile banking services will increase bank profitability.

25 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 emphasising the importance of interaction between the company and the community. Meanwhile, the Resource-Based Perspective Theory emphasises that the bank's efforts to increase the informativeness of risk disclosure positively impact the company (Elamer *et al.*, 2021). 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).

On the other side, previous research has shown that risk disclosure can result in reduced profits and decreased expected earnings since disclosing non-hedgeable risk can damage a bank reputation. Consistent with (Nahar, Azim and Jubb, 2016), he stated that higher disclosure is associated with poor performance. A research study by (Goldstein and Leitner, 2018) stated no optimal disclosure. The other study shows that disclosing too much information can destroy risk-sharing opportunities for banks (Goldstein and Leitner, 2018). This can also reduce the expected bank performance due to risk disclosure. Too much risk disclosure can also make bank clients worry about bank risk-taking strategies and may respond negatively to excessive risk exposure by shifting their deposits to be smaller (Nier and Baumann, 2006). Scepticism is also strengthened by the number of articles released by the press about banking risk disclosure. Therefore, excessive risk of the disclosure can make the ASEAN community sceptical and may respond negatively to such disclosure (Nier and Baumann, 2006). Based on the above explanation, then the second hypothesis is:

H2. The level of risk disclosure is associated with bank profitability.

METHODOLOGY

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 liberalisation in the ASEAN region is broader in various ways, especially in the banking sector (OECD, 2019). Liberalisation has two impacts, 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 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 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 calculated as the ratio of net income divided by total assets (Lafuente and Vaillant, 2019; Karyani *et al.*, 2020). This performance indicator has been used in research (Lafuente and 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. The 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 annual report disclosure. Mobile banking is a banking service that can be accessed via the internet through the banking application software. The mobile banking indicator is analysed from nine disclosure items (Trujillo, Sitorus and Aviles, 2018) in the annual report, calculated using the disclosure index. The proxy of mobile banking uses a dummy variable, number 1 if disclosing and 0 if not disclosing. The proxies for the digital branch and mobile banking can be seen in table 2.

Table 2. Digital Innovation Disclosure Indicator

Variable	Disclosure items	Indicators
Digital Branch	Branchless banking	The dummy variable is 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

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 (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. The risk disclosure proxy is dummy, given the number 1 if the item disclosure is disclosed and 0 if otherwise. Researchers (Nier and Baumann, 2006; Nahar, Azim and Jubb, 2016) also used a risk disclosure index. The proxy for risk disclosure can be seen in table 3.

Table 3. The Proxy 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: 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 and Vaillant, 2019). Bank size is measured using Ln total assets (Lafuente and Vaillant, 2019; Amidjaya and Widagdo, 2020). The liquidity ratio is measured by total loans to total funds collected (Amidjaya

and Widagdo, 2020). Finally, 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	Formula
CAR	Equity plus risk-weighted reserve divided by total assets	(Equity + risk-weighted reserved)/total assets
Liquidity Ratio	Total loan to total funds collected	(Total loan/total deposit)
Bank Size	Total assets at the end of year t	Ln total assets
AQR	The ratio of provision for loan losses to total gross loans	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 regression model for the following empirical models.

Empirical Model:

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

RESULTS AND DISCUSSION

The first step in the research was sample selection, and 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	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	1.096	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 maturi from the bank 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 (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, then the distribution of the residual data is assumed to be normally distributed. Collinearity has met the standard, which shows the VIF values are below 10. The collinearity value of all variables is between 1.022 and 1.459. The heteroscedasticity test is used to test whether the regression model used has inequality of variance from the residuals of one observation to another. In this study, the heteroscedasticity test showed a p-value of 0.0006 or a heteroscedasticity problem in the pooled OLS model.

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% *

Gretl software is used in determining models and testing the hypotheses, where the data will go through a panel regression test consisting of the F-test, Breusch-Pagan Test, and Hausman test. The F-test and Breush-pagan test shows that the fixed effect or random-effect model is appropriate than pooled OLS. Furthermore, the Hausman test shows the fixed effect is the best model than the random effect model.

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 that 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 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 shows the results of the hypothesis testing of the panel

data. Again, the result of the WLS model is the final model to answer the hypothesis.

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 Result

H1a revealed that the existence of a digital branch would increase bank profitability. However, our test results show that a digital branch at banks in ASEAN does not significantly affect bank performance (H1a is rejected). H1b revealed that the existence of mobile banking would increase bank profitability (H1b accepted). Our test results show that mobile banking services at ASEAN banks positively affect bank profitability with a coefficient value of 0.0040 at a p-value <0.0001.

H2 reveals that risk disclosure is associated with bank profitability (H2 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 0.0001.

Discussion

This study found that the existence of a digital branch in ASEAN banks does not significantly affect bank performance. Based on 280 observations, there were 94 observations (33.6%) or as many as 32 out of 70 banks with digital branches during the 2015 to 2018 period. However, out of the 32 banks, 17 banks had digital branches recently within one to three years of the observation

period, while the rest had digital branches for four full years.

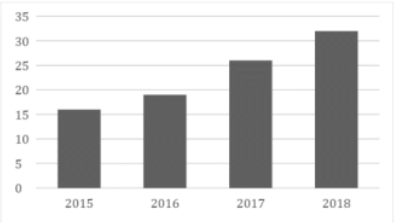

Figure 1. Number of ASEAN Banks with Digital Branches in Period 2015 - 2018

Figure 1 shows a significant growth in the number of ASEAN banks with digital branches. However, the culture of the ASEAN community greatly affects the speed of the transformation process towards a digital branch. ASEAN people prefer to visit branch offices to conduct consultations and purchase products, (Barquin, HV and Yip, 2015) Singaporeans who have made 94% of online banking transactions still choose to visit branch offices, while 36% of clients 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 clients in Singapore banks stated that they would not open accounts with banks that did not have physical branch offices (Forbes, 2020).

A traditional branch and 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). Even though digital innovation raises a huge cost of innovation burden on the bank, in the long term, the costs will reduce, and the profitability will increase over time (Shahabi and Razi, 2019). Further study after several years of implementing ASEAN digital branches is required in the future.

The study finds a positive association between the expansion of mobile banking services on bank profitability. Based on sample data, several studied banks had various mobile banking services, and some did not have, indicated by the absence of any disclosure items related to mobile banking.

However, some banks had all types of mobile banking services, indicated by the disclosure of the nine service items of mobile banking. For example, 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 are "e-money top-up", "open account", and "online lending" (figure 2). This finding is consistent with the research of Gupta and Xia (2018) that the existence of mobile banking can provide opportunities for banks to differentiate their services based on clients' behaviour and demands. Thus when the bank can meet the expectations of the young clients that are dynamic, practical and adaptable to digitalisation, 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 clients or be client-centric to make banks more profitable.

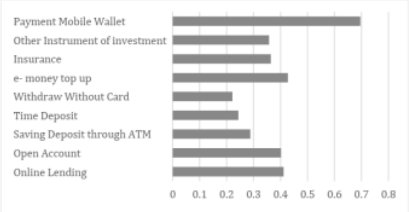

Figure 2. Mobile Banking Disclosure Index Per Disclosure Item

The effect of risk disclosure on profitability shows a negative association. This result confirms the research hypothesis (H2), which states that the level of risk disclosure is associated with bank performance. This finding is also in line with (Goncharenko, Hledik and Pinto, 2018), who stated that information disclosure could result in a decrease in expected earnings since disclosing too many potential risks can impair the banking image. This is in line with research conducted by (Nahar, Azim and Jubb, 2016) which showed that higher disclosure is associated with poor performance.

CONCLUSION AND IMPLICATION

In conclusion, digital innovation is one of the most powerful sources for banks to increase profitability and market

differentiation, specifically in the ASEAN region since ASEAN is dominated by the millennial generation, which is 61.8%. Digital innovation can allow banks to implement strategic differentiation to target Millennials customers. Two proxies were used in this research, namely digital branches and mobile banking. Digital branches are not proven to affect bank profitability. Nevertheless, mobile banking is found to affect bank profitability in ASEAN. The existence of digital branches in ASEAN is still low, that is 33.6 per cent in the 2015 to 2018 period. Mobile banking is also a banking innovation product often used by young people since it only requires an internet network and application software and can be transferred freely and easily. The result is also supported by Barquin, HV and Shrikhande (2018) which stated that 21% of the total monthly transaction in emerging Asia were completed through traditional branches.

The other finding is that risk disclosure harms bank profitability in ASEAN. We found a significantly lower risk disclosure for high profitability banks. Banks are inherently risky endeavours, and abnormal high-risk disclosure can create resistance from potential customers.

The research implies that banks in ASEAN can increase their profitability through digital innovation, especially mobile banking, by expanding the scope and types of banking services that can be accessed online. In addition, the demographics of the ASEAN population, which are dominated by the Millennial and Z generations, who prefer digital technology, is a potential for ASEAN digital branch system. However, further research on digital branches and their impacts on bank performance requires to be investigated in the next few years, considering the 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 to disclose information, such as press releases, prospectuses, conferences, and websites. Future

studies may investigate disclosure items from other sources.

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