

Digital Transformation on Financial Performance: Unleashing Corporate Excellence through Mobile Banking Adoption in Malaysia's Public Listed Banks

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Abstract

Many banks continuously evolve and drive growth strategies on technology, such as mobile banking, to increase efficiency and enhance financial performance. However, the effectiveness of these technological initiatives remains a subject of scrutiny. This study examines the financial performance of publicly listed banks in Malaysia before and after adopting a mobile banking application. The sample comprises eight banks, covering a period of twelve quarters before and twelve quarters following the implementation of mobile banking. The evaluation of financial performance focuses on key dimensions of earnings, capital adequacy, asset quality, and liquidity, which are measured with Return on Equity (ROE), Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Loan to Deposit Ratio (LDR). The Shapiro-Wilk normality test indicates that both ROE and LDR meet the assumption of normality required for the Paired Sample T-test analysis, while CAR and NPL are analysed using the Wilcoxon Signed Rank Test. The findings indicate a significant difference in LDR and CAR before and following the adoption of mobile banking, while no significant difference is observed for ROE and NPL.

Keywords: Digital Transformation, Financial Performance, Mobile Banking Adoption, Malaysian Public Listed Banks

Introduction

The current information technology development has had a significant impact on various aspects of modern life. Dwivedi et al (2021) reveal that the rapid advancement in communication, media, and informatics technology, along with the widespread development of information globally, have transformed the patterns and methods of conducting business activities, including the companies in the banking sector. The technological shift that has experienced rapid growth in the past few years is the use of mobile phones. The growing

popularity of online payments, coupled with advancements in mobile technology, has demanded payment service providers in Malaysia to introduce innovative solutions for online payment. Based on the report from Bank Negara Malaysia, the penetration rate of mobile banking subscribers to the population of Malaysia in 2022 was approximately 88.73%. There were around 1.67 billion mobile banking transactions, an increase from around 1.47 billion transactions in the previous year and 935 million transactions in 2019. The data show substantial market growth for mobile transactions. Additionally, the Financial Sector Blueprint 2022-2026 outlines the objective of enhancing the financial well-being of households and businesses through the improvement of financial capability and the effective utilisation of financial services by strengthening the role of mobile banks and their contribution to the financial ecosystem.

This study examines the financial implications of the transition to mobile banking adoption for publicly listed banks in Malaysia. The significance of this study lies in its potential to provide practical insights that can be utilized as considerations in enhancing banking performance. Furthermore, it can act as a matrix in the implementation and advancement of new banking products. Thus, the primary objective is to assess the extent of the financial benefits associated with the adoption of mobile banking services. This research addresses the question: "Does the adoption of mobile banking result in a significant difference in the financial performance of publicly listed banks in Malaysia, as indicated by the ROE, CAR, NPL, and LDR ratios, before and after its implementation?"

Literature Review

Mobile Banking

Mobile banking refers to the utilisation of mobile devices, for example, cell phones and tablets, to carry out various financial transactions (Wazid et al., 2019; Loaba, 2022; Shaikh et al., 2022). Mobile banking is performed through specialised applications downloaded onto mobile devices (Cleveland, 2016). This form of banking has revolutionised the way individuals manage their finances, offering convenience and accessibility. In collaboration with financial institutions and mobile phone operators, mobile banking has expanded its reach to the unbanked population, especially those residing in remote areas or with low incomes, granting them access to essential banking services (Salzman et al., 2001; Raksmeij et al., 2022). It enables them to save, borrow, and conduct transactions easily and efficiently, aligning with banks' desires to reduce operational costs, streamline processes, and bolster competitiveness in the rapidly evolving financial industry (Ho, 2020; Chen & Rao, 2023; Schilling & Seuring, 2023).

Financial Performance

Most companies heavily rely on financial performance, including companies in the sector of banking. Financial performance has a key role in the making decisions process for all stakeholders in a company (Hajek et al., 2014; Bărbuță-Mișu et al., 2019). Better financial performance often leads to better overall company performance (Taouab & Issor, 2019). Financial performance analysis effectively reflects financial conditions (Fahmi, 2020). Simamora (2000) identifies that ratio analysis is commonly used for financial performance analysis. In this study, the financial ratios, including Return on Equity Ratio (ROE), Capital Adequacy Ratio (CAR), Non-Performing Loan Ratio (NPL), and Loan to Deposit Ratio (LDR), are utilised to gauge the capital, asset quality, earnings, and liquidity aspects.

The ROE is a ratio commonly used to measure the financial performance of banks in terms of profitability. It assesses a bank's management ability to utilise its capital to generate net income (Kasmir, 2003). Hence, a high ROE indicates better financial performance. The CAR is a ratio that indicates the extent to which a bank's total assets, including risky elements such as loans, investments, securities, and interbank receivables, are financed by its capital and funds obtained from external sources (Dendawijaya, 2009). A higher CAR implies greater profitability and improves financial performance of the bank (Arimi, 2012). The NPL ratio measures the proportion of total loan volume disbursed by the bank to the amount of funds received from various sources. The NPL ratio measures the loan portfolio's credit quality and assesses the potential default risk level (Kasmir, 2003). Lastly, LDR is a ratio that gauges a bank's capacity to fulfil its short-term financial liabilities. These obligations typically consist of call money that needs to be fulfilled when clearing obligations arise, and their execution is performed by utilising the company's liquid assets (Sudarini et al., 2005).

Mobile Banking and Financial Performance

Mobile banking adoption continuously evolves and has emerged as the preferred platform for banks to offer services, focusing on growth strategies. Leveraging the advantages of mobile banking can enhance efficiency, facilitate business growth, and reduce reliance on cash transactions and associated risks through an efficient, cost-effective, and reliable money service support system, leading to an increase in financial performance (Anyasi & Otuba, 2009; Harelimana, 2017). Omar and Koori (2022) found that the availability of mobile banking services, including features like airtime top-up, has empowered commercial banks to boost sales volumes, lower distribution costs, and enhance customer satisfaction, ultimately leading to a favourable effect on financial performance. Mobile banking allows financial institutions to reach new customers and expand their market reach by offering services through mobile devices (Lee et al., 2007). Moreover, banks with internet banking generate higher income than those without (Furst et al., 2002; Malhotra & Singh, 2009). Banks' financial performance shows positive growth in balance sheet quality and customer conversion/retention when they incorporate cutting-edge mobile banking features alongside diligent cost reduction measures for frontline tellers and reduced investments in physical branches (Cleveland, 2016; Cho & Chen, 2021).

Diffusion of Innovation Theory

The innovation diffusion theory explores the process by which innovations are communicated among members of social systems over time (Rogers, 1995). This theory applies to understanding the adoption and utilisation of information technology, such as mobile banking. Rogers highlighted that the speed at which innovations are adopted is influenced by several factors, such as the perceived benefits compared to existing options, compatibility with existing systems, innovation observability, and the complexity engaged in its implementation. The compatibility aspect is exemplified by the collaboration between commercial banks and telecommunication companies, enabling mobile banking services to customers via mobile phones (Dang, 2011). Simplicity in understanding and easiness of use is important to adopt with innovations. Mobile phones, being user-friendly devices, contribute to the perception that mobile banking systems are less complex (Sevcik, 2004). Mobile banking has become a preferred choice due to its convenience, secure storage, and accessibility through smartphones by installing applications from platforms such as Play Store and App Store (Siagian & Manzilati, 2022).

Research Methodology

This comparative study employs a quantitative approach by comparing and analysing the similarities or differences between the multiple factors and the characteristics of the studied objects within the conceptual framework. Comparative research is descriptive research that seeks to understand the fundamental cause-and-effect relationships by analysing the factors that contribute to the occurrence or emergence of a specific phenomenon (Nazir, 2017).

The adoption of mobile banking yielded a return on investment in less than three years and positively impacted the financial performance of the banks through increased revenue generation (Obadia & Kumungunyi, 2022). Various studies have examined the time frame that encompassed three years before and after the mobile banking adoption (Adhitya & Sembel, 2020; Winata et al., 2021; Afifah & Taufiq, 2022). Therefore, the collection of the financial information in this study relied on secondary data from quarterly reports published on the banks' websites, observing the ratio of twelve quarters prior to and following the adoption of a mobile banking application that provides financial transaction services. The population in this study consists of banks that have implemented mobile banking and are listed in the main market of the Malaysian Stock Exchange. In this research, the sampling technique used is purposive sampling based on the availability and accessibility of the required information. A total of eight banking companies were selected, and the list is presented in the table below.

Table 1

List of Samples

No	Bank Name	Acronym	M-Banking App Launch Date	Period of Study
1	Public Bank	PBBANK	May 2014	Before: Apr 2011 - Apr 2014 After: Jun 2014 - Jun 2017
2	CIMB Bank	CIMB	Sep 2009	Before: Aug 2006 - Aug 2009 After: Oct 2009 - Oct 2012
3	AmBank	AMBANK	Nov 2009	Before: Oct 2006 - Oct 2009 After: Dec 2009 - Dec 2012
4	RHB Bank	RHBBANK	Apr 2011	Before: Mar 2008 - Mar 2011 After: May 2011 - May 2014
5	Maybank	MAYBANK	Sep 2014	Before: Aug 2011 - Aug 2014 After: Oct 2014 - Oct 2017
6	Alliance Bank	ABMB	Apr 2018	Before: Mar 2015 - Mar 2018 After: May 2019 - May 2022
7	Hong Leong Bank	HLBANK	Aug 2011	Before: Jul 2008 - Jul 2011 After: Sep 2011 - Sep 2014
8	Bank Islam Malaysia	BIMB	Nov 2019	Before: Oct 2016 - Oct 2019 After: Dec 2019 - Dec 2022

Financial ratios used to evaluate the financial performance of banks are commonly assessed using the CAMEL (Capital, Asset Quality, Management, Earnings, Liquidity) method. The evaluation of financial performance, according to Riyadi (2006), includes the following factors: capital, which is measured using the Capital Adequacy Ratio; asset quality, which is measured using Non-Performing Loans; earnings, which encompass Return on Equity; and liquidity, which involves the Loan to Deposit Ratio.

Table 2

Operational Variables

Dimension	Variable	Indicator	Scale
Earning	Return on Equity	$\frac{\text{Income available to Common excluding Extraordinary Items, TTM}}{\text{Common Shareholders Equity, YoY Average}} \times 100$	Ratio
Capital Adequacy	Capital Adequacy Ratio	$\frac{\text{Total Capital Adequacy (Value)}}{\text{Risk Weighted Assets}} \times 100$	Ratio
Asset Quality	Non-Performing Loan	$\frac{\text{Non – Performing and Impaired Loans}}{\text{Gross Loans}} \times 100$	Ratio
Liquidity	Loan to Debt Ratio	$\frac{\text{Total Loans}}{\text{Total Deposits}} \times 100$	Ratio

Source: Thompson Reuters Eikon database (2023)

The data acquired is analysed statistically using the SPSS 27 software. The normality test assesses the data distributional characteristics, thereby assisting in applying parametric tests that rely on the normality assumption. To assess the normality, the Shapiro-Wilk test is employed due to the relatively small sample size, as suggested by Ruxton et al. (2015). If the Shapiro-Wilk normality test indicates that the data is normally distributed, the Paired Sample T-test (parametric) is used for the different tests. However, the Wilcoxon Signed Rank Test (non-parametric) is applied if the data is not normally distributed (McCrum-Gardner, 2008).

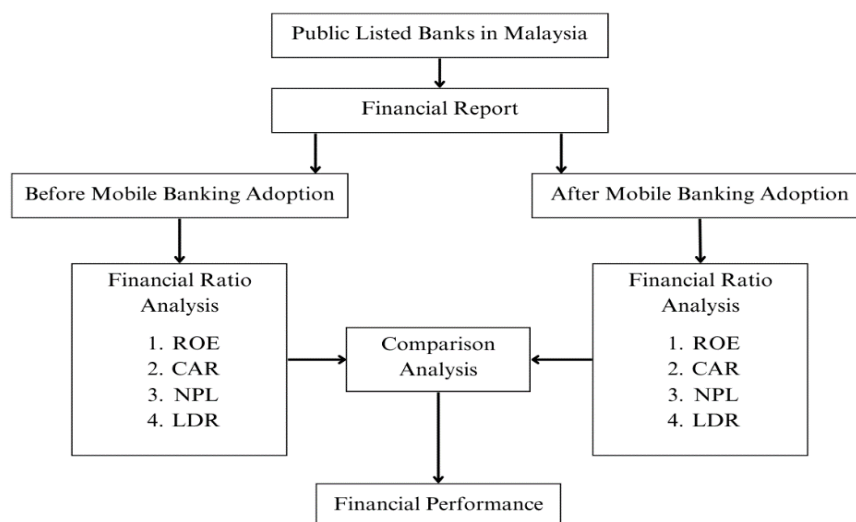


Figure 1. Conceptual Framework

Source: Adapted from Siagian and Manzilati (2022)

Hypotheses

H₀1 = The ROE difference between the pre and post mobile banking adoption is not significant.

H₁1 = The ROE difference between the pre and post mobile banking adoption is significant.

H₀2 = The CAR difference between the pre and post mobile banking adoption is not significant.

H₁2 = The CAR difference between the pre and post mobile banking adoption is significant.

H₀3 = The NPL difference between the pre and post mobile banking adoption is not significant.

H₁3 = The NPL difference between the pre and post mobile banking adoption is significant.

H₀₄ = The LDR difference between the pre and post mobile banking adoption is not significant.

H₁₄ = The LDR difference between the pre and post mobile banking adoption is significant.

Results and Discussions

Financial Ratio Analysis

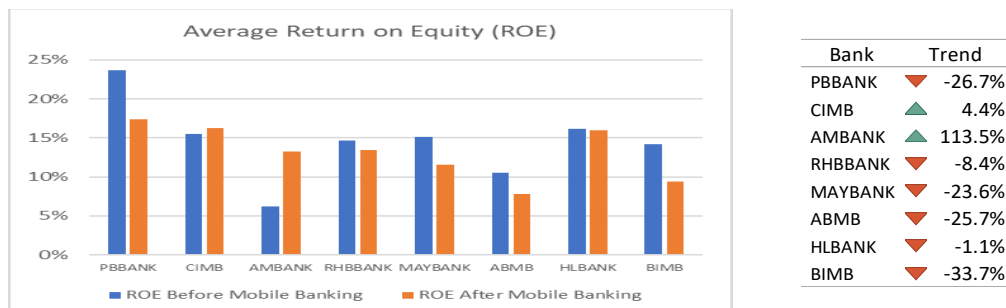


Figure 2. ROE of Listed Banks in Malaysia
Source: Data processed on MS Excel (2023)

Figure 2 demonstrates that the average ROE before and after mobile banking adoption varied among publicly listed Malaysian banks. AmBank and CIMB Bank both implemented mobile banking in 2009. Both banks recorded an increase in ROE from 6.22% to 13.28% and from 15.52% to 16.20%, respectively, while the other banks reported a decline in ROE after the mobile banking adoption. Public Bank, which had the highest ROE compared to other banks, experienced a decrease in the level of ROE recorded from 2011 to 2017. Overall, the decline in ROE for the majority of banks might suggest that mobile banking has not been a significant driver of profitability for these banks.

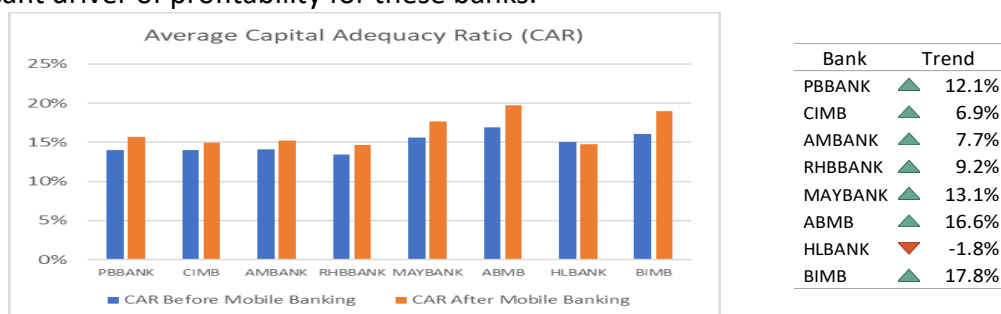


Figure 3. CAR of Listed Banks in Malaysia
Source: Data processed on MS Excel (2023)

Figure 3 illustrates the varied change in the average CAR prior to and following the adoption of mobile banking among public listed Malaysian banks. The majority of banks displayed an upward trend in CAR. At the same time, Hong Leong Bank reported a minor decline in CAR from 15.06% to 14.78% due to the increasing level of the risk-weighted average. Overall, the majority of banks experienced an upward trend, indicating an improvement in their capital position and an enhanced ability to manage risks in the period after the implementation of mobile banking.

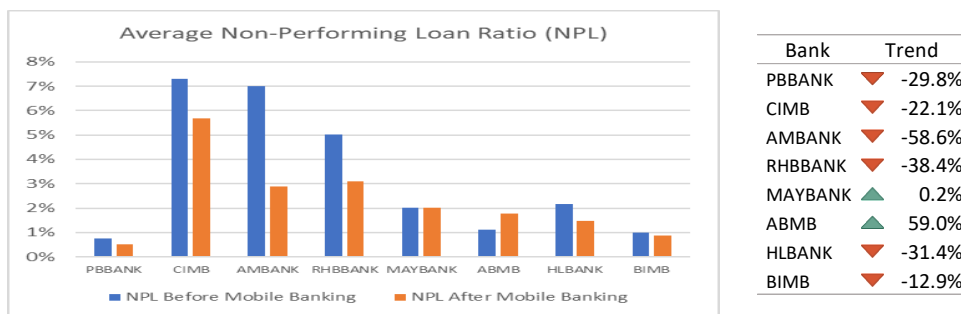


Figure 4. NPL of Listed Banks in Malaysia
 Source: Data processed on MS Excel (2023)

Figure 4 illustrates the trend in the average NPL prior to and succeeding the adoption of mobile banking among publicly listed Malaysian banks. The data reveals a prevailing pattern of NPL ratio reduction post-adoption among most banks. However, Maybank displayed a marginal increase in its NPL ratio, whereas Alliance Bank encountered a more substantial rise from 1.12% to 1.79% in its NPL ratio. Overall, the majority decrease in the NPL ratio shows a positive development for the overall financial performance of publicly listed Malaysian banks. It suggests that there is an improvement in asset quality after the m-banking adoption.

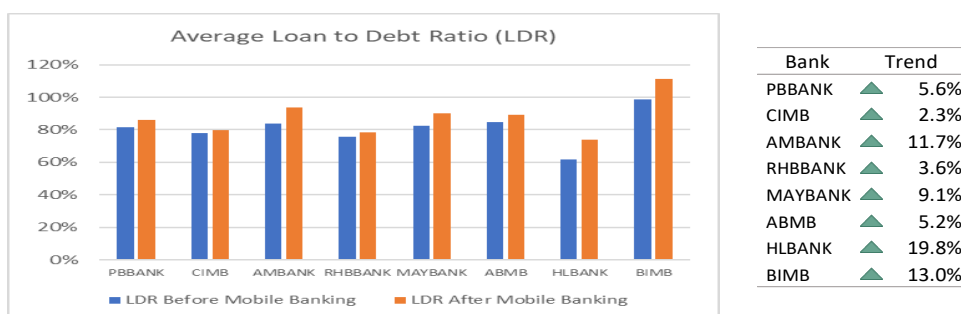


Figure 5. LDR of Listed Banks in Malaysia
 Source: Data processed on MS Excel (2023)

Figure 5 presents the LDR prior to and following the adoption of mobile banking among publicly listed Malaysian banks, demonstrating and illustrating an increase across all banks, which indicates a higher proportion of loans relative to deposits among the eight banks. Overall, the rise in the LDR can be viewed from both positive and negative perspectives. On one hand, it can contribute to economic growth by facilitating business investments and consumer spending. On the other hand, a high LDR can indicate potential risk, as a higher number of loan defaults can create financial challenges for the banks.

Descriptive Statistic Analysis

Table 3

Descriptive Statistics Analysis Results

Ratio	Before Mobile Banking					After Mobile Banking				
	Min	Max	Mean	Median	Std. Dev	Min	Max	Mean	Median	Std. Dev
ROE	.06	.24	.1463	.150	.05069	.08	.17	.1300	.130	.03295
CAR	.13	.17	.1488	.145	.01356	.15	.20	.1663	.155	.02066
NPL	.01	.07	.0325	.020	.02659	.01	.06	.0238	.020	.01685
LDR	.62	.99	.8113	.825	.10343	.74	1.11	.8775	.875	.11548

Source: Data processed using SPSS 27 (2023)

Table 3 reveals that the mean ROE before mobile banking adoption ranged from 0.06 to 0.24. The standard deviation was 0.05069, indicating a moderate level of variability. However, after the adoption of mobile banking, the ROE showed a slight decrease, with a range of 0.08 to 0.17, a mean of 0.1300, and a median of 0.130. These findings indicate that mobile banking had a marginal impact on the average ROE, with a slight decline observed.

The CAR values before mobile banking ranged from 0.13 to 0.17, with a mean of 0.1488 and a median of 0.145. The standard deviation was 0.01356, indicating a relatively low level of variability. After the implementation of mobile banking, the CAR values showed a slight increase, ranging from 0.15 to 0.20, with a mean of 0.1663 and a median of 0.155. The standard deviation increased to 0.02066, suggesting a slightly higher level of variability. These findings suggest that mobile banking adoption positively impacts the average CAR, with a slight improvement observed.

Meanwhile, the NPL before mobile banking adoption ranged from 0.01 to 0.07, with a mean of 0.0325 and a median of 0.020. The standard deviation was 0.02659, indicating a moderate level of variability. After the implementation of Mobile Banking, the NPL values showed a decrease, ranging from 0.01 to 0.06, with a mean of 0.0238 and a median of 0.020. The standard deviation decreased to 0.01685, suggesting a lower level of variability. These findings indicate that mobile banking had an impact on reducing the NPL ratio, with a decrease observed.

Furthermore, the LDR ratio before the mobile banking adoption ranged from 0.62 to 0.99, with a mean of 0.8113 and a median of 0.825. The standard deviation was 0.10343, indicating a moderate level of variability. After the adoption of Mobile Banking, the LDR values increased, ranging from 0.74 to 1.11, with a mean of 0.8775 and a median of 0.875. The standard deviation increased to 0.11548, suggesting a slightly higher level of variability. These findings indicate that mobile banking influenced the increase in the NPL ratio.

Normality Test

Table 4

Shapiro-Wilk Normality Test Results

Variable	Mobile Banking	Asymp. Sig. (2-tailed)	Sig.	Distribution	Conclusion
ROE	Before	.384	$p > 0.05$	Normal	Paired Sample T-test
	After	.427	$p > 0.05$	Normal	
CAR	Before	.512	$p > 0.05$	Normal	Wilcoxon Signed Ranks Test
	After	.025	$P < 0.05$	Non-normal	
NPL	Before	.019	$P < 0.05$	Non-normal	Wilcoxon Signed Ranks Test
	After	.035	$P < 0.05$	Non-normal	
LDR	Before	.485	$p > 0.05$	Normal	Paired Sample T-test
	After	.463	$p > 0.05$	Normal	

Source: Data processed using SPSS 27 (2023)

Table 4 presents the results of the normality tests conducted on the ROE and LDR ratios with the Asymp. Sig. (2-tailed) value greater than 0.05 indicates that both ratios have a normal distribution. Hence, parametric hypothesis testing can be applied to analyse the variables. However, both prior and proceeding the mobile banking implementation of the NPL ratio shows the Asymp. Sig. (2-tailed) value that is less than 0.05 suggests a non-normal distribution. Therefore, non-parametric hypothesis testing is employed for the NPL ratio. Similarly, the CAR ratio also exhibits a non-normal distribution after the adoption of mobile banking, necessitating the use of non-parametric tests.

The normality tests demonstrate that the ROE and LDR ratios satisfy the assumption for the Paired Sample T-test, which is a parametric test. Conversely, due to the non-normal distribution of the CAR and NPL ratios, the Wilcoxon Signed Rank Test is utilized. In the hypothesis testing, both the Paired Sample T-test and the Wilcoxon Signed Rank Test are interpreted based on the criterion that if $\text{Sig. (2-tailed)} \leq 0.05$, the null hypothesis is rejected, and the alternative hypothesis is accepted.

Hypothesis Test

Table 5

Paired Sample T-test Results

Variable	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)	Description	Conclusion
ROE	.01625	.04207	.01487	.311	Sig. (2-tailed) > 0.05	Not Significant
LDR	-.06625	.04241	.01499	.003	Sig. (2-tailed) ≤ 0.05	Significant

Source: Data processed using SPSS 27 (2023)

Table 5 shows the results of Paired Sample T-test that indicate the Sig. (2-tailed) value for the ROE ratio is greater than 0.05. This leads to the rejection of H_{11} , suggesting no significant difference in the ROE ratio. The finding is consistent with the studies by El-Chaarani and El-Abiad (2018); Siddik et al (2016), which suggest an insignificant influence of ROE on Internet banking. However, Lu (2022) discovered a significant positive impact on ROE for local

commercial banks in Malaysia through the adoption of mobile banking as a cashless payment method.

The Sig. (2-tailed) value for the LDR ratio is less than 0.05, suggesting an acceptance of H₁₄ with a significant difference in the LDR ratio before and after the mobile banking adoption. The finding is consistent with the study conducted by Adhitya and Sembel (2020), which also reported a significant difference and higher LDR results following the adoption of mobile banking.

Table 6

Wilcoxon Signed Rank Test Results

Variable	Mean		Z	Asymp. Sig. (2-tailed)	Description	Conclusion
	Before	After				
CAR	.1488	.1663	-2.392	.017	Asymp. Sig. (2-tailed) ≤ 0.05	Significant
NPL	.0325	.0238	-1.511	.131	Asymp. Sig. (2-tailed) > 0.05	Not Significant

Source: Data processed using SPSS 27 (2023)

Table 6 shows that the Asymp. Sig. (2-tailed) value for the CAR is below the significance level of 0.05. This indicates an acceptance of H₁₂, which signifies a significant difference in the CAR ratio prior to and proceeding with the mobile banking adoption. Additionally, the table illustrates an increase in the average CAR. This finding aligns with the study conducted by Adhitya and Sembel (2020), which discovered a significant and positive impact on the CAR of banks after the adoption of mobile banking while contradicting the study by Ulfa et al. (2017), which found a significant decrease in capital adequacy of banks in Indonesia following the implementation of internet banking.

Conversely, the Asymp. Sig. (2-tailed) value for the NPL ratio is 0.131, which is greater than 0.05. This indicates that H₁₃ is rejected, suggesting no significant difference in the NPL ratio before and after mobile banking. Moreover, Table 6 shows a decrease in the average NPL ratio. Previous studies (Ulfa et al., 2017; Santosa et al., 2017) also found no significant difference in NPL prior to and proceeding with the adoption of mobile banking technology.

Conclusions

The financial ratio analysis of the Return on Equity (ROE), Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Loan to Debt Ratio (LDR) reveal mixed impact on the bank's financial performance. The average ROE shows a decline after the mobile banking adoption, which indicates a decrease in financial profitability. On the other hand, the average CAR and NPL ratios exhibited improvements, indicating enhanced financial stability and a decrease in non-performing loans. However, the average LDR ratio increased, suggesting a potential decline in financial performance in terms of the loan-to-deposit ratio.

Further analysis of the hypothesis test reveals that there is a significant difference in the LDR before and after mobile banking adoption, indicating a change in lending practices. This study also discovers a significant difference in the CAR before and after the mobile banking adoption, which indicates an improvement in the banks' ability to meet regulatory capital requirements. However, there is no significant difference in the ROE found before and after the mobile banking adoption, which suggests a relatively stable financial performance

in the profitability aspect. Moreover, there is also no significant difference in the NPL, which suggests that the level of delinquent loans did not experience a significant change with the introduction of mobile banking.

In conclusion, the adoption of mobile banking has yielded varied effects on the financial performance of banks, with significant impacts on liquidity and capital adequacy. Consequently, banks should contemplate the prioritization of their mobile banking strategies in these critical domains. Firstly, banks should implement measures to sustain a healthy balance between loans and deposits and continue to invest in and enhance mobile banking offerings with the aim of attracting and retaining deposits, in alignment with the findings of Wu et al (2023), who highlighted the significant influence of continuous improvements in mobile banking applications on deposit levels. Secondly, leveraging the positive impact of CAR highlights the importance of continued investment in mobile banking facilitates to maintain and further improve capital adequacy and stability. Banks can thrive in the digital age while safeguarding their capital adequacy through prudent risk management (Arora, 2019), for example, through robust credit assessment procedures and regular monitoring of loan portfolios. By addressing these areas, companies can ensure stability in the dynamic landscape of mobile banking and enhance their financial performance.

Nevertheless, there are certain limitations in this study. The findings solely focus on eight domestic banks listed in Bursa Malaysia, and the study covers a relatively short time span of six years, analysing only four variables of financial performance. Therefore, it is recommended that future research endeavours extend the study period. Additionally, incorporating alternative research subjects and encompassing a broader range of variables and controls, such as company size, market share, interest rate, and other macroeconomic factors, would allow for a more comprehensive analysis.

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