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OF MALAYSIAN FULL-FLEDGED ISLAMIC BANKS:
A DEA ANALYSIS (2018–2023)**

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Abstract:

This study investigates the operational performance and relative technical efficiency of selected Malaysian full-fledged Islamic banks from 2018 to 2023. While prior studies have addressed Islamic banking efficiency, limited empirical research addresses how dedicated full-fledged Islamic banks maintained operational technical efficiency across specific crisis phases. Using the input-oriented Charnes-Cooper-Rhodes (CCR) Data Envelopment Analysis (DEA) model under an intermediation framework, this study evaluates relative technical efficiency using three inputs (Total Assets, Labour Costs, and Third-Party Funds) and two outputs (Total Financing and Operating Revenue). The evaluation covers three explicit periods: pre-COVID-19 (2018–2019), during COVID-19 (2020–2021), and post-COVID-19 (2022–2023). The sample consists of four standalone full-fledged operating Islamic banks: Bank Islam Malaysia Berhad, Bank Muamalat Malaysia Berhad, Bank Rakyat, and MBSB Bank Berhad. Empirical findings indicate that Bank Islam Malaysia Berhad and MBSB Bank Berhad maintained score-level consistency on the estimated efficient frontier throughout the six years. Bank Rakyat and Bank Muamalat Malaysia Berhad displayed minor fluctuations but achieved or recovered to full efficiency in the post-pandemic period. Rather than demonstrating absolute resilience or broad sector-wide stability, these relative results

suggest that the sampled institutions successfully adapted input allocation relative to financial output generation across macroeconomic disruptions.

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Banks Efficiency, CCR Model, Covid-19, DEA, Islamic Banks



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Introduction

Islamic banking has become an important component of Malaysia's financial system, supported by an established regulatory and institutional framework and the country's longstanding development of Shariah-compliant financial services. In addition, the expansion of Islamic banking in nations like Malaysia has been heavily supported by governmental interventions, encompassing financial subsidies and legal framework development (Abdullah et al., 2013). The development of Islamic banking in Malaysia can be traced to the establishment of Tabung Haji in 1963 and subsequently to the establishment of Bank Islam Malaysia Berhad following the Islamic Banking Act 1983 (Asni, 2019). The Malaysian Islamic banking sector has since developed into a broader ecosystem supported by regulatory, educational, and research institutions. Furthermore, Malaysia is currently one of the key countries driving the growth of Islamic banking services globally (Alwi et al., 2019).

According to (Hidayati et al., 2017), the operational efficiency of Islamic banks is particularly important because banks must transform financial and human resources into financing and income while maintaining financial stability. Efficiency becomes even more important during periods of economic disruption because financial institutions must continue providing essential services while managing changes in customer behaviour, financing demand, liquidity conditions, operating costs, and credit risks.

The COVID-19 pandemic represented a significant disruption to Malaysia's banking sector. The implementation of the Movement Control Order (MCO) in March 2020 affected economic activities and banking operations (Sukumaran, 2020). Extended pandemic lockdown measures significantly disrupted the banking industry, with Islamic financial institutions experiencing notable operational friction. Rapid transmission of COVID-19 created widespread macroeconomic instability across diverse sectors including manufacturing, tourism, and entertainment which directly propagated risk into the financial system. Given its central role in facilitating economic activity and consumer liquidity, the banking sector emerged as one of the most severely impacted industries during the pandemic (Banna & Alam, 2020). In addition, Islamic banks like other financial institutions, faced challenges associated with customers'

repayment capacity, financing risk, operational restrictions, and changing patterns of banking activity. Consequently, examining whether Islamic banks were able to maintain or recover their operational efficiency during and after the pandemic provides useful evidence concerning their capacity to withstand economic disruptions.

While existing literature has examined bank efficiency in Malaysia, regional contexts (e.g., MENA and Indonesia), or general banking periods, an empirical research gap remains regarding how standalone, full-fledged Islamic banks maintained technical efficiency across the distinct phases of the COVID-19 pandemic. Existing studies frequently group different types of financial institutions together or omit multi-phase comparative analyses (pre-, during-, and post-pandemic). Dedicated full-fledged Islamic banks operate entirely under Shariah parameters without reliance on parent conventional bank windows, making their input-output transformation dynamic uniquely critical to analyse.

This study thus aims to assess the technical efficiency of the four full-fledged Islamic banks in Malaysia in 2018–2023 by applying the CCR-DEA model. The period is divided into three phases: pre-COVID-19 (2018–2019), during COVID-19 (2020–2021), and post-COVID-19 (2022–2023).

The study addresses two objectives:

1. To compare the relative technical efficiency scores of selected Malaysian full-fledged Islamic banks before, during, and after the COVID-19 pandemic.
2. To rank the selected full-fledged Islamic banks according to their relative DEA technical efficiency performance within the sample.

The findings provide implications for bank managers, policymakers, and other stakeholders seeking to understand resource utilisation and operational stability within Malaysia's Islamic banking sector.

Literature Review

This section reviews the literature related to the operational efficiency and performance of Islamic banking institutions, with particular emphasis on the application of Data Envelopment Analysis (DEA) in evaluating banking efficiency. It then examines previous empirical studies on Islamic bank efficiency, including research conducted in Malaysia, Indonesia, and the Middle East and North Africa (MENA) region. The review also considers the impact of the COVID-19 pandemic on Islamic banking performance, as the pandemic created significant operational and financial challenges for banking institutions. This review provides the theoretical and empirical foundation for examining the efficiency trends of selected Malaysian full-fledged Islamic banks using the CCR-DEA model.

Islamic Banking in Malaysia

Malaysia has a well-developed Islamic banking system with regulatory and institutional frameworks in place, Asni said. The formation of Bank Islam Malaysia Berhad under the auspices of the Islamic Banking Act 1983 marked a significant milestone in the evolution of the dual banking system in Malaysia. The governance and regulation of Islamic financial

institutions were further enhanced by subsequent regulatory developments such as the Islamic Financial Services Act 2013 (Asni, 2019).

The stabilizing effect of financial relief programs by the government was highlighted by Ariffin et al. (2024), in investigating Islamic banking performance amid COVID-19. The six-month repayment moratorium, worth about RM100 billion, was implemented in April 2020 to help alleviate liquidity constraints on individuals and SMEs, with a targeted extension of three months for borrowers who are severely affected. These moratoriums relieved the financial impact of consumers, giving them the time to adjust, which in turn helped protect Islamic banks from major losses and income declines in the economic upheaval.

Ismail et al. (2013) believe that Islamic banks are different from Islamic windows in the way that their banking functions are carried out within the Islamic banking framework. Their operational performance thus offers a significant measure of the efficiency of Islamic banking institutions in harnessing resources to create financing and income.

COVID-19 and Banking Efficiency

The COVID-19 pandemic created substantial economic uncertainty and operational disruption. In Malaysia, the MCO restricted movement and affected economic activity, while repayment moratoriums and restructuring measures were introduced to reduce the financial burden on households and businesses (Anwar et al., 2020).

These steps brought an immediate relief to the banks but also posed challenges to their operations. The relationship between bank inputs and outputs may be impacted by changes in financing demand, repayment capacity, customer behaviour, and operating arrangements. Therefore, efficiency analysis can offer a quantitative perspective on the issue of whether banks were using their resources efficiently during economic shocks.

Data Envelopment Analysis and Islamic Banking Efficiency

Data Envelopment Analysis is a non-parametric frontier technique used to measure the relative efficiency of decision-making units (DMUs) that utilise multiple inputs to produce multiple outputs (Liu et al., 2012). According to Charnes et al. (1978), DEA constructs an efficient frontier from the best-performing DMUs and evaluates other DMUs relative to this frontier.

DEA is particularly suitable for banking studies because banks simultaneously employ multiple resources and generate multiple financial outputs. The method also allows institutions to be compared using variables measured in different units and is applicable to relatively small samples. Previous studies have applied DEA to Islamic banking efficiency using different combinations of deposits, financing, assets, labour costs, operating costs, and income. However, DEA efficiency results are relative to the sample and model specification. Therefore, a score of 1.000 indicates that a bank is located on the estimated efficient frontier under the specified model rather than demonstrating absolute efficiency in every aspect of banking operations (Pascoe, 2024).

Methodology

This study uses secondary annual data extracted from published audited financial statements (2018–2023). The sample is limited to four standalone full-fledged Islamic banks operating in Malaysia: Bank Islam Malaysia Berhad (BIMB), Bank Muamalat Malaysia Berhad, Bank Rakyat, and MBSB Bank Berhad. These banks fulfil the criteria of operating as dedicated Islamic financial entities under Shariah governance.

DEA Input and Output Variables

Devi and Firmansyah (2020) state that in order for a business to be stable in its operations, it must maintain high efficiency to maintain its financial performance. Operational costs are a crucial input for banks to effectively achieve profitability. Eventually, this enables outputs to be optimized, resulting in improved efficiency. A bank's efficiency reflects its ability to maximize output by effectively utilizing available resources (Firmansyah, 2018). The study adopts an intermediation-oriented representation of bank operations based on previous study (Ikhwan and Riani, 2022) to represent banking operations, this study employs three inputs (X) and two outputs (Y) extracted from the audited financial statements of the selected banks. The inputs utilized comprise Total Assets (X_1), defined as non-current assets and total balance sheet assets; Labour Costs (X_2), representing total staff expenses and personnel-related expenditure; and Third-Party Funds (X_3), which encompass customer deposits, investment accounts, and mobilized funds. Correspondingly, the outputs generated from these resources are Total Financing (Y_1), consisting of the total Shariah-compliant financing granted to customers, and Operating Revenue (Y_2), which measures the total gross income recorded in the income statement.

Table 1: Definition of Inputs and Outputs for the Bank Efficiency

Category	Variable	Symbol	Definition
Input	Total assets	X1	Non-current assets on a bank's balance sheet.
Input	Labour cost	X2	Total cost incurred by the bank in employing its staff.
Input	Third-party funds	X3	Funds such as loans, investments and donations.
Output	Total financing	Y1	Total financing provided to customers.
Output	Operating revenue	Y2	Income generated by the banks in income statement.

CCR-I DEA Model

The study employs the input-oriented CCR model developed by Charnes, Cooper and Rhodes. The CCR model assumes constant returns to scale (CRS). For decision-making unit DMU j , technical efficiency score h_j is calculated as:

$$h_j = \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}}$$

where y_{rj} represents output r produced by DMU j , x_{ij} represents input i used by DMU j , and u_r, v_i are optimized weights. A score of 1.000 indicates that the DMU lies on the estimated efficient frontier relative to the sample. Scores below 1.000 represent relative technical inefficiency.

Operational Resilience Perspective

This study looks at operational resilience in terms of the temporal dynamics of technical efficiency. A bank is considered to be more operationally resilient if it has remained efficient during COVID or has come back to the efficient frontier after a dip. This operationalisation does not consider DEA efficiency as a direct indicator of resilience. Instead, efficiency persistence and recovery are used as quantitative measures of operational resilience.

Results

From the descriptive analysis results in Table 2, it can be seen that the highest value of the input in monetary terms is total assets. The total assets mean over the observations is around RM67.86 billion while the total financing mean over the observations is around RM46.68 billion. The mean operating revenue recorded was around RM3.40 billion.

Table 2: Descriptive Analysis of Input and Output Data (RM in Millions)

Variables	Minimum	Maximum	Average	Standard Deviation
Total Assets (Input)	22,828.81	118,409.81	67,862.92	33,132.10
Labor Cost (Input)	178.29	1,167.72	548.62	320.41
Third-party Fund (Input)	338.30	3,157.07	1,412.29	875.11
Total Financing (Output)	14,687.85	81,425.29	46,682.93	22,119.74
Operating Revenue (Output)	1,062.17	6,665.61	3,399.03	1,949.69

DEA Efficiency Scores

The DEA results show in Table 3 demonstrate generally high technical efficiency across the four banks.

Table 3: Efficiency Value of Full-fledge Islamic Banks

Bank	2018	2019	2020	2021	2022	2023	Mean
BIMB	1.000	1.000	1.000	1.000	1.000	1.000	1.000
B. MUAMALAT	0.960	1.000	0.970	1.000	1.000	1.000	0.988
B. RAKYAT	1.000	0.970	1.000	1.000	1.000	1.000	0.995
MBSB	1.000	1.000	1.000	1.000	1.000	1.000	1.000

The Bank Islam Malaysia Berhad (BIMB) and MBSB Bank Berhad stayed in the DEA efficient frontier during the entire six-year period with efficiency scores of 1.000. The efficiency of Bank Rakyat was also very high, dropping to 0.970 in 2019. The efficiency of Bank Muamalat

Malaysia Berhad fell in 2018 (0.960) and 2020 (0.970) but recovered to 1.000 from 2021 onwards.

Efficiency Ranking

The highest position is shared by Bank Islam Malaysia Berhad and MBSB Bank Berhad with mean efficiency scores of 1.000. The second best is Bank Rakyat with 0.995, followed by Bank Muamalat Malaysia Berhad with 0.988. The results should be seen as relative ranking rather than absolute ranking of the entire Malaysian Islamic banking industry.

Efficiency Across the COVID-19 Period

The temporal results suggest that there was no significant reduction in the technical efficiency of the banks in the sample due to COVID-19. Bank Islam Malaysia Berhad and MBSB Bank Berhad were both at 1.000 in 2020-2021. During these two years, Bank Rakyat has also been fully efficient. Bank Muamalat Malaysia Berhad had an efficiency score of less than 1 in 2020 but bounced back to become fully efficient in 2021 and is fully efficient in 2022 and 2023. This pattern suggests a temporary downturn and ongoing improvement. The results indicate overall high level of technical efficiency persistence over the three periods.

Discussion

The results indicate that the chosen full-fledged Islamic banks in Malaysia exhibited a high degree of operational stability during the COVID-19 crisis. The continuous efficiency of Bank Islam Malaysia Berhad and MBSB Bank Berhad suggests that they were able to sustain the relationship between their financial inputs and outputs and their resources during the economic disruption. The performance of Bank Rakyat is also good, though there is a minor drop in 2019, which shows that efficiency can also shift even during non-crisis periods.

The case of Bank Muamalat Malaysia Berhad is different. It was less efficient in 2018 and 2020 but has been on the efficient frontier since 2021. From an operational resilience lens as applied in this study this recovery is significant as it is not always a sign of resilience when performance is not continuous. Rather, an institution can be resilient by being able to get back to normal operations after disruption.

The high positive correlation between inputs and outputs also suggest that the resources used by the banks were well related to their financing and revenue generation. But correlation does not imply causation. The DEA results offer a relative efficiency measure and do not explain the reasons for the higher or lower efficiency of specific banks. The findings also indicate that efficient institutions could be used as reference institutions for the less efficient ones. Specifically, the practices around resource allocation, financing activities, workforce management, and fund mobilisation could offer opportunities for managerial benchmarking.

Conclusion

The technical efficiency and operational resilience of four full-fledged Islamic banks in Malaysia were analyzed in this study from 2018 to 2023 by adopting the input-oriented CCR DEA model. The study was conducted in the pre-COVID-19, during-COVID-19, and post-COVID-19 eras. Results show generally high technical efficiency in the sample. Bank Islam

Malaysia Berhad and MBSB Bank Berhad had 100% efficiency in all years and Bank Rakyat had a mean score of 0.995. Bank Muamalat Malaysia Berhad had an average efficiency score of 0.988 and showed a significant improvement in 2021, after being less efficient in 2018 and 2020.

The findings indicate that the sampled full-fledged Islamic banks in Malaysia, on average, continue to achieve good operational efficiency despite the COVID-19 crisis. Furthermore, efficiency of several banks and the improvement of efficiency for Bank Muamalat Malaysia Berhad indicate that banks have been technically efficient and resilient in terms of efficiency. The findings, however, are limited to the four banks sampled under the set of model parameters and should not be used as a generalisation for the Malaysian Islamic banking industry.

Recommendation

For the effective and resilience of Islamic banks in Malaysia, the following recommendations are suggested to Islamic bank managers, regulators, policy makers and future studies. To ensure cost flexibility in the event of future shocks, bank managers must continuously review the use of resources (assets, labour and third-party funds) and invest in digital banking channels. Efficiency benchmarking can be one of the indicators regulators and policymakers can use to monitor the performance of Islamic banking. A systematic efficiency assessment may be useful to identify institutions that need more focus on resource utilization and operational improvement. Moreover, relative efficiency indicators can be built into the financial monitoring system to guarantee sustainable resource use in Islamic institutions.

Furthermore, this study is based on CCR model and thus assumes constant returns to scale. The analysis may be expanded in future studies by applying other specifications of the DEA model such as the BCC model to separate technical efficiency and scale efficiency. Another possible application of the Malmquist Productivity Index is to analyze productivity change over time. The sample can be further extended to Islamic banking windows and foreign Islamic banks in Malaysia in future studies. Other factors and alternative efficiency views may also offer a more holistic view of the resilience of Islamic banking.

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