International Journal of Islamic Economics and Finance (IJIEF)
Vol. 8(1), page 58-81, January 2025

The Determinants of Islamic Rural Banks' Efficiency in Indonesia

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Article History
Received: Jan 27th, 2024 Revised: July 16th, 2024 Accepted: Jan 28th, 2025

Abstract

Given the critical role of Islamic Rural Banks (IRB) in supporting financial inclusion and economic stability in Indonesia, this research urgently highlights the need for strategic improvements in IRB efficiency to ensure sustainable growth and resilience in the face of economic uncertainties. This research aims to assess the effectiveness of Islamic Rural Banks (IRB) in Indonesia. In the second phase, the study examines the impact of Risk Profile, Good Corporate Governance (GCG), Earnings & Capital (RGEC) factors on IRB efficiency. Additionally, the research analyzes the influence of the *Maqashid Sharia* Index (MSI) on IRB efficiency. The methodology involves employing Data Envelopment Analysis (DEA) followed by a Multinomial Logistic Regression test, using a sample of 119 IRB across Indonesia. The research period of this article is from the fourth quarter of 2019 to the fourth quarter of 2021. The DEA results categorize 516 and 693 data observations as high efficiency for intermediation and production approaches, respectively. Risk Profile factors (NPF & FDR) significantly affect IRB efficiency. GCG factors, specifically Board of Directors' Ownership & Board of Commissioners' Ownership, have a significant impact on IRB efficiency, but only in the intermediation approach. Earnings, represented by ROA, significantly influence both approaches, while ROE yields opposite results. Capital, represented by CAR, significantly affects the intermediation approach. The Sharia factor, MSI, demonstrates a significant impact on IRB efficiency in both intermediation and production approaches. These findings serve as an academic reference for IRB managers, guiding decision making to enhance efficiency in the future

Keywords: Risk Profile, Efficiency, Islamic Rural Bank, *Maqashid Sharia* Index, Multinomial
JEL Classification: G21, G32, O18, Z12
Type of paper: Research Paper

DOI:
https://doi.org/10.18196/ijief.v7i2.21491

Web:
https://journal.umy.ac.id/index.php/ijief/article/view/21491

Citation:
Wastuti, W., Thalib, H. A. H., & Fitrijanto, A. (2025). The Determinants of Islamic Rural Banks' Efficiency in Indonesia. ***International Journal of Islamic Economics and Finance (IJIEF)***, *8*(1), 58-81 https://journal.umy.ac.id/index.php/ijief/article/view/21491

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I. Introduction

Islamic Rural Banks (IRB) in Indonesia are reported to hold a market share of only 2.54% within banking industry in June 2023 (Binekasri, 2023). In this context, 2.9% is contributed to the total financing distributed by the sector despite the possession of 171 units. IRB serves as a microfinance institution (MFI) and offers an alternative financing source for individuals lacking access to BUS or UUS, preventing reliance on high-interest moneylenders (Priyadi et al., 2021). However, the average financing distribution to the MSME sector from 2009 to 2022 remained below 55%.

The growth of IRB units should be consistent with performance. In this context, IRB must focus on channeling funds to high-risk MSME, operating with Sharia principles with inherent risks due to direct participation in the real sector. The Non-Performing Financing (NPF) ratio for IRB consistently exceeds 6%, surpassing the 5% threshold mandated by Bank Indonesia (BI). Additionally, liquidations occur frequently, with nine instances reported between 2009 and 2021, according to data from the Savings Guarantee Institution (LPS) in 2022. (LPS, 2022).

Considering the challenges, evaluating IRB performance is important. Different methods have been used for performance analysis, including Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA). A 90.12% technical efficiency for IRB in East Java was reported using SFA, suggesting room for optimization (Sadono, 2018). DEA reported consistent efficiency in four out of 14 IRB in eastern Indonesia (Salama, 2022). Furthermore, 86% average technical efficiency was suggested for IRB using SFA, emphasizing the need for optimization, with larger banks proving more efficient (Agustina et al., 2019).

Factors influencing IRB efficiency were identified (Devi & Firmansyah, 2018) and (Halim & Oswari, 2020). Return on Assets (ROA) positively impacted efficiency, reflecting that higher profits contribute to enhanced efficiency. Conversely, NPF showed a negative correlation with efficiency, emphasizing the need to manage bank risks continuously. Capital Adequacy Ratio (CAR) is crucial for mitigating unforeseen financial losses. With the evolving financial landscape and increasing competition, understanding efficiency factors is important for maintaining stability and ensuring long-term sustainability. Banks can also improve operational efficiency by focusing on enhancing ROA and managing NPF effectively. Moreover, maintaining a robust CAR is essential for safeguarding against potential financial disruptions, protecting depositors, and maintaining public confidence in banking system. Immediate attention to the factors can help IRB navigate economic uncertainties and enhance the competitive edge.

Despite the conventional efficiency tests, IRB, as Sharia-compliant institutions, should be consistent with the principles of *Maqashid Sharia* to achieve maslahah. The importance of incorporating Sharia objectives into performance measurement has also been reported (HT & Rama, 2018). The *Maqashid Sharia* Index (MSI) developed by (O. M. Mohammed & Md Taib, 2015) serves the purpose. However, research connecting MSI to IRB efficiency remains limited. Previous results focused on BUS, such as (Rusydiana & Firmansyah, 2017), which used DEA and MSI to compare efficiency. The research categorized banks into quadrants, with Bank Muamalat Indonesia and Panin Syariah occupying the top-performing quadrant.

Based on the description, this research aimed to evaluate efficiency of IRB in Indonesia, considering the effects of conventional factors on Risk Profile, GCG, Earnings, and Capital (RGEC) and Sharia using the MSI. In this context, a comprehensive sample was used to provide detailed insights. The analysis comprised two stages namely assessing efficiency, followed by an exploration of the factors influencing IRB efficiency in section 1. Section 2 reviews pertinent literature, while Section 3 outlines the data and methodology. Additionally, Section 4 presents model results and Section 5 concludes the research and offers policy recommendations.

II. Literature Review

The General Concept of Efficiency

The concept of efficiency is related to the theory of production and consumption in economic systems, specifically microeconomics. According to (Koutsoyiannis, 1979), production function describes the process of changing inputs into outputs in a certain period. The model used to explain this function is the production frontier and the line represents the maximum output level of each input. Firm efficiency consists of two components, namely technical and allocation efficiency (Farrell, 1957). Technical efficiency reflects the ability to obtain maximum output from a given set of inputs, while allocation efficiency shows the use of inputs in optimal proportions, given the price and production technology. There are three concepts in banking efficiency, namely first, standard, and alternative profit efficiency (Berger & Mester, 1997). According to (Akhavein et al., 1997), there are three theories used to measure the level of efficiency of financial institutions, namely asset, cost, and added value methods.

The Concept of Efficiency in Islamic Perspective

Quran, particularly in Surah Al-Baqarah [2]: 60, states that humans are granted God's blessings but are not allowed to cause harm to the earth. Additionally, Islamic teachings, as mentioned in Surah Al-Isra [17]: 26 – 27, emphasize the efficient use of resources and property. Islam discourages wasteful practices and inefficient utilization of assets. In the context of business, managers are urged to be mindful of resource utilization to prevent extravagance, ensuring that existing resources are used effectively to achieve optimal results. However, the implementation of efficiency concept in Islamic economics must be carried out with careful consideration. According to Ibn Kathir, Prophet Muhammad SAW said, "Everyone is dependent on Allah, and the most beloved are those who show the greatest care for His dependents through responsible use of resources" (Yusof & Amin, 2003).

Islamic economic system creates human happiness (*falah*) and a good life (*hayatan thayyibah*) to bring justice and pleasure (Chapra & Basri, 2000). The system establishes a balance between material and spiritual needs while harmonizing individual and societal interests. Fundamentally, pursuing personal interests is not inherently problematic but a structured mechanism must be in place to ensure individual actions do not infringe on the rights of others. Achieving the objectives requires human development and institutional reforms to shape economic behavior. In this context, prioritizing the protection of social interests is essential. Human development is guided

by three interrelated concepts that form the foundation of Islamic philosophy, namely *Tauhid* (Allah is the creator of this universe), *Khalifah* (the trusted leader by Allah), and *'Adalah* (the central role of justice in all aspects of life). These building blocks are related to each other and are aimed at changing the perspectives of the world. Based on human reforms guided by Islamic philosophy, particularly concerning the role of humans as Caliphs, three fundamental questions are asked regarding the economic system. These include What should be produced, how should production be conducted, and for whom should the process be carried out to achieve Maqasid al-Sharia. (Chapra, 2011).

The concept of efficiency in Islamic economics differs from conventional. In Islam, efficiency is understood as the optimal utilization of resources, emphasizing that resources should not be wasted since individuals are accountable to God. This notion must be realized proportionally, ensuring moderation in consumption and investment decisions based on actual needs to maximize available resources. In this context, the basic needs *(dharuriyat)* must be prioritized to increase *hajjiyat* and *tahsiniyyat* (Amalia, 2003). According to M. Umer Chapra, optimum efficiency could be achieved by using natural and human resources to produce sufficient goods and services, fulfill human needs stably, and keep growth continuously (Chapra & Basri, 2000).

The Underlying Theory of the Determinants of IRB Efficiency

Efficiency of IRB is influenced by various determinants, including Shariah compliance, regulatory frameworks, corporate governance, operational efficiency, financial performance, and market conditions. Shariah compliance and Islamic banking principles play a fundamental role, particularly the Profit and Loss Sharing (PLS) mechanism, where *Mudarabah* and *Musharakah* principles impact risk management and profitability (Sutrisno & Widarjono, 2022). Additionally, asset-backed financing methods, such as *Murabaha*, *Ijarah*, and *Salam*, affect liquidity and operational efficiency (Yusoff et al., 2023). The prohibition of *riba* compels Islamic banks to adopt alternative income-generating methods, influencing monetary policies and economic interactions (Alam et al., 2017).

The regulatory framework shapes IRB efficiency, with Islamic banking regulations ensuring governance and risk management, while central bank policies influence capital adequacy and liquidity. Corporate governance and management are important since effective Shariah Supervisory Board (SSB) oversight enhances transparency (Tashkandi, 2022) and competent leadership improves efficiency (Mai et al., 2024). Furthermore, operational efficiency depends on cost management (Fithria et al., 2021) and technology adoption, which enhances customer service (Suhartanto et al., 2020). Financial performance and risk management also require efficient credit risk (Priyadi et al., 2021) and liquidity to ensure Shariah compliance.

Market conditions and competition, particularly the rural economic environment and competition from conventional financial institutions, significantly impact efficiency of IRB. Recognizing the determinants is essential for improving operational efficiency, promoting financial inclusion, and contributing to rural economic development. Efficiency of IRB is shaped by a combination of factors, including Shariah compliance, regulatory frameworks, management practices, operational strategies, and market dynamics. A comprehensive understanding of

conventional banking efficiency theories, with the distinctive characteristics of Islamic finance, is crucial for optimizing IRB performance. To enhance efficiency and ensure long-term sustainability, IRB must continuously improve governance structures, strengthen risk management practices, and embrace technological advancements. These improvements enable IRB to operate more effectively while upholding ethical and equitable financial practices in line with Islamic financial principles.

Previous Research

A substantial piece of literature has assessed the efficiency of IRB using different methodologies. A two-stage test on IRB efficiency showed that IRB operated with good efficiency during the sample period, with ratios mostly exceeding 90% (Nashihin & Harahap, 2014). Efficiency pattern reported an initial increase, reaching a peak, followed by a subsequent decline. Competitive factors were identified as positively impacting efficiency, but the reasons behind efficiency deceleration remained unclear. Training expenditure for employees was found to be insufficient in explaining efficiency changes. Regression analysis reported that NPF had a significant effect on efficiency, and the results based on Bank Operational Costs to Operating Income (BOPO) ratio also showed a positive image of IRB efficiency. In contrast, a deterioration in IRB inefficiencies was suggested (Jatmiko, 2017). Ownership concentration, capital structure, liquidity, and risk management were identified as determinants of efficiency. Higher capital structure ratios showed an increased perceived risk by shareholders, potentially driving efforts to enhance IRB management for greater efficiency. Liquidity was negatively correlated with efficiency since more liquid IRB faced challenges in financing, resulting in lower efficiency.

SFA was used to measure IRB efficiency in East Java province, finding a technical efficiency of 90.12% (Sadono, 2018). Factors contributing to technical inefficiency included CAR and NPF, emphasizing the need for sufficient capital and risk management to improve IRB performance. A total of 58 IRB was analyzed using SFA and determining an average technical efficiency of 86% (Agustina et al., 2019). Larger banks were found to be more efficient, and the research period showed an overall increase in IRB efficiency.

A total of 59 IRB was investigated using DEA and panel data regression (Nugrohowati, 2019). The results showed that the average efficiency of IRB across regional areas did not reach optimal levels, with internal factors such as BOPO and KPMM affecting efficiency. Macro variables, including BI Rate and inflation, were found to positively impact efficiency. DEA and Tobit regression showed that Islamic IRB remained inefficient from 2014 to 2017 (Halim & Oswari, 2020). However, different independent variables had statistically significant effects on IRB efficiency.

IRB was considered in South Sulawesi, using DEA and Tobit panel regression (Khatimah & Miranti, 2022). The research identified average efficiency, with fixed assets, operating income, and costs having partial significant effects on efficiency. Efficiency of Rural Credit Banks (BPR) and IRB in Indonesia was compared, and both institutions were not efficient in the intermediary role (Wasiaturrahma et al., 2020). Capital increase and city location were crucial for improving efficiency. Additionally, (Parisi et al., 2021) measured efficiency using the MSI, where

conventional banks were reported to be more efficient except during financial crises. The influence of MSI on efficiency of Islamic banks discovered a positive and significant relationship between the variable and technical efficiency (Hakimah et al., 2020).

Based on the description above, this research will examine efficiency of IRB in depth using both production and intermediation methods. In addition, a comprehensive sample is used to explore all IRB in Indonesia. This research also analyzes the factors influencing efficiency of IRB from the conventional perspective focused on the Risk Profile, Good Corporate Governance (GCG), as well as RGEC factors. However, the Sharia principles of the IRB were not omitted in the form of MSI.

III. Methodology

Data

This research examines the entire population of IRB in Indonesia, with a structured sampling method based on specific criteria. In May 2022, there were 165 IRB in operation, from which a sample of 119 was selected. The selection process adhered to two key criteria, namely (1) the inclusion of IRB listed on the Financial Services Authority (*Otoritas Jasa Keuangan* or OJK) website, and (2) the selection of IRB consistently publishing financial reports throughout the period. The research covers the period from the fourth quarter of 2019 to the fourth quarter of 2021, resulting in a total of 1,071 observations.

Model Development

This research examined efficiency of Islamic banking sector using a two-stage DEA method. (Masrizal et al., 2023). In this context, DEA is applied and regressed by multinomial regression.

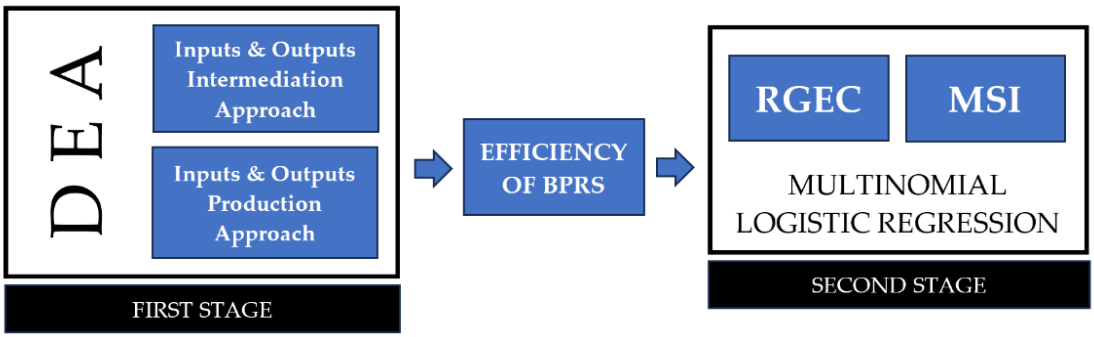

Figure 1. Research Conceptual Framework

Method

In this research, two stages of calculation will be carried out. The first stage calculates efficiency of IRB using DEA. In the second stage, multinomial logistic regression test is used to analyze the influence of RGEC and MSI factors on efficiency of IRB (Ascarya & Masrifah, 2022) (Billah, 2022). The following is a description of the analytical method adopted in this research.

DEA

DEA is a non-parametric, distribution-free statistical method used to assess efficiency, assuming no random errors and varying efficiency levels among entities. According to Farrell (1957), DEA evaluated decision-making units (DMUs) with multiple inputs and outputs using linear programming (Widiarto & Emrouznejad, 2015). Efficiency scores range from 0 to 1, where higher values show greater efficiency. DEA provides relative efficiency measurements, dependent on the benchmark established by the sample.

$$e_s = \frac{\sum_{i=1}^{m} u_i y_{is}}{\sum_{j=1}^{n} v_j x_{js}}$$

For i = 1,…m and j=1,…,n, with: y_{is}: the number of i outputs produced by bank; x_{js}: the number of j inputs produced by bank; u_i: the weight of output; v_j: the weight of input

The first step in using DEA is to determine the appropriate input and output variables. In the production method, input variables include profit-sharing from Third Party Funds (Jatmiko, 2017), operational costs (Miranti et al., 2022), and non-operational costs, while the output consists of income from financing distribution and others (Wasiaturrahma et al., 2020). In the intermediation method, input variables comprise capital, Third Party Funds (DPK) (Khatimah & Miranti, 2022), and IRB debt, with Distributed Financing as the output (Wasiaturrahma et al., 2020).

This research uses the Variable Returns to Scale (VRS) model, also known as Banker, Charnes, and Cooper (BCC), with an output-oriented measurement. The objective is to assess the achievement level of optimal efficiency by maximizing output relative to available inputs. DEA test results are categorized into four efficiency levels to provide a structured evaluation, as adapted from (Hidayat, 2014). This categorization framework facilitates the comparison of DMUs by analyzing multiple inputs and outputs. Additionally, insights are also offered into the relative efficiency of financial institutions, enabling the identification of areas for improvement and the adoption of best practices.

Table 1. Efficiency Value Categorization

Efficiency Criteria	Mark
High	0.81 – 1.00
Moderate	0.60 – 0.80
Low	0.40 – 0.59
Not efficient	>0.40

Source: adapted from (Hidayat, 2014)

Multinomial Logistic Regression

Multinomial logistic regression allows more than two categories for the dependent variable. According to (Hausman & Mcfadden, 1984: 1219-1220), this model provides a convenient closed form for the underlying choice probabilities without conditional multivariate integration. Multinomial logistic regression uses maximum likelihood estimation to evaluate the probability of category membership (Miyamoto & Vargas-Hernandez, 2014: 328). The binary and multinomial logistic regression models compare one and several dichotomies, respectively. The

two regressions use maximum likelihood estimation to assess the probability of category membership. The following is an estimation of multinomial logistic model.

$$Ln = \frac{P\,(M_i)}{P(M_J)} = \alpha + \beta_1 NPF + \beta_2 FDR + \beta_3 ROA + \beta_4 ROE + \beta_5 CAR + \beta_6 MSI + \beta_7 BOD + \beta_8 BOC + \beta_9 SSB$$

Information:

P = Probability
M_i = Category to-i
M_j = Reference category
α = constant
β = beta
NPF = Non-Performing Financing
FDR = Financing to Deposit Ratio
ROA = Return on Assets
ROE = Return on Equity
CAR = Capital Adequacy Ratio
MSI = *Maqashid Sharia* Index
BOD = Managerial Ownership of the Board of Directors
BOC = Managerial Ownership of the Board of Commissioners
SSB = Managerial Ownership of the Sharia Supervisory Board

Multinomial logistic model primarily interprets results through the odds ratio, which represents the ratio of probabilities among different individual choices (Field, 2017). The evaluation follows the maximum likelihood estimation, including three key aspects. First, the assessment of model adequacy uses Pseudo R^2 metrics, including Cox and Snell, Nagelkerke, and McFadden, to evaluate the goodness of fit. In ordinary least squares (OLS) estimation, these values serve as an equivalent to the coefficient of determination. Additionally, Pearson and Deviance values are used to further assess model fit. Second, the suitability test determines the appropriateness of multinomial logistic regression model. This test includes the Log-likelihood Ratio (LR) test, which follows a chi-square distribution with degrees of freedom equal to n – k, where n represents the number of observations, and k denotes the estimated parameters, excluding constants. The significance of individual independent variables on the dependent is examined through the Wald or likelihood ratio test. The Wald test evaluates the significance based on the Exp(B) coefficient, while the likelihood ratio test compares the -2LL difference between the estimated and reduced models using degrees of freedom corresponding to the number of omitted independent variables.

Data Operationalization Variables

This section will explain the definition of the variables used in the research. The following are details of the dependent and independent variables used in the logistic regression test.

1. Factors RGEC
   In this research, RGEC factors are manifested in the form of financial ratios and the formula for RGEC factors includes the following.

a. Risk Profile
   The risk profile is represented by credit and liquidity risk. Credit risk is represented through the NPF ratio (Abdullah, 2020).

$$NPF = \frac{Uncollectible\ Financing\ (KL, D, M)}{Total\ Financing}\ x\ 100\%$$

This liquidity risk is represented by the Financing to Deposit Ratio (FDR) (Nasfi et al., 2019).

$$FDR = \frac{Total\ Financing}{(The\ Third\ Fund + Modal)} x\ 100\%$$

b. GCG

CGC measurement uses the capital ownership by the Board of Directors, Board of Commissioners, and SSB (Fithria et al., 2021). The data is the percentage of participating capital paid up by each Board of Directors, Board of Commissioners, and SSB at IRB.

c. Earnings

The ratios used to represent the factor are ROA and ROE (Nasfi et al., 2019) and the calculation formula is as follows.

$$ROA = \frac{Earnings\ After\ Tax}{Total\ Assets} x\ 100\%$$

According to (Raihani, 2022), the ROE formula is as follows.

$$ROE = \frac{Earnings\ After\ Tax}{Total\ Equity} x\ 100\%$$

d. Capitals

CAR or Minimum Capital Adequacy Ratio (KPMM) formula is as follows.

$$CAR = \frac{Modal}{Weighted\ Risk\ Assets} x\ 100\%$$

e. MSI

To calculate MSI for IRB, several steps are needed to obtain the final ratio. There are three stages adapted from research conducted by (OM Mohammed & Md Taib, 2015).

1) Stage 1: Table 2 shows the ratios representing the MSI calculations for each dimension and element. These ratios are based on dimensions and elements taken from the *Maqashid Sharia* concept.

Table 2. Calculation of MSI

The concept of *Maqashid Sharia*	Dimensions (D)	Element (E)	Performance Ratio
Individual Education	D1. Knowledge Enhancement	E1. Education Grants	$\frac{Education\ Grant}{Total\ Income}$
		E2. Research	$\frac{Research\ Expense}{Total\ Expense}$
	D2. Add and improve new abilities	E3. Training	$\frac{Training\ Expense}{Total\ Expense}$
	D3. Creating awareness of Sharia banking	E4. Publication	$\frac{Publicity\ Expense}{Total\ Expense}$

The concept of *Maqashid Sharia*	Dimensions (D)	Element (E)	Performance Ratio
Realizing Justice	D4. Fair Contract	E5. Fair Returns	$\frac{Profit\ Equalization\ Reserves\ (PER)}{Net\ or\ Investment\ Income}$
	D5. Affordable products and services	E6. Distribution Function	$\frac{Mudharabah\ and\ Musharakah\ Modes}{Total\ Investment\ Modes}$
	D6. Elimination of Injustice	E7. Non-Interest Products	$\frac{Interest\ Free\ Income}{Total\ Income}$
Public interest	D7. Profitability	E8. Profit Ratio	$\frac{Net\ Income}{Total\ Assets}$
	D8. Distribution of Wealth & Profits	E9. Operating Income	$\frac{Zakah\ Paid}{Net\ Assets}$
	D9. Investment in the Vital Real Sector	E10. Investment Ratio in the Real Sector	$\frac{Investment\ in\ Real\ Economic\ Sector}{Total\ Investment}$

Source: Mohammed & Md Taib (2015)

2) Stage 2: After calculating the ratios for each IRB in each period, the subsequent step is weighting. This research uses the Simple Additive Wseighting (SAW) method requiring decision-makers to determine the weight for each attribute/reference.

Table 3. SAW Method

The concept of *Maqashid Sharia*	Average Weight (100%)	Element (E)	Average Weight (100%)
Individual Education	30	E1. Education Grants	24
		E2. Research	27
		E3. Training	26
		E4. Publication	23
		Total	100
Creating Justice	41	E5. Fair Returns	30
		E6. Distribution Function	32
		E7. Non-Interest Products	38
		Total	100
Public interest	29	E8. Profit Ratio	33
		E9. Operating Income	30
		E10. Investment Ratio in the Real Sector	37
		Total	100

Source: Mohammed & Md Taib (2015)

3) Stage 3: In this step, performance ratios are compared between samples and observations to provide an initial depiction of MSI assessment. The ratios represent the three *Maqashid Sharia* variables to facilitate calculations based on data

availability. (MO Mohammed et al., 2008), (Antonio et al., 2012), and (Hakimah et al., 2020).

$$\frac{Publicity\ Expense}{Total\ Expense} \rightarrow R_1^4$$

$$\frac{Mudharabah\ and\ Musharakah\ Modes}{Total\ Investment\ Modes} \rightarrow R_2^2$$

$$\frac{Net\ Income}{Total\ Assets} \rightarrow R_3^1$$

$$\frac{Zakah\ Paid}{Net\ Assets} \rightarrow R_3^2$$

4) Stage 4: The weighting is obtained with the ratio determined in stage 3. (Mohammed & Md Taib, 2015) and the calculation includes the following.

Individual Education (O1)

$$WR(O1) = W_1^1(E_1^4 \times R_1^4)$$

Creating Justice (O2)

$$WR(O2) = W_2^2(E_2^2 \times R_2^2)$$

Public Interest (O3)

$$WR(O3) = W_3^3[(E_3^1 \times R_3^1) + (E_3^2 \times R_3^2)]$$

The three calculations are summarized to obtain the MSI value for each IRB.

$$MSI = WR(O1) + WR(O2) + WR(O3)$$

IV. Results and Discussions

Result of DEA

The calculation starts with efficiency testing through DEA and proceeds with multinomial logistic regression testing. DEA calculations and multinomial logistic regression testing use the WinDEAP and SPSS applications, respectively. The total observation data is 1,071 data from 119 IRB with 9 periods. Before carrying out the DEA test, the observation is divided into four quartiles. These four quartiles are based on the ROA of each IRB period and the goal is intended to provide an appropriate benchmark for each group.

Table 4 shows the Case Processing Summary for the intermediation method, where 46, 250, and 498 IRB are categorized into the inefficient, low, and moderate groups, respectively. The high-

efficiency category is owned by 277 IRB. The dummy has ownership by Board of Directors of 97 IRB unlike the remaining 974. Furthermore, 512 IRB have ownership by the Board of Commissioners unlike the remaining 559. A total of 195 IRB has ownership by the SSB, unlike 876 IRB.

Table 4. Case Processing Summary

		Intermediation Method		Production Method	
		N	Marginal Percentage	N	Marginal Percentage
Efficiency	Not efficient	46	4.3%	46	4.3%
	Low Efficiency	250	23.3%	203	19.0%
	Moderate Efficiency	498	46.5%	417	38.9%
	High Efficiency	277	25.9%	405	37.8%
Ownership_BOD	No Ownership	974	90.9%	974	90.9%
	There is Ownership	97	9.1%	97	9.1%
Ownership_BOC	No Ownership	512	47.8%	512	47.8%
	There is Ownership	559	52.2%	559	52.2%
Ownership_SSB	No Ownership	876	81.8%	876	81.8%
	There is Ownership	195	18.2%	195	18.2%
Valid		1071	100.0%	1071	100.0%
Missing		0		0	
Total		1071		1071	

Table 5. Model Fitting Information

Approach	Model	-2 Log Likelihoods	Chi-Square	df	Sig.
Intermediation	Intercept Only	2.528,9087			
	Finals	1701.0343	827,8744	27	0.0000
Production	Intercept Only	2539,1985			
	Finals	2,414,4767	124.7218	27	0.0000

In the production method, 405, 417, and 203 IRB are in the high, moderate, and low efficiency categories, respectively. Managerial ownership by the Board of Directors, Commissioners, and SSB is only 9,1%, 52,2%, and 18,2%, respectively. Based on Table 4, the intermediation and production methods are declared valid, and nothing is missing before proceeding to the subsequent stage.

The value of Intercept Only to Final has decreased from 2,528.91 to 1,701.03 or by 827.87 in the intermediation method with Sig. (p-value) of 0.0000 < 0.05. Therefore, multinomial logistic regression models with an intermediation method in the presence of independent variables provide better results than only with interceptions. A similar condition is shown by the production method. The value of Intercept Only to Final decreased from 2,539.20 to 2,414.48 or by 124.72 with Sig. (p-value) of 0.0000 < 0.05. In this context, multinomial logistic regression models with a production method in the presence of independent variables provide better results than only with interceptions. Multinomial logistic regression models with both methods are model fit.

Table 6. Goodness of Fit

Approach		Chi-Square	df	Sig.
Intermediation	Pearsons	13185.4900	3183	0.0000
	Deviance	1701.0343	3183	1.0000
Production	Pearsons	3,191,1451	3183	0.4561
	Deviance	2,414,4767	3183	1.0000

Deviance in the intermediation method is 1.0000 which is 1.0000 > 0.05. This is shown by the production method producing a Deviance of 1.0000 > 0.05 with a Pearson value of 0.4561 > 0.05. Therefore, multinomial logistic regression model fits the observation data in both methods.

Table 7. Pseudo R-Square

Approach	Pseudo R-Square	
Intermediation	Cox and Snell	0.5384
	Nagelkerke	0.5944
	McFadden	0.3274
Production	Cox and Snell	0.1099
	Nagelkerke	0.1213
	McFadden	0.0273

Table 7. Pseudo-R-Square provides information on the substantial influence of independent variables on the dependent. For the intermediation method, the model selected is the Nagelkerke which obtains 0.5944. Therefore, 59.44% of the independent variables can influence the dependent in the form of efficiency and the remaining 40.56% is influenced by other external variables. A different factor is shown by the production method where the value of the Nagelkerke model is 0.1213 or 12.13%. The independent variables in the production method were only able to influence the dependent by 12.13% while 87.87% were influenced by other external variables.

Table 8. Likelihood Ratio Test

Approach	effects	Model Fitting Criteria	Likelihood Ratio Tests		
		-2 Logs Likelihood of Reduced Model	Chi-Square	df	Sig.
Intermediation	Intercepts	1,701,034.0000	0.0000	0	
	NPF	1,702,7511	1.7167	3	0.6332
	FDR	2,412,9586	711.9243	3	0.0000
	ROA	1720,2908	19.2564	3	0.0002
	ROE	1.705,3268	4.2925	3	0.2316
	CAR	1708,1182	7.0838	3	0.0693

Approach	effects	Model Fitting Criteria	Likelihood Ratio Tests		
		-2 Logs Likelihood of Reduced Model	Chi-Square	df	Sig.
	MSI	1724,1077	23.0733	3	0.0000
	Ownership_ Board of Directors	1714,5502	13.5158	3	0.0036
	Ownership_Board_Commissioners	1,710,4114	9.3770	3	0.0247
	Ownership_SSB	1710,1414	9.1071	3	0.0279
Production	Intercepts	2,414,477,0000	0.0000	0	
	NPF	2,447,4180	32.9413	3	0.0000
	FDR	2,426,8557	12.3790	3	0.0062
	ROA	2,429,6794	15.2027	3	0.0017
	ROE	2,414,9641	0.4874	3	0.9216
	CAR	2,417,9448	3.4682	3	0.3249
	MSI	2450,9445	36.4678	3	0.0000
	Ownership_ Board of Directors	2,421.0260	6.5494	3	0.0877
	Ownership_Board_Commissioners	2,416,4232	1.9465	3	0.5836
	Ownership_SSB	2,418,1004	3.6237	3	0.3051

Table 8 shows the partial test results of the model including managerial ownership as independent variables. Based on the intermediate method, the independent variables without partial effect on efficiency of the IRB are NPF, ROE & CAR with a value of Sig. 0.6332, 0.2316, and 0.0693. The other independent variables have Sig values. < 0.05 with FDR, ROA, and MSI are 0.0000, 0.0002, and 0.0000, respectively. For managerial ownership variables, each variable has a value of 0.0036, 0.0247, and 0.0279 for Board of Directors, Board of Commissioners, and SSB ownership.

The Sig. Value of managerial ownership shows different factors in the production method with a variable > 0.05. Ownership of the Board of Directors, Commissioners, and SSB is 0.0877, 0.5836 and 0.3501, respectively. ROE and CAR also become independent variables that do not offer a significant effect on efficiency of IRB. The values of ROE and CAR are 0.9216 and 0.3249, while NPF, FDR, ROA, and MSI have Sig values. < 0.05. Therefore, the variables have a partial effect on efficiency of IRB with NPF, FDR, ROA, and MSI of 0.0000, 0.0062, 0.0017, and 0.0000, respectively.

The Parameter Estimates provide information to form a regression model, as shown in Table 9. The following is a regression model formed in the intermediation method.

$$(1)\ Ln\ \frac{P\ (Not\ Efficient)}{P\ (High\ Efficiency)} = -\ 1{,}1388\ -\ 0{,}2397FDR - 0{,}2514ROA$$

In the first regression equation, FDR and ROA are two independent variables with Sig. < 0.05. FDR and ROA have a value of Sig. 0.0000 and 0.0038, respectively. The regression equation formed shows that every one-unit increase in the FDR reduces the opportunity for IRB to have an inefficiency of 0.7868 compared to high efficiency. Subsequently, every unit increase in ROA reduces the opportunity for IRB to have an inefficient of 0.7777 compared to high efficiency.

$$(2)\ Ln\frac{P\ (Low\ Efficiency)}{P\ (High\ Efficiency)} = 12{,}5258 - 0{,}1254FDR\ -\ 21{,}5288MSI -\ 0{,}9829BOD - 0{,}4751BOC$$

In the second regression equation from the intermediation method, there are four independent variables whose Sig. < 0.05 namely FDR, MSI, Board of Directors Ownership, and Board of Commissioners Ownership. FDR, MSI Board of Directors Ownership, and Board of Commissioners Ownership have a value of Sig. 0.0000, 0.0000, 0.0150, and 0.0490, respectively. The regression equation formed shows that every one-unit increase in FDR and MSI reduces the chances for IRB to have a low efficiency of 0.88821 and 0.000, respectively. The tendency for IRB with capital ownership to become bank in the low category is reduced by 0.3742 than high efficiency. A lower trend occurs in IRB, which has capital ownership by the Board of Commissioners. There is also a lower probability of 0.6218 to become SRB in the low-efficiency category compared to the high-efficiency.

$$(3)\ Ln\ \frac{P\ (Moderate\ Efficiency)}{P\ (High\ Efficiency)} = 5{,}6603 - 0{,}0451FDR\ -\ 13{,}2345MSI -\ 0{,}5443BOC + 0{,}4520SSB$$

In the third regression equation, there are four independent variables whose Sig. <0.05, namely FDR, MSI, Board of Commissioners Ownership, and SSB. FDR, MSI, Board of Commissioners Ownership, and SSB have a value of Sig. 0.0000, 0.0001, 0.0026, and 0.0477, respectively. The regression equation formed shows that every one-unit increase in FDR and MSI reduces the chances for IRB to have a moderate efficiency of 0.09559 and 0.000 compared to high efficiency. The tendency for IRB with capital ownership by the Board of Commissioners and SSB to become banks in the moderate category is 0.5802 and 1.5714, respectively.

The following is a regression model formed on the production method.

$$(1)\ Ln\ \frac{P\ (Not\ Efficient)}{P\ (High\ Efficiency)} = -\ 3{,}8531 + 0{,}0725NPF\ -\ 8{,}7970MSI$$

In the first regression equation of the production method, there are only two independent variables whose Sig. < 0.05, namely NPF and MSI with a value of Sig. 0.0000 and 0.0001, respectively. The regression equation formed shows that every one-unit increase in the NPF

variable improves the opportunity for IRB to become inefficient by 1.0752. In contrast, every one-unit increase in MSI reduces the chances for IRB to become inefficient by 0.0002.

(2) $Ln\ \frac{P\ (Low\ Efficiency)}{P\ (High\ Efficiency)} = -1{,}8239 + 0{,}0303NPF + 0{,}098FDR - 0{,}0977ROA\ -\ 3{,}5441MS$I

For the second regression equation, there are four independent variables whose Sig. < 0.05, namely NPF, FDR, ROA, and MSI with a value of Sig. 0.0059, 0.0016, 0.0048, and 0.0495, respectively. The regression equation formed shows that every one-unit increase in NPF and FDR improves the opportunity for IRB to have low efficiency of 1.0307 and 1.0098, respectively. However, the chance for IRB to have low efficiency decreases by 0.9069 when there is an increase of one unit in ROA and MSI. In this context, the opportunity for IRB to have low efficiency will decrease by 0.0289.

(3) $Ln\ \frac{P\ (Moderate\ Efficiency)}{P\ (High\ Efficiency)} = 5{,}6603 + 0{,}0072FDR\ -\ 15{,}9757MSI$

In the last regression equation, there are only two independent variables whose Sig. < 0.05, namely FDR and MSI with a value of Sig. 0.0059 and 0.0000, respectively. The regression equation formed shows that every one-unit increase in FDR improves the chances for IRB to become inefficient by 1.0072. In contrast, each increase of one unit in MSI reduces the opportunity for IRB to become inefficient by 0.0000.

Table 10 provides information on which efficiency category is the best predicted by the model formed. In the intermediate method, the percentage value for accuracy of all models is 65.97% since only 65.97% of the observations are classified correctly, while the remaining 34.03% are incorrect. The accuracy of the classification is the IRB with an inefficient category predicted at 62.50% by the model formed. IRB in the low, moderate, and high efficiency categories is predicted correctly at 52.33%, 80.02%, and 53.68%, respectively.

Table 10. Classification

Approach	Observed	Predicted				
		Not efficient	Low Efficiency	Moderate Efficiency	High Efficiency	Percent Correct
Intermediation	Not efficient	45	27	0	0	62.50%
	Low Efficiency	4	225	201	0	52.33%
	Moderate Efficiency	3	75	709	99	80.02%
	High Efficiency	8	27	204	277	53.68%
	Overall Percentage	3.15%	18.59%	58.51%	19.75%	65.97%
Production	Not efficient	1	13	30	36	1.25%
	Low Efficiency	0	26	235	141	6.47%
	Moderate Efficiency	0	15	500	214	68.59%
	High Efficiency	0	18	431	244	35.21%

	Overall Percentage	0.05%	3.78%	62.82%	33.35%	40.49%

In the production method, the category of efficiency as the highest position can be predicted correctly by the model with 68.59%. Subsequently, the high, low, and inefficient categories can be predicted correctly at 35.21%, 6.47%, and 1.25% with an accuracy of 40.49%.

Based on Table 9, IRB must develop specific strategies and intervention programs aimed at improving the performance of banks classified as "Not efficient" and "Low Efficiency". This can use benchmarks from "Moderate Efficiency" and "High Efficiency" to set performance targets and identify the best practices. Additionally, training programs are implemented for management and staff to enhance operational practices and decision-making processes. A system of continuous performance monitoring should also be established to track improvements over time and adjust strategies as needed. IRB must pay attention to allocating resources strategically to areas with the most significant impact on efficiency, such as technology upgrades, process improvements, and customer service enhancements. Risk management practices should also be strengthened to reduce non-performing assets and improve financial health as an important task for IRB.

Discussions

The results from the research using multinomial logistic regression were consistent with the conclusions obtained from (Wasiaturrahma et al., 2020), where NPF negatively impacted the collection and distribution of financing within the intermediation method. High NPF conditions were associated with increased risks for IRB due to improper and careless financing distribution. According to (Nurcahyania et al., 2020), a lower level of NPF was correlated with improved IRB performance. The shortcomings in financing analysis are attributed to deficiencies in Standard Operating Procedure (SOP) policies, inadequate analytical skills among employees, insufficient customer information, and a lack of caution in conducting financing analyses. Therefore, this research focuses on the influence of NPF on IRB within the production method. IRB should also enhance the prudence principle in financing distribution to elevate the overall quality. The improvement is crucial in providing a significant opportunity to generate higher income from clients with superior credit quality.

FDR showed significant results in support of research conducted (Halim & Oswari, 2020). The variable reports the level of liquidation of IRB as well as the negative and significant effect on efficiency. Therefore, the level of efficiency decreases with increasing liquidity. Excess liquidity causes banks to become inefficient, resulting in unproductive or idle funds. The IRB needs to adjust the amount of liquidity for optimal use of funds (Nurcahyani et al., 2020).

GCG is measured through managerial ownership influencing efficiency of IRB and the results are different (Fithria et al., 2021). In this research, the Board of Directors and Commissioners Ownership did not have a significant effect on efficiency of IRB. This is because capital ownership with a high percentage has a significant effect on the efficiency of IRB. However, the existence of the variable in low and high percentages has an impact on efficiency of IRB. The Board of Directors

and Commissioners are parties directly included in IRB operational activities. Capital is invested in IRB to obtain reciprocity in the form of profit sharing. Therefore, these two parties must enable the efficient operation of IRB to achieve maximum profits (Ridwansyah et al., 2021). According to (Fithria et al., 2021), SSB ownership has an indirect relationship with IRB operations without a significant influence on IRB efficiency.

Table 11. Summary of Multinomial Logistic Regression Test Results

	Intermediate Approach						Production Approach					
Comparison Category	Not efficient		Low Efficiency		Moderate Efficiency		Not efficient		Low Efficiency		Moderate Efficiency	
Significance	Sig.	+/-	Sig.	+/-	Sig.	+/-	Sig.	+/-	Sig.	+/-	Sig.	+/-
NPF	X		X		X		V	+	V	+	X	
FDR	V	-	V	-	V	-	X		V	+	V	+
ROA	V	-	X		X		X		V	-	X	
ROE	X		X		X		X		X		X	
CAR	X		X		X		X		X		X	
MSI	X		V	-	V	-	V	-	V	-	V	-
Ownership of Directors	X		V	-	X		X		X		X	
Ownership of the Board of Commissioners	X		V	-	V	-	X		X		X	
SSB Ownership	X		X		V	+	X		X		X	

(Remarks: V = significant *p-value, X* = insignificant *p-value)*

ROA has a significant influence on both the production and intermediation methods. The results are different from the research produced by (Nugrohowati, 2019). ROA was not significant because many negative values affected the regression. This variable is a measure of profitability and is most often used as a reference for the performance of an entity. ROA of an entity is directly proportional toefficiency of the performance. This shows that the more efficient the IRB is, the more profit obtained by IRB. The results prove that ROA does have a significant influence on efficiency of IRB (Endri et al., 2022).

CAR also shows significant results in the intermediation method. The variable reports the ability of IRB to provide funds in anticipating the possibility of default. The potential for achieving efficiency is enhanced when CAR increases mainly due to higher capital and lower-risk assets. Since high capital is a source of funds for IRB, the selling price of financing will be more competitive. This makes the intermediation ability of IRB higher because funds are unlikely to be withdrawn by investors except in a state of dispute or bankruptcy (Wasiaturrahma et al., 2020: 7). CAR obtained from a comparison between capital and ATMR (Risk Weighted Assets) measures the ability of capital to absorb potential losses arising from credit, interest rate, and liquidity risk. CAR decreases and ATMR increases when capital is assumed to be fixed. An increase in ATMR has the potential to improve financing risk and capital must absorb potential risk. IRB with sufficient

capital can face risks in the future hence increasing efficiency of performance (Hidayati et al., 2017).

Islamic financial institutions such as IRB are currently measured using conventional measurement tools and sharia standards. IRB with a high MSI score is considered to fulfill and implement the standards as Islamic financial institution. The implementation of Sharia standards can increase public trust in IRB. This causes the IRB to work more efficiently to accommodate the needs of the community. According to (Mashfufah & Yasid, 2020), investors (shareholders and depositors) strongly agree that IRB performance is measured by adopting tools or models based on *Maqashid Sharia* Index. This is because IRB as Islamic financial institutions focus on achieving profit and Sharia goals. Performance is measured in financial and social ratios containing Islamic values. Therefore, the results of performance measurements using *Maqashid Sharia* are used as criteria or decision-making tools in investing.

V. Conclusion and Recommendation

In conclusion, the efficiency of IRB was classified into four forms, namely inefficiency, low, moderate, and high efficiency. From 1,071 samples, the highest percentage obtained by moderate efficiency was 38.9%. This result was followed by high, low, and inefficiency levels of 37.8%, 19.0%, and 4.3%, respectively. Therefore, efficiency of IRB in Indonesia was good but could be optimized to achieve high results.

After obtaining efficiency value, RGEC factors influencing IRB were investigated. On the Risk Profile factor, IRB became efficient with a small NPF value. IRB could collect back the financing funds disbursed with a decreased NPF value. The amount of liquidity was also adjusted as measured by FDR ratio to suit the needs of the IRB. This allowed all funds to be used optimally with efficient IRB operations. The subsequent factor was GCG represented by Board of Directors, Board of Commissioners, and SSB ownership. Managerial ownership in the form of capital invested by the Board of Directors and Commissioners created motivation for the parties to work actively. Meanwhile, financial ratios in the form of ROA and ROE represented the Earnings factor. The profitability of IRB was directly proportional to efficiency of the operation. Therefore, the parties directly included in the operation maintained an increase in the profitability of IRB. The last factor was Capital represented by CAR ratio. IRB, with sufficient capital, could face risks in the future.

In addition to RGEC factors, this research raised sharia factors in analyzing the determinants affecting efficiency of IRB. Sharia factor used the MSI developed from the thinking of Abu Zahrah. MSI showed a significant influence on efficiency of IRB in the intermediation and production methods. The variable could be used as a basis for evaluating the implementation of Sharia principles in the operational activities. A high MSI value enhanced trust from the public and showed IRB operation in line with Sharia principles to increase the number of customers. This increase in the number of customers can increase IRB revenue, which could increase IRB efficiency.

Further exploration into the field required substantial research efforts since investigations focusing on IRB were limited. Analyzing efficiency of IRB could be enhanced by using a comprehensive method, incorporating output and input orientations in modeling and conducting comparative analyses. Additionally, expanding the factors influencing IRB efficiency included the incorporation of additional variables, such as technological factors. Refining the methods and testing tools contributed to more optimal results.

The outcomes served as a broad reference for stakeholders in IRB operations. These stakeholders used the results as a basis for decision-making to enhance IRB efficiency. Meanwhile, the factors of RGEC and MSI served as important elements for IRB management, guiding the attention and policies to achieve operational efficiency. Key variables such as NPF, FDR, director and Board of Commissioners Ownership, ROA, CAR, and MSI demanded special consideration. For instance, the application of the prudence principle was crucial for maintaining NPF values. IRB could also balance financing and fund distribution to control FDR and CAR values. Increasing revenue was essential to boost ROA values while maintaining public trust required attention to MSI. These variables were interdependent and necessitated consistent maintenance to collectively contribute to the achievement of IRB efficiency.

Author Contributions

Conceptualization, W.W., H.A.H.T., and A.F.; Methodology, W.W., and A.F.; Investigation, W.W., and H.A.H.T.; Analysis, W.W., H.A.H.T., and A.F.; Original draft preparation, W.W.; Review and editing, W.W.

Acknowledgement

The authors are grateful to the editor and two anonymous reviewers for the valuable comments, which improved the quality of the paper.

Conflicts of Interest

The authors declare no conflicts of interest regarding this research.

References

Abdullah, A. (2020). Measuring Islamic Bank's Performance Using CAMELS And RGEC Method Based On Indonesian Financial Services Authority Circular. *Journal of Business Management Review*, *1*(4), 248–258. https://doi.org/10.47153/jbmr14.442020

Agustina, D., Sholihin, M., & Fithria, A. (2019). The Efficiency of Indonesian Islamic Rural Banks: A Stochastic Frontier Analysis. *International Journal of Islamic Economics and Finance (IJIEF)*, *1*(2), 229–248. https://doi.org/10.18196/ijief.1212

Akhavein, J. D., Berger, A. N., & Humphrey, D. B. (1997). The Effects of Megamergers on Efficiency and Prices: Evidence from a Bank Profit Function. *Review of Industrial Organization*, *12*(1), 95–139. https://doi.org/10.1023/A:1007760924829

Alam, N., Gupta, L., & Shanmugam, B. (2017). Prohibition of Riba and Gharar in Islamic Banking. *Islamic Finance*, 35–53. https://doi.org/10.1007/978-3-319-66559-7_3

Amalia, E. (2003). Teori Perilaku Konsumen dalam Perspektif Ekonomi Islam. *Jauhar*, *4*, 15.

Antonio, M. S., Sanrego, Y. D., & Taufiq, M. (2012). An Analysis of Islamic Banking Performance: MaqashidIndex Implementation in Indonesia and Jordania. *Journal of Islamic Finance*, *1*(1), 12–29.

Ascarya, A., & Masrifah, A. R. (2022). Challenges in Applying Standard Methodology for Research in Islamic Economics and Finance, and The Way Forward (Chapter 21). In *Teaching and Research Methods in Islamic Economics and Finance.* (p. 22). Routledge.

Berger, A. N., & Mester, L. J. (1997). Inside the black box: What explains differences in the efficiencies of financial institutions? *Journal of Banking and Finance*, *21*(7), 895–947. https://doi.org/10.1016/S0378-4266(97)00010-1

Billah, M. M. (2022). *Teaching and Research Methods for Islamic Economics and Finance* (Issue March). Routledge. https://doi.org/10.4324/9781003252764-20

Binekasri, R. (2023). *Potensi Keuangan Syariah di Indonesia Sebesar Ini*. https://www.cnbcindonesia.com/syariah/20231013165255-29-480399/potensi-keuangan-syariah-di-indonesia-sebesar-ini

Chapra, M. U. (2011). The economic problem: can Islam play an effective role in solving it efficiently as well as equitably ? *IRTI Working Paper Series*, 1–22.

Chapra, M. U., & Basri, I. A. (2000). *Islam dan Tantangan Ekonomi* (Sholihat, D. I., & S. L. Hassan (eds.)). Gema Insani Press & Tazkia Institute.

Devi, A., & Firmansyah, I. (2018). Solution To Overcome the Bankruptcy Potential of Islamic Rural Bank in Indonesia. *Journal of Islamic Monetary Economics and Finance*, *3*, 33–58. https://doi.org/10.21098/jimf.v3i0.750

Endri, E., Fatmawatie, N., Sugianto, S., Humairoh, H., Annas, M., & Wiwaha, A. (2022). Determinants of efficiency of Indonesian Islamic rural banks. *Decision Science Letters*, *11*(4), 391–398. https://doi.org/10.5267/j.dsl.2022.8.002

Farrell, M. J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society*, *120*(3), 253–290. https://doi.org/10.2307/j.ctv5rdxd5.7

Field, A. (2017). Discovering Statistic Using IBM SPSS Statistic 5th. In *Sage Publication, Inc.* (Vol. 53, Issue 9).

Fithria, A., Sholihin, M., Arief, U., & Anindita, A. (2021). Management ownership and the performance of Islamic microfinance institutions: a panel data analysis of Indonesian Islamic rural banks. *International Journal of Islamic and Middle Eastern Finance and Management*, *14*(5), 950–966. https://doi.org/10.1108/IMEFM-05-2020-0257

Hakimah, W., Ibrahim, W., & Ismail, A. G. (2020). Do Regulation , *Maqashid Sharia* h And Institutional Parameter Improve Islamic Bank Efficiency? *Journal of Islamic Monetary Economics and Finance*, *6*(1), 135–162. https://doi.org/https://doi.org/10.21098/jimf.v6i1.1195

Halim, A., & Oswari, T. (2020). The Level of Efficiency of Islamic Rural Banks (BPRS) in Java 2014-2017 Using Slacks-Based Data Envelopment Analysis. *Falah: Jurnal Ekonomi Syariah*, *5*(1), 45–57. https://doi.org/10.22219/jes.v5i1.11910

Hausman, J., & Mcfadden, D. (1984). Specification Tests for the Multinomial Logit Model. *Econometrica, JSOTR*, *52*(5), 1219–1240. https://doi.org/https://doi.org/10.2307/1910997

Hidayat, R. (2014). *Efisiensi Perbankan Syariah: Teori dan Praktik*. Gramata Publishing.

Hidayati, N., Siregar, H., & Pasaribu, S. H. (2017). Determinant of Efficiency of the Islamic Banking in Indonesia. *Buletin Ekonomi Moneter Dan Perbankan*, *20*(1), 29–48. https://doi.org/10.21098/bemp.v20i1.723

HT, H. A., & Rama, A. (2018). Indeks Kinerja Perbankan Syariah di Asia Tenggara Berdasarkan Konsep Maqâshid al-Syarî`ah. *Madania: Jurnal Kajian Keislaman*, *22*(1), 33. https://doi.org/10.29300/madania.v22i1.782

Jatmiko, W. (2017). Efficiency and Ownership Structure: Evidence From Rural Banks in Indonesia. *International Journal of Economics, Management and Accounting*, *25*(2), 355–380.

Khatimah, N., & Miranti, T. (2022). The Efficiency of Islamic Rural Banks (BPRS) in South Sulawesi. *I-Finance: A Research Journal on Islamic Finance*, *8*(1), 1–18. https://doi.org/10.19109/ifinance.v8i1.12387

Koutsoyiannis, A. (1979). *Modern microeconomics second edition* (Second). The Macmillan Press Ltd. https://doi.org/10.1007/9781349160778

LPS. (2022). *Bank yang Dilikuidasi*. https://www.lps.go.id/bank-yang-dilikuidasi

Mai, M. U., Nansuri, R., & Setiawan, S. (2024). Ownership structure, board characteristics, and performance of Indonesian Islamic rural banks. *International Journal of Islamic and Middle Eastern Finance and Management*, *17*(2), 292–309. https://doi.org/10.1108/IMEFM-12-2022-0465

Mashfufah, W., & Yasid, M. (2020). Performance Analysis of Islamic Rural Banks (BPRS) with The *Maqashid Sharia* Approach as An Investment Decision-making Tool. *Tazkia Islamic Finance and Business Review*, *14*(2), 115–141.

Masrizal, Sukmana, R., Fianto, B. A., & Gultom, R. Z. (2023). Does economic freedom fosters Islamic rural banks efficiency? Evidence from Indonesia. *International Journal of Productivity and Performance Management*, *72*(9), 2538–2558. https://doi.org/10.1108/IJPPM-11-2021-0660

Miranti, T., Aulia, N. A., & Pimada, L. M. (2022). How the Covid-19 Outbreak Affect the Efficiency of Islamic Rural Banks? *El Dinar*, *10*(1), 56–68. https://doi.org/10.18860/ed.v10i1.15577

Miyamoto, M., & Vargas-Hernandez, J. G. (2014). Credit Risk Assessment for a Small Bank by Using a Multinomial Logistic Regression Model Cite this paper Related papers PREDICT ING DEFAULT FOR JAPANESE SMES WIT H ROBUST LOGIST IC REGRESSION TJPRC Publicat ion Inst it ut ional and Cult ural Implicat ions. *International Journal of Finance and Accounting 2014, 3*(5), 327–334. https://doi.org/10.5923/j.ijfa.20140305.07

Mohammed, M. O., Razak, D. A., & Taib, F. M. (2008). The Performance Measures of Islamic

Banking Based on the Maqashid Framework. *IIUM International Accounting Conference*, 1–17.

Mohammed, O. M., & Md Taib, F. (2015). Developing Islamic Banking Performance Measures Based on Maqasid Al-Shari'Ah Framework: Cases of 24 Selected Banks. *Journal of Islamic Monetary Economics and Finance*, *1*(1), 55–77. https://doi.org/10.21098/jimf.v1i1.483

Nasfi, Iska, S., Nofrivul, & Antoni. (2019). Financial Sustainability Inthe Assessment of Thefinancial Performance of West Sumatra Sharia Financing Bank (Bprs. *Menara Ekonomi*, *5*(1), 51–62. https://doi.org/https://doi.org/10.33559/me.v5i1.1272

Nashihin, M., & Harahap, L. (2014). The Analyis of the Efficiency of BPR-S: Production Function Approach Vs Financial Ratios Approach. *Procedia - Social and Behavioral Sciences*, *115*(Iicies 2013), 188–197. https://doi.org/10.1016/j.sbspro.2014.02.427

Nugrohowati, R. N. I. (2019). Measuring The Efficiency of Indonesian Sharia Rural Banks: Two Stage Approach. *Jurnal Ekonomi Pembangunan: Kajian Masalah Ekonomi Dan Pembangunan*, *20*(1), 28–49. https://doi.org/10.23917/jep.v20i1.6692

Nurcahyania, S. S., Kusnendi, & Cakhyaneu, A. (2020). Efisiensi Bank Pembiayaan Rakyat Syariah di Indonesia: Analisis Pengaruh Kecukupan Modal, Likuiditas dan Pembiayaan Bermasalah. *Akuntansi*, *15*(2), 91–101.

Parisi, S. Al, Fahmi, I., & Andati, T. (2021). Efficiency Vs the *Maqashid Sharia* h Index: a Comparative Study of Conventional and Islamic Banks in Indonesia. *Jurnal Aplikasi Bisnis Dan Manajemen*, *7*(2), 252–261. https://doi.org/10.17358/jabm.7.2.252

Priyadi, U., Utami, K. D. S., Muhammad, R., & Nugraheni, P. (2021). Determinants of credit risk of Indonesian Sharīʿah rural banks. *ISRA International Journal of Islamic Finance*, *13*(3), 284–301. https://doi.org/10.1108/IJIF-09-2019-0134

Raihani, H. (2022). Analisis Penilaian Kesehatan Bank Menggunakan Metode Risk Profile, Earning dan Capital Pada BPRS. *Al-Bank: Journal of Islamic Banking and Finance*, *2*(1), 28. https://doi.org/10.31958/ab.v2i1.4818

Ridwansyah, Kufepaksi, M., Gamayuni, R. R., & Ahadiat, A. (2021). The Impact of the Supervisory Structure on the Financial Performance of Sharia Rural Banks in Indonesia. *International Journal of Economics and Finance Studies*, *13*(1), 25–42. https://doi.org/10.34109/ijefs.202112223

Rusydiana, A. S., & Firmansyah, I. (2017). Efficiency versus *Maqashid Sharia* Index An Application on Indonesia Islamic Bank. *Shirkah Journal of Economics and Business*, *2*(2), 139–165. https://doi.org/10.22515/shirkah.v2i2.154

Sadono, E. D. (2018). Efficiency of Islamic Rural Banks (BPRS) in East Java Province, Indonesia. *Tazkia Islamic Finance and Business Review*, *11*(1), 1–14. https://doi.org/10.30993/tifbr.v11i1.103

Salama, S. C. U. (2022). Analysis of Islamic Rural Banks Efficiency in the East Region of Indonesia. *Journal of Developing Economies*, *7*(1), 100–106. https://doi.org/10.20473/jde.v7i1.33554

Suhartanto, D., Dean, D., Ismail, T. A. T., & Sundari, R. (2020). Mobile banking adoption in Islamic banks: Integrating TAM model and religiosity-intention model. *Journal of Islamic Marketing*,

11(6), 1405–1418. https://doi.org/10.1108/JIMA-05-2019-0096

Sutrisno, S., & Widarjono, A. (2022). Is Profit–Loss-Sharing Financing Matter for Islamic Bank's Profitability? The Indonesian Case. *Risks*, *10*(11), 1–12. https://doi.org/10.3390/risks10110207

Tashkandi, A. A. (2022). Shariah supervision and corporate governance effects on Islamic banks' performance: evidence from the GCC countries. *Journal of Business and Socio-Economic Development*, *3*(3), 253–264. https://doi.org/10.1108/jbsed-02-2022-0024

Wasiaturrahma, Sukmana, R., Ajija, S. R., Salama, S. C. U., & Hudaifah, A. (2020). Financial performance of rural banks in Indonesia: A two-stage DEA approach. *Heliyon*, *6*(7), e04390. https://doi.org/10.1016/j.heliyon.2020.e04390

Widiarto, I., & Emrouznejad, A. (2015). Social and financial efficiency of Islamic microfinance institutions: A Data Envelopment Analysis application. *Socio-Economic Planning Sciences*, *50*, 1–17. https://doi.org/10.1016/j.seps.2014.12.001

Yusof, S. A., & Amin, R. M. (2003). Allocative Efficiency of Profit Maximization: An Islamic Perspective. *Review of Islamic Economics*, *13*, 5–21.

Yusoff, A., Hassan, R., & Salman, S. A. (2023). Risk Assessment of Islamic Banking Products: A Case Study of Murabaha and Ijarah. *Lecture Notes in Networks and Systems*, *621 LNNS*, 581–592. https://doi.org/10.1007/978-3-031-26956-1_55

Appendix 1

Table 9. Parameter Estimates

Approach	Efficiency		B	std. Error	Wald	df	Sig.	Exp(B)
Intermediation	Not efficient	Intercepts	-1.1388	1.4713	0.5991	1	0.4389	
		NPF	0.0081	0.0250	0.1057	1	0.7451	1.0082
		FDR	-0.2397	0.0178	180.7737	1	0.0000	0.7868
		ROA	-0.2514	0.0870	8.3542	1	0.0038	0.7777
		ROE	-0.0007	0.0020	0.1230	1	0.7258	0.9993
		CAR	-0.0129	0.0087	2.1774	1	0.1400	0.9872
		MSI	-4.0689	10.9077	0.1392	1	0.7091	0.0171
		[Ownership_Directors=0]	16.5203	0.0000		1		14,951,712.9989
		[Ownership_Directors=1]	0 [b]			0		
		[Ownership_Board_Commissioners=0]	-0.6766	0.5262	1.6532	1	0.1985	0.5083
		[Ownership_Board_Commissioners=1]	0 [b]			0		
		[Ownership_SSB=0]	1.2489	0.8390	2.2155	1	0.1366	3.4865
		[Ownership_SSB=1]	0 [b]			0		
	Low Efficiency	Intercepts	12.5258	0.8977	194.7137	1	0.0000	
		NPF	0.0112	0.0160	0.4900	1	0.4839	1.0112
		FDR	-0.1254	0.0079	253.1161	1	0.0000	0.8821
		ROA	-0.0547	0.0469	1.3634	1	0.2430	0.9467
		ROE	0.0006	0.0012	0.2337	1	0.6288	1.0006
		CAR	-0.0007	0.0070	0.0116	1	0.9143	0.9993
		MSI	-21.5288	5.2384	16.8903	1	0.0000	0.0000
		[Ownership_Directors=0]	-0.9829	0.4040	5.9191	1	0.0150	0.3742
		[Ownership_Directors=1]	0 [b]			0		
		[Ownership_Board_Commissioners=0]	-0.4751	0.2413	3.8756	1	0.0490	0.6218
		[Ownership_Board_Commissioners=1]	0 [b]			0		
		[Ownership_SSB=0]	-0.0037	0.2978	0.0002	1	0.9902	0.9963

Approach		Efficiency	B	std. Error	Wald	df	Sig.	Exp(B)
	Moderate Efficiency	[Ownership_SSB=1]	0 [b]			0		
		Intercepts	5.6603	0.6557	74.5267	1	0.0000	
		NPF	-0.0050	0.0129	0.1509	1	0.6977	0.9950
		FDR	-0.0451	0.0042	115.8831	1	0.0000	0.9559
		ROA	0.0564	0.0333	2.8696	1	0.0903	1.0580
		ROE	0.0007	0.0004	2.6745	1	0.1020	1.0007
		CAR	0.0068	0.0057	1.4223	1	0.2330	1.0068
		MSI	-13.2345	3.4114	15.0504	1	0.0001	0.0000
		[Ownership_Directors=0]	-0.4696	0.3162	2.2047	1	0.1376	0.6253
		[Ownership_Directors=1]	0 [b]			0		
		[Ownership_Board_Commissioners=0]	-0.5443	0.1809	9.0499	1	0.0026	0.5802
		[Ownership_Board_Commissioners=1]	0 [b]			0		
		[Ownership_SSB=0]	0.4520	0.2283	3.9200	1	0.0477	1.5714
		[Ownership_SSB=1]	0 [b]			0		
Production	Not efficient	Intercepts	-3.8531	0.9381	16.8717	1	0.0000	
		NPF	0.0725	0.0148	23.9469	1	0.0000	1.0752
		FDR	0.0048	0.0056	0.7257	1	0.3943	1.0048
		ROA	0.0117	0.0437	0.0722	1	0.7882	1.0118
		ROE	-0.0001	0.0004	0.0311	1	0.8601	0.9999
		CAR	0.0070	0.0046	2.3375	1	0.1263	1.0070
		MSI	-8.7970	2.2904	14.7519	1	0.0001	0.0002
		[Ownership_Directors=0]	0.2168	0.6292	0.1187	1	0.7304	1.2421
		[Ownership_Directors=1]	0 [b]			0		
		[Ownership_Board_Commissioners=0]	0.1121	0.3339	0.1128	1	0.7370	1.1187
		[Ownership_Board_Commissioners=1]	0 [b]			0		
		[Ownership_SSB=0]	0.1563	0.4450	0.1233	1	0.7254	1.1692
		[Ownership_SSB=1]	0 [b]			0		
	Low Efficiency	Intercepts	-1.8239	0.4853	14.1239	1	0.0002	
		NPF	0.0303	0.0110	7.5715	1	0.0059	1.0307

Approach	Efficiency	B	std. Error	Wald	df	Sig.	Exp(B)
Moderate Efficiency	FDR	0.0098	0.0031	9.9146	1	0.0016	1.0098
	ROA	-0.0977	0.0347	7.9552	1	0.0048	0.9069
	ROE	0.0002	0.0011	0.0243	1	0.8760	1.0002
	CAR	-0.0027	0.0043	0.3799	1	0.5377	0.9973
	MSI	-3.5441	1.8045	3.8574	1	0.0495	0.0289
	[Ownership_Directors=0]	-0.3136	0.2768	1.2828	1	0.2574	0.7308
	[Ownership_Directors=1]	0 [b]			0		
	[Ownership_Board_Commissioners=0]	0.1592	0.1803	0.7801	1	0.3771	1.1726
	[Ownership_Board_Commissioners=1]	0 [b]			0		
	[Ownership_SSB=0]	0.4555	0.2457	3.4371	1	0.0637	1.5770
	[Ownership_SSB=1]	0 [b]			0		
	Intercepts	-0.8033	0.4282	3.5191	1	0.0607	
	NPF	-0.0007	0.0107	0.0047	1	0.9456	0.9993
	FDR	0.0072	0.0026	7.5780	1	0.0059	1.0072
	ROA	0.0257	0.0272	0.8911	1	0.3452	1.0261
	ROE	0.0003	0.0006	0.2545	1	0.6139	1.0003
	CAR	-0.0026	0.0036	0.4955	1	0.4815	0.9974
	MSI	-15.9757	3.2477	24,1974	1	0.0000	0.0000
	[Ownership_Directors=0]	0.4228	0.2615	2.6146	1	0.1059	1.5262
	[Ownership_Directors=1]	0 [b]			0		
	[Ownership_Board_Commissioners=0]	0.1966	0.1460	1.8141	1	0.1780	1.2173
	[Ownership_Board_Commissioners=1]	0 [b]			0		
	[Ownership_SSB=0]	0.1081	0.1836	0.3470	1	0.5558	1.1142
	[Ownership_SSB=1]	0 [b]			0		