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THE STRATEGIC IMPACT OF R&D AND SIZE OF SHARIA SUPERVISORY BOARD ON ISLAMIC BANK PERFORMANCE: A COMPARISON BETWEEN INDONESIA AND MALAYSIA

ABSTRACT

The development of Islamic banking in Southeast Asia has intensified interest in how these institutions maintain performance while complying with Sharia principles. However, the specific contributions of research and development (R&D) activities and Sharia Supervisory Board (SSB) decisions remain underexplored, particularly across different regulatory contexts. Understanding these dynamics is essential for enhancing the competitiveness and sustainability of Islamic banks.

This study examines the influence of R&D and SSB on the performance of Islamic banks in Indonesia and Malaysia. It aims to identify how these factors affect Islamic banking performance differently, reflecting variations in national policies. A mixed-method design is adopted, integrating quantitative and qualitative approaches. The quantitative analysis uses purposive sampling of Islamic banks in Indonesia and Malaysia, with panel data reported under International Financial Reporting Standards (IFRS) for 2016–2022. The Generalized Method of Moments (GMM) estimator is applied to assess the impact of R&D and SSB. Complementary qualitative insights are drawn from observation and an extensive literature review to contextualize the findings.

The results show that R&D has no significant impact on bank performance in Indonesia but exerts a positive effect in Malaysia, underscoring the importance of supportive policy environments. The role of SSB remains vital for governance but varies by institutional context.

These findings offer practical implications for policymakers, regulators, and bank managers, highlighting the need to design innovation policies tailored to national contexts while upholding Sharia compliance. The study contributes to the literature by providing a comparative perspective on how R&D and SSB jointly shape Islamic bank performance.

Keywords: research and development, sharia supervisory board size, Islamic banking performance, total asset, comparative analysis, Generalized Method of Moments (GMM), Indonesia, Malaysia

JEL Classification: M4

INTRODUCTION

Islamic banking has emerged as one of the accelerating segments in finance, especially in states with a predominantly Muslim population. This growth is driven by the need for a financial system that aligns with Sharia principles and the enhanced understanding of the significance of adhering to Islamic laws in economic activities. Although there has been considerable progress, studies investigating the determinants of Islamic bank performance are still relatively scarce. Existing literature has predominantly concentrated on corporate governance aspects, with a strong emphasis on the influence of the Sharia Supervisory Board (SSB) on financial outcomes.

Islamic banking systems in Malaysia and Indonesia are both grounded in Sharia principles; however, notable variations in how these principles are applied lead to differences in their growth and operational outcomes. Malaysia adopts a more flexible regulatory

framework, incorporating contracts such as Bai' al-Inah, which allows greater diversification of Islamic financial products (Ascarya, 2016). This approach has enabled Malaysia to achieve a higher market share in Islamic banking, with annual growth rates of 22.08% in 2018 and 29.50% in 2019 (Capital, 2021).

In contrast, Indonesia adopts a more rigorous approach to Sharia compliance, overseen by the National Sharia Council (DSN) under the Indonesian Ulema Council (MUI). Although the Islamic banking sector has shown consistent growth, its market share remains limited, reaching only 9.39% in 2019 due to insufficient product innovation. (Wiratmini, 2020) indicates that the absence of diverse financial offerings presents a major obstacle to enhancing the competitiveness of Islamic banking in the country.

Nevertheless, verifying transaction compliance with Sharia standards has revealed that advisors often endorse managerial decisions without substantial intervention. Non-compliance with Sharia principles may result in depositors withdrawing their savings and investors halting their ventures, ultimately reducing the profitability of Islamic banks (Grassa, 2015). To promote consistency in global practices, the International Financial Reporting Standards (IFRS) have sought to formalize the role of Sharia advisors by setting guidelines for the structure of Sharia Supervisory Boards. These guidelines mandate that Islamic banks appoint a minimum of three Sharia advisors, selected during the annual general meetings of all shareholders. This highlights the indispensable role of SSBs in ensuring the sustainability of Islamic banks.

Although Sharia Supervisory Boards (SSBs) play an essential role in oversight, the growing competitiveness of the business landscape has made strategic initiatives like research and development (R&D) increasingly important. R&D expenses, funded through a company's financial projections, influence total assets, which are key indicators of Islamic banking performance. These decisions stem from directives issued by stakeholders, who, as decision-makers, hold vested interests in corporate activities. Comprehensive analyses have revealed that R&D activities significantly impact Islamic banking performance across various industries. Notably, in high technology firms, unexpected increases in R&D expenditures yield positive abnormal returns and enhance operational performance. It can thus be inferred that R&D not only drives product and service innovation but also improves operational efficiency and long-term competitiveness.

Malaysia and Indonesia provide compelling cases for comparison due to their geographic proximity and cultural similarities, yet notable differences in governance, market size, and business strategies. For instance, proactive governmental policies in Malaysia have significantly fostered the growth of Islamic finance, whereas Indonesia faces challenges in market penetration and evolving regulations. This study seeks to offer fresh perspectives on strategies to improve the global competitiveness and long-term viability of Islamic banking by examining how R&D expenditures and the structure of Sharia Supervisory Boards (SSBs) influence the performance of Islamic banks in the selected countries.

LITERATURE REVIEW

The literature review starts by examining how research and development (R&D) impacts Islamic banking performance in industries outside the banking sector, before shifting focus to its relevance within Islamic banking. It further explores the function of Sharia Supervisory Boards (SSBs) as a key element of corporate governance. Recent studies, such as Hadibowono & Munandar (2023), highlight the importance of maintaining a balance between innovation and adherence to Sharia principles to strengthen the competitive edge of Islamic banking, especially in the contexts of Indonesia and Malaysia.

Research and Development (R&D) in Islamic Banking

Investments in research and development (R&D) are widely acknowledged as essential contributors to organizational performance by enhancing innovation and responsiveness to change. Studies by Jacqueline et al. (2024) and Rahman & Howlader (2022) have identified strong positive links between R&D spending and company performance, particularly in e-commerce and developing market sectors. Nonetheless, the role of R&D within the Islamic banking industry has yet to be thoroughly examined.

Zulfikar et al. (2021) assert that purposeful R&D investment contributes to improving the competitiveness of Islamic banks through the development of novel, Sharia-compliant financial solutions. This is particularly evident in Malaysia, where a supportive regulatory framework has allowed Islamic banks to integrate R&D into product diversification efforts. In contrast, Islamic banks in Indonesia face challenges due to stricter Sharia compliance requirements, limiting their ability to innovate.

Research examining the influence of R&D on Islamic bank performance remains limited. Prior studies, including those by Jacqueline et al. (2024) and Rahman & Howlader (2022), have identified a positive correlation between R&D expenditures

and firm value across various industries, notably within emerging markets. These findings highlight the potential advantages of strategic R&D investments, particularly in sectors driven by technological advancement. Nonetheless, the specific contribution of R&D within the Islamic banking sector has received little scholarly attention, even though innovation is essential for maintaining competitiveness in rapidly evolving environments.

The influence of R&D investments in Islamic banking is consistent with the resource-based view (RBV) theory, which suggests that distinctive capabilities like R&D can lead to a long-term competitive edge (Barney, 1991). Therefore, the study puts forward the following hypothesis:

- H1: Research and Development (R&D) has a positive effect on Islamic banking performance.

Sharia Supervisory Board (SSB) and Islamic banking performance

Sharia Supervisory Boards (SSBs) serve as a core component of Islamic banks' governance systems, tasked with upholding adherence to Sharia law. They function as a governance tool that safeguards stakeholder interests by providing guidance and oversight concerning financial operations and the creation of banking products (Fani et al., 2023).

Research shows that the effectiveness of Sharia Supervisory Boards (SSBs) is greatly influenced by their size and the qualifications of their members. According to Abdul & Bukhari (2019), SSBs composed of individuals with strong financial expertise contribute notably to improved governance and performance in Islamic banking. While larger boards may incur greater operational costs, they offer enhanced oversight and a wider range of insights, which in turn support better compliance and foster innovation (Tashkandi, 2022).

Kok et al. (2021) emphasize the crucial function of Sharia Supervisory Boards (SSBs) in promoting innovation and enhancing transparency within Islamic banking systems in both nations. The study reveals that Malaysia's more progressive regulatory framework supports greater product variety and more effective compliance than that observed in Indonesia.

The Sharia Supervisory Board (SSB) holds a vital position in overseeing governance within the Islamic financial sector, Masruki et al. (2018), ensuring that all banking operations are conducted in accordance with Sharia principles, particularly in relation to the structure of products and services. The role of the SSB significantly contributes to the enhancement of governance and oversight standards (Farook et al., 2011). It protects the interests of stakeholders and serves as a central governance mechanism, often more influential than other structures (Haddad & Bouri, 2022). The board's primary function typically supports enhanced performance in Islamic banks, given that its members are appointed by the stakeholders themselves (Rashidah & Faisal, 2015; Tamanni et al., 2022).

The key findings indicate that internal Sharia compliance mechanisms, Sharia risk oversight, and internal Sharia audits represent emerging frameworks for evaluating the adherence to Sharia principles within Islamic banking (Minaryanti & Mihajat, 2024). Moreover, the Sharia Advisory Board plays a crucial role in influencing the performance of 180 Islamic banks operating across 56 countries during the period from 2010 to 2019 (Haddad & Bouri, 2022; Hanafi et al., 2021; Nomran et al., 2018; Nomran & Haron, 2020).

Furthermore, Kok et al. (2021) highlight that cross-membership and a diverse educational background among SSB members contribute to more effective decision-making and greater innovation in product development within Islamic banks. This is especially evident in Malaysia, where SSBs are recognized for their broad expertise and active engagement in shaping regulatory policies. In light of these insights, the following hypothesis is presented:

- H2: The presence of a Sharia Supervisory Board (SSB) contributes positively to the performance of Islamic Banking.

AIMS AND OBJECTIVES

The primary purpose of this study is to explore how research and development activities and the Sharia Supervisory Board influence the performance trajectories of Islamic banks in Indonesia and Malaysia. By investigating these two factors in the context of competing demands — innovation on one side and strict Sharia compliance on the other — this research addresses a key gap in our understanding of how Islamic banks can maintain stakeholder trust while pursuing growth. In particular, the study asks whether strategic investment in research and development delivers efficiency gains and competitive advantage for institutions operating under Sharia principles, and how the interpretive and oversight functions of the Sharia Supervisory Board support or adjust those gains under each country's regulatory framework.

To meet these aims, the analysis begins with a quantitative assessment of the effects of research and development expenditures on established performance indicators of Islamic banks. It then examines the role of Sharia Supervisory

Board governance in ensuring compliance and promoting operational excellence. By comparing Indonesia, where Islamic banking has expanded rapidly but still represents a modest share of the overall banking sector, with Malaysia, which boasts a mature Islamic finance industry supported by centralized governance and innovation initiatives, the study illuminates how different institutional environments shape outcomes. Finally, the findings are translated into concrete policy and managerial recommendations designed to help regulators and bank leaders craft innovation and oversight strategies that align with Sharia principles while driving sustainable performance in diverse national settings.

METHODS

Data and Sample

This research relies on secondary data sourced from the official websites of Indonesia’s Financial Services Authority (OJK) and Bank Negara Malaysia (BNM), as well as the annual reports of selected Islamic banks. All banks included in the sample follow the International Financial Reporting Standards (IFRS), which guarantees consistency and comparability in financial reporting. IFRS, established by the International Accounting Standards Board (IASB), functions as the global standard for financial disclosure (Lidyah et al., 2019).

The data collection process encountered several obstacles, notably the 2021 consolidation of Bank BRI Syariah, Bank BNI Syariah, and Bank Mandiri Syariah into Bank Syariah Indonesia (BSI), which impacted the accessibility of financial and governance-related information. An additional challenge was the absence of clearly defined financial line items for Research and Development (R&D) expenses within Islamic banking reports. Since R&D efforts are often presented in qualitative terms without precise figures, this study utilized extrapolation techniques to estimate R&D values based on the available qualitative disclosures.

The study focuses on Islamic banks in Indonesia and Malaysia that operated during the period from 2016 to 2022. Banks were selected using a purposive sampling approach based on specific eligibility requirements to maintain the relevance and reliability of the data. These requirements included adherence to the International Financial Reporting Standards (IFRS), the availability of comprehensive disclosures related to the research variables, and consistent financial reporting throughout the study period. Such criteria were crucial to ensure data consistency and comparability between the two countries, enabling a thorough examination of the variables analyzed. Tables 1 and 2 provide an overview of the selection criteria and the banks included in the sample.

Table 1. Sample Selection Criteria.

Criteria	Indonesia	Malaysia
Total Islamic banks	14	16
Banks adopting IFRS	12	8
Banks disclosing relevant variables	10	8

Following the establishment of the sampling criteria, Table 2 outlines Islamic banking, which is selected for inclusion in the study.

Table 2. Research Sample.

Indonesia	Malaysia
Bank Aceh	Bank Muamalat Malaysia Berhad
PT Bank Jabar Banten Syariah	Hong Leong Islamic Bank Berhad
PT Bank BNI Syariah	Kuwait Finance House (Malaysia) Berhad
PT Bank Mandiri Syariah	Malaysia Building Society Berhad
PT Bank Panin Dubai Syariah Tbk	Standard Chartered Saadiq Berhad
PT Bank BCA Syariah	Bank Islam Malaysia Berhad
PT Bank Muamalat Indonesia	
PT Bank Aladin Syariah Tbk	
PT Bank NTB Syariah	
PT Bank Swaguna (Victoria Syariah)	
Bank Syariah Indonesia	
Bank BRI Syariah	

Empirical Models and Measures

This review aims to establish a strong theoretical foundation for empirical analysis, providing insights into how investments in R&D and Sharia governance structures can enhance the competitiveness of Islamic banking, particularly in Malaysia and Indonesia, as illustrated in Figure 1.

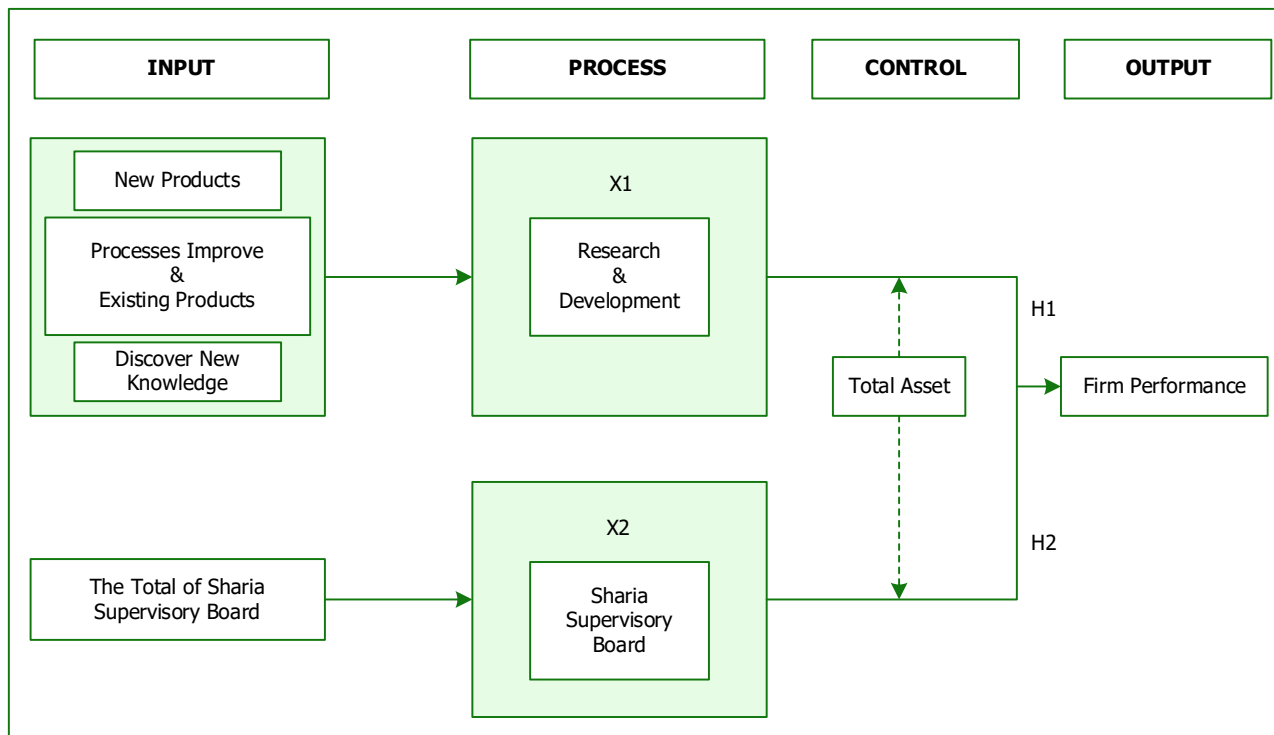


Figure 1. Moderation Model for the Study.

Figure 1 was cited in the literature review to provide a theoretical basis for how R&D and Sharia governance jointly contribute to Islamic banking performance. The figure integrates key inputs (such as innovation in new products, process improvements, and knowledge discovery) and Sharia compliance mechanisms (through the Sharia Supervisory Board), which flow into the process stage. The two main processes—R&D activities (X1) and the Sharia Supervisory Board's role (X2)—are posited to influence Islamic banking performance directly (hypotheses H1 and H2). Additionally, total assets are included as a control variable, acknowledging their potential moderating effect on the firm's ability to capitalize on R&D and governance mechanisms.

The inclusion of this model in the literature review section serves to clarify the theoretical underpinnings of the study and to show how the current research builds upon and extends prior findings. It demonstrates that the research does not simply examine R&D or Sharia governance in isolation, but rather in combination, reflecting the unique dual mandate of Islamic banking to innovate competitively while adhering to Sharia principles. Removing the figure would diminish the reader's ability to grasp how these components are theorized to interact to affect Islamic banking performance, and why they are relevant in the empirical analysis presented later in the paper.

Incorporating Research and Development (R&D), Sharia Supervisory Board (SSB) Size, and Control Variables

This study adopts an integrated model that simultaneously examines the impact of R&D and SSB size on Islamic banking performance, along with firm-specific characteristics and corporate governance factors. This methodology provides a holistic view of the key determinants influencing the performance of Islamic banks in both Indonesia and Malaysia.

In our study, total assets are used as a control variable to represent bank size. While we understand that the total assets figure is also used in the denominator of the Return on Assets (ROA) calculation, it is important to note that total assets as a control variable serve a distinct purpose. They allow us to isolate the effects of R&D and SSB size from potential size-related confounding factors, ensuring that the results reflect the specific influences of R&D and governance mechanisms.

As such, total assets are treated as a firm-specific control variable, rather than a factor that directly impacts ROA. Controlling for total assets allows the model to better capture the true influence of the main explanatory variables on performance outcomes.

In this study, the data analysis for Indonesia and Malaysia was conducted separately to ensure a clear understanding of the distinct economic and financial contexts in each country. By analyzing the data independently for each nation, we aim to highlight the unique characteristics and driving factors within each market. Consequently, the currency units used for analysis are consistent with the respective national currencies: Malaysian Ringgit (MYR) for Malaysia and Indonesian Rupiah (IDR) for Indonesia. This approach ensures that the results remain relevant and accurately reflect the financial landscapes of each country, allowing for meaningful comparisons while preserving the integrity of the data in their respective contexts.

The Effect of Research and Development on Islamic Banking Performance

As an independent variable (X1), R&D encompasses various elements that shape its value, including enhancements to processes and the pursuit of new knowledge. Conceptually, Research and Development aligns with stakeholder theory, which asserts that a company should not function solely for its own profit but must also generate value for its stakeholders. Consequently, a company's sustainability is heavily dependent on stakeholder support. Within this theory, the notion of the "Managerial Mindset Problem" emerges, which explores how managers perceive their role in value creation and whether integrating business ethics motivates firms to engage in R&D activities (Parmar et al., 2010).

This indicates that the research and development variable cannot stand alone or is influenced by other variables (endogenous variables). Therefore, it is necessary to perform an endogeneity test as a robustness check before carrying out the analysis. The Generalized Method of Moments (GMM) model is the appropriate analytical model for performing analyses on endogenous variables.

The Generalized Method of Moments (GMM) model applies a two-stage estimation process — comprising first-stage and second-stage regressions — to examine the connection between research and development and Islamic banking performance. The regression discontinuity design (RDD) also employs a simultaneous framework divided into two stages to evaluate this relationship.

First-stage regression:

$$\text{Log}(RND)_{it} = \alpha + \beta_2 \text{new product}_{it} + \beta_3 \text{process improve existing product}_{it} + \beta_4 \text{discover knowledge}_{it} + \beta_5 \text{Total A} + \mu_i$$

Second stage regression:

$$\text{firm performance}_{it} = \alpha + \beta_1 \text{log}(R\&D)_{it} + \mu_i$$

This model is estimated for both countries, resulting in two models: the Malaysian model and the Indonesian model.

The Influence of Sharia Supervisory Board (SSB) on the Performance of Islamic Banking

From a theoretical perspective, the Sharia Supervisory Board (SSB) is closely linked to stakeholder theory, as its decisions are the result of a consensus between management and shareholders, emphasizing accountability for each action taken. This connection is especially evident in the preparation of financial statements, where both parties share equal responsibility in evaluating financial allocations, which in turn serve as indicators of the Islamic banking's overall performance.

This study assesses the Sharia Supervisory Board (SSB) based on the number of members appointed at each bank. Notably, there are differences in how SSBs are managed in Indonesia and Malaysia. In Indonesia, Islamic banks themselves are responsible for compensating board members, whereas in Malaysia, the remuneration is provided by the country's central bank. Furthermore, the procedures for appointing SSB members vary between the two nations, contributing to the differences in board size within Islamic banks across both countries.

This suggests that additional factors may be affecting the Sharia Supervisory Board (SSB) variables. As a result, an endogeneity test is necessary to determine whether the SSB variable is endogenous. This consideration also contributes to the study's decision to utilize the Generalized Method of Moments (GMM) approach.

The GMM framework adopts a simultaneous modeling strategy, consisting of a first-stage and second-stage regression to examine the link between the Sharia Supervisory Board and organizational performance.

First-stage regression:

$$CG_{it} = \alpha + \beta_2 total\ asset + \mu_i$$

Second stage regression:

$$firm\ performance_{it} = \alpha + \beta_1 Shariah\ Advisory\ Board_{it} + \mu_i$$

This model is estimated for both countries, resulting in two distinct models: the Malaysian model and the Indonesian model.

The research framework, represented by the equations, is analyzed using the Generalized Method of Moments (GMM). This technique is specifically applied to handle challenges associated with endogeneity. The GMM approach involves a two-stage estimation process, consisting of initial and subsequent regressions. Comprehensive definitions of all variables used in the study are provided in Table 3.

Table 3. List of the Variables of the Study. (Source: collected from various sources by researchers, 2022)

Variable	Proxy	Scale
Independent Variable		
Research and Development (X1)	$IRND = \frac{\text{Research and Development Cost}}{\text{Total Asset}}$	Ratio
Sharia Supervisory Board	Number of Sharia Supervisory Board	Total
Dependent Variable		
Islamic banking performance (Y)	$ROA = \frac{\text{Net Income}}{\text{Total Assets}}$	Ratio
Control Variable: Total Asset (c)	Total Asset	Total

Finding and Discussion

Descriptive Statistics and Correlations

The sample data related to Islamic banking in Indonesia and Malaysia, spanning the years 2016 to 2022, is succinctly displayed in Table 4.

Table 4. Summary Statistics of Research Sample (2016-2022). (Source: data processed by researchers, 2022)

Variable	Malaysia			Indonesia		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
ROA (Percent)	56	0.66	0.48	84	0.59	3.23
TOTAL ASET (Malaysia: Ringgit, Indonesia: Rupiah)	56	63.640.000.000	76.240.000.000	84	26.640.000.000.000	56.930.000.000.000
Total R&D (Malaysia: Ringgit, Indonesia: Rupiah)	56	3.819.000.000	9.835.000.000	84	735.700.000.000	1.048.000.000.000
Sharia Supervisory Board (SSB) (Total)	56	5.29	0.72	84	1.96	0.88

Table 4 presents a comparative overview of Islamic banking performance in Indonesia and Malaysia across several indicators from 2016 to 2022. The data indicate that Indonesian banks, based on 84 observations, exhibit a lower average Return on Assets (ROA) of 0.59, whereas Malaysian banks, with 56 observations, report a higher average ROA of 0.66. The analysis also highlights that average R&D investment is greater in Indonesia. Moreover, Malaysian Islamic banks tend to have a higher average number of Sharia Supervisory Board (SSB) members compared to those in Indonesia.

RESULTS

Impact of R&D on Islamic Banking Performance

The study of the influence of Research and Development on Islamic Banking Performance, using the Generalized Method of Moments (GMM) method, is shown in Table 5.

Table 5. The Effect of Research and Development on Islamic Banking Performance. Note: Robust Standard Errors in parentheses; *** P<0.01, ** P<0.05, * P<0.1. (Source: data processed by researchers, 2022)

Variables	Malaysia	Indonesia
R&D Islamic Banking	0.214**	-0.887
	(0.085)	(0.730)
Constant	-3.709**	23.640
	(1.783)	(18.737)
Observations	56	84

Table 5 presents the results of the analysis examining the effect of R&D on Islamic banking performance using the Generalized Method of Moments (GMM) approach. The findings are divided into three datasets: a combined sample and individual analyses for Malaysia and Indonesia, allowing for a detailed understanding of how R&D investment impacts Islamic banking performance in different national settings.

In the combined dataset, the R&D coefficient stands at 0.316, indicating a statistically significant positive relationship with Islamic banking performance at the 10% significance level (*). This finding highlights the important role R&D investment plays in improving overall Islamic banking performance. In the case of Malaysia, the R&D coefficient is slightly lower at 0.214 but shows greater statistical significance (P<0.05), further emphasizing the value of R&D in boosting firm outcomes in that region. On the other hand, the Indonesian data reveal a negative association, with an R&D coefficient of -0.887. While this result does not appear to be statistically significant, recent studies consistently stress the importance of R&D in fostering innovation and strengthening competitive positioning.

Additionally, the study offers an understanding of firms' baseline performance by analyzing the constant values generated from the model. In the full sample, the constant is -6.886, serving as a reference point for Islamic banking performance before accounting for the impact of R&D. For Malaysian firms, the constant improves to -3.709 and is statistically significant at the 5% level ($p < 0.05$), indicating a moderately stronger initial performance. In contrast, the Indonesian sample shows a much higher constant value of 23.640, implying a considerably stronger baseline performance; however, due to the absence of statistical significance, this result should be interpreted with caution.

The analysis is based on 140 total observations, comprising 56 from Malaysia and 84 from Indonesia. Robust standard errors, shown in parentheses next to each coefficient, are utilized to strengthen the accuracy of the estimations. This careful method of reporting the precision of R&D's estimated effects across different datasets highlights the rigor and credibility of the study's results.

Impact of Sharia Supervisory Board size on Islamic Banking Performance

The effects of the Sharia Supervisory Board on Islamic banking performance, as assessed through the Generalized Method of Moments (GMM) technique, are detailed in Table 6.

Table 6. The Effect of the Sharia Supervisory Board on Islamic Banking Performance. Note: Robust Standard Errors in parentheses; *** P<0.01, ** P<0.05, * P<0.1. (Source: data processed by researchers, 2022)

Variables	Malaysia	Indonesia
Sharia Supervisory Board (SSB)	6.559	4.081**
	(5.429)	(1.822)
Constant	-10.197	-2.906*
	(9.089)	(1.736)
Observations	56	74

Table 6 investigates The Influence of the SSB in shaping Islamic banking performance using the Generalized Method of Moments (GMM) methodology, focusing on data from Malaysia and Indonesia, along with a comprehensive overview of all observations. The study reveals a nuanced picture, indicating that the influence of SSBs varies significantly across different geographic regions. For the overall dataset, the impact of SSB appears to be negative (-4.229); however, this finding is not statistically significant, suggesting an indeterminate impact on Islamic banking performance at a broader level. This is evidenced by a robust standard error of 3.198. In contrast, the SSB's presence in Malaysia shows a positive influence on Islamic banking performance, with a coefficient of 6.559. However, consistent with the overall results, this effect is not statistically significant, as reflected by a robust standard error of 5.429. The situation in Indonesia differs, where the SSB exhibits a positive and statistically significant relationship with Islamic banking performance (coefficient of 4.081), supported by a p-value below 0.05 and a robust standard error of 1.822.

The constants across these datasets offer insights into the intrinsic baseline performance of firms prior to considering the influences of SSB. The overall observations set a baseline at 5.325, whereas Malaysia exhibits a negative baseline (-10.197), and Indonesia shows a slightly negative baseline (-2.906), which is statistically significant at the $P < 0.1$ level. These variations in baseline performance highlight the distinct economic and operational landscapes in which these firms operate.

The analysis encompasses a total of 130 observations, with 56 from Malaysia and 74 from Indonesia, employing robust standard errors to ensure the reliability of the findings. Statistical significance is denoted meticulously, with asterisks indicating levels from $P < 0.1$ to $P < 0.01$, providing a clear measure of confidence in these outcomes.

DISCUSSION

How Research and Development Shapes Islamic Banking Performance

The findings from the GMM analysis show that R&D has no significant effect on Return on Assets (ROA) in Indonesia. In contrast, R&D demonstrates a positive influence on ROA in the Malaysian context. These outcomes underscore notable regional differences in how R&D impacts Islamic banking performance, particularly when comparing Malaysia and Indonesia. Overall, the aggregated results display a positive relationship between R&D and performance, supported by a positive coefficient. A deeper breakdown reveals that although Malaysia's coefficient is smaller, it is statistically significant, confirming R&D's beneficial role. Meanwhile, Indonesia reports a negative coefficient, but this result lacks statistical significance.

These disparities can be linked to multiple factors, such as how R&D is adopted and embedded within business operations, differences in regulatory frameworks, innovation ecosystems, and the level of resources allocated to R&D in each country. The variation in research findings on R&D's impact in Indonesia and Malaysia highlights that, despite shared foundations in Islamic banking, notable distinctions remain, particularly in the extent to which R&D is emphasized and implemented within the sector in each country.

Based on the analysis, researchers have identified several perspectives as supporting factors for the creation of R&D. For instance, in Indonesia, there exists a roadmap for the development of Indonesian banking, which includes strategies by Otoritas Jasa Keuangan (OJK), which functions as the governing body responsible for supervising financial institutions in Indonesia, particularly in advancing the Islamic banking sector.

The roadmap identifies three key areas of development: reinforcing the identity of Islamic banking, integrating the Sharia economic ecosystem, and improving the processes of licensing, regulation, and supervision. It is important to note that the strategies presented are still part of the foundational phase of Islamic banking development. Although R&D initiatives have been undertaken, they remain at an early stage and primarily focus on raising public awareness rather than advancing comprehensive innovation.

Within the Indonesian context, the focus on R&D in Islamic banking shows a minimal effect on Islamic banking performance, as other factors appear to play a more dominant role in shaping performance outcomes, in this case ROA, stemming from developmental activities such as the competence of employees and relevant product development. Therefore, the R&D implemented by Islamic banks does not significantly impact Islamic banking performance.

Conversely, in Malaysia, under the Ministry of Science, Technology, and Innovation (MOSTI) regulations, R&D encompasses experimental development which involves Systematized operation; uses existing knowledge gained from research or practical experience, aimed at creating innovative materials, goods, or technologies; and implementing innovative processes, systems, and services, or significantly enhancing existing ones that are already in place or produced (Malaysian

Science and Technology Information Centre (MASTIC), 2020) This strategy motivates Islamic banks in Malaysia to pursue initiatives aimed at boosting productivity, which subsequently leads to improved financial results—measured in this study through Return on Assets (ROA) as an indicator of Islamic banking performance.

An example is the Bai Al-inah contract, which is allowed in Malaysia but remains restricted in Indonesia. Its application in Malaysia reflects increased productivity, representing progress driven by research efforts. Another notable advancement in Malaysian Islamic banking is the implementation of the Islamic Window scheme, permitting conventional banks to provide Islamic financial products alongside traditional services, subject to Sharia Supervisory Board approval. These developments highlight the significant role of R&D in enhancing the performance of Islamic banks in Malaysia.

The observed relationship between R&D and Islamic banking performance is consistent with both stakeholder and stewardship theories. According to stakeholder theory, a company's purpose extends beyond its own interests to include delivering value to its stakeholders, whose support is essential for the organization's continued success (Safitri et al., 2022). In contrast, stewardship theory posits that when managers are not driven by self-interest, they tend to prioritize decisions that are directly aligned with organizational success, resulting in meaningful and positive impacts (Donaldson & Davis, 1991).

Success and decisions are interdependent since decisions initiate paths that lead to success; this is particularly true for R&D activities. These activities are believed to enhance ROA due to the innovation and development of new products which increase the company's revenue but may reduce the assets held as they divert funds from other uses to R&D. These findings are reinforced by the analysis of baseline performance, which shows significant differences between the two countries: Malaysia exhibiting considerable improvement in initial performance, while Indonesia displays a much higher baseline. This indicates that foundational economic factors, regulatory frameworks, and the structure of the industry play a significant role in shaping a firm's baseline performance prior to the influence of R&D initiatives.

Employing robust standard errors in the analysis reflects a commitment to improving the accuracy of the estimates, emphasizing the necessity of a careful and precise approach when interpreting results, particularly in situations characterized by substantial variability or heteroskedasticity. The stark contrast between the impacts of R&D in Malaysia and Indonesia underscores the importance of giving regional contexts in assessing the effect of R&D initiatives, including factors such as government policies, supportive infrastructure, and the quality of human resources.

The results of this study on Islamic banking in Malaysia, demonstrating a positive relationship between research and development and Islamic banking performance, are consistent with the findings reported by previous researchers (Dewiruna et al., 2020; Guldiken & Darendeli, 2016; Leung & Sharma, 2021; Vo et al., 2022; Guo et al., 2018; W. J. Kim et al., 2019, 2019, 2019; Rahman & Howlader, 2022; Tsegaye, 2023; Tung & Binh, 2022; Xu & Sim, 2018). Conversely, the findings from Indonesia, which show that research and development do not significantly impact Islamic banking performance, are consistent with the research by Ravšelj & Aristovnik (Ravšelj & Aristovnik, 2020).

How the Sharia Supervisory Board (SSB) Shapes Islamic Banking Performance

The findings indicate that in Malaysia, the number of Sharia Supervisory Board (SSB) members has no measurable impact on Islamic banking performance. Conversely, in Indonesia, the existence of the SSB positively contributes to Islamic banking performance. This divergence in outcomes between the two countries is attributed to the differing roles SSBs play in shaping Islamic banking practices, particularly in influencing product-related decisions available to consumers. Such decisions inevitably impact the income of Islamic banks. The decision-making process by the Sharia Supervisory Boards is closely linked to the policies prevailing in each country.

In Malaysia, the SSB's impact on Islamic banking performance is negligible due to the board's rigid adherence to the National Fatwa Committee of Malaysia's guidelines. It is recommended that the Sharia Supervisory Board take on a broader role, not only supervising and authorizing banking products, but also providing valuable input to the National Sharia Council regarding the flexibility of products within Malaysia's Sharia banking system.

In Malaysia, the Sharia Supervisory Board (SSB) has no direct effect on firms' return on assets (ROA), as its members are selected and remunerated by Bank Negara Malaysia (BNM). This arrangement eliminates the financial obligation for Islamic banks in Malaysia to allocate resources for SSB-related expenses (Ultsa, 2015). Thus, Malaysian Sharia banks are not required to allocate funds to pay fees (ujrah) for the Sharia Advisory Board (SAB). Bank Negara Malaysia's policy supports the independence of the Sharia Advisory Board (SAB) by preventing its expenses from affecting banks' return on assets (ROA). This approach eliminates the need to allocate bank resources for SAB remuneration, thereby protecting the financial performance of the Islamic banking sector. Meanwhile, in Indonesia, the Sharia Supervisory Board (SSB) functions in accordance with the directives outlined by the Fatwa of the National Sharia Council – Indonesian Ulema Council (DSN-

MUI). Each Sharia bank that utilizes the services of the Sharia Advisory Board (SAB) pays a fee (*ujrah*) for its services (Ultsa, 2015). This necessitates that Indonesian Sharia banks prepare an allocation of funds for the payment of fees (*ujrah*) to the Sharia Advisory Board (SAB) from the outset of the budget planning process, according to the company's financial reports. This allocation impacts the return on the company's capital, which is further affected by the Distribution of Profit Shares (DPS).

Moreover, the financial responsibility entrusted to the Sharia Advisory Board (SAB) grants it full authority to supervise the implementation of Sharia principles in banking operations. Refocusing on the study's examination of the SSB's effect on Islamic banking performance, the SAB, acting as a key advisory body, plays an essential role in guiding decisions related to the development and distribution of Sharia-compliant products. The findings of this research are consistent with both stakeholder and stewardship theories, which emphasize that an organization should not act solely in its own interest but must also create value for its stakeholders. As such, an Islamic bank's sustainability is closely tied to the level of support it garners from these stakeholders (Safitri et al., 2022). Stewardship theory asserts that the establishment of an accountability mechanism can aid in achieving organizational goals. The accountability mechanism provided to the Sharia Supervisory Board is expected to enhance Islamic banking performance, particularly in terms of Return on Assets (ROA). Consequently, the evidence that demonstrates the influence of the Sharia Supervisory Board on Islamic banking performance, specifically regarding ROA, is highly pertinent to this theory.

The outcomes observed in Malaysian Islamic banking correspond with the findings reported in the research of Musaddad et al. (2021). This confirms that the Sharia Supervisory Board has a favorable impact on Islamic banking performance. In contrast, the outcomes from Indonesia's Islamic banking sector, showing no significant effect of the Sharia Supervisory Board on Islamic banking performance, align with the conclusions drawn by Arifah et al. (2021).

CONCLUSIONS

Implications

Based on the results of the previous chapters, this study offers theoretically and practically relevant insights. On the theoretical side, the findings empirically strengthen the arguments of previous studies (Gleason & Klock, 2006). Both research and development (R&D) and corporate governance are vital factors with a statistically significant effect on improving Islamic banking performance. The study also highlights notable regional differences in how R&D impacts performance, particularly when comparing Malaysia and Indonesia. In the Malaysian context, R&D demonstrates a positive relationship with Islamic banking performance, indicating that such investments enhance productivity and strengthen financial outcomes.

Limitations and Future Research

This study is subject to several limitations. First, the analysis is constrained to the 2016–2022 period, as data beyond 2020 in Indonesia became inconsistent due to the merger of several major Islamic banks into Bank Syariah Indonesia. Second, the study only considers R&D expenditures and Sharia Supervisory Board characteristics as explanatory variables, potentially omitting other relevant factors influencing Islamic bank performance. Future research could address these limitations by extending the timeframe, adopting alternative measures of R&D and governance, and incorporating additional variables such as digital innovation, market competition, and regulatory changes to provide a more comprehensive understanding of the determinants of Islamic bank performance in both Indonesia and Malaysia.

For future studies, it is suggested to extend the timeframe and incorporate additional variables beyond R&D and governance that may influence firm outcomes in both countries. Scholars are also encouraged to apply different measures for R&D, Sharia Supervisory Board evaluation, and Islamic banking performance, whether drawn from existing literature or newly developed, to better capture the influence of these independent variables.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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СТРАТЕГІЧНИЙ ВПЛИВ НДДКР І РОЗМІРУ ШАРІАТСЬКОЇ НАГЛЯДОВОЇ РАДИ НА ЕФЕКТИВНІСТЬ ІСЛАМСЬКОГО БАНКУ: ПОРІВНЯННЯ ІНДОНЕЗІЇ ТА МАЛАЙЗІЇ

Розвиток ісламського банкінгу в Південно-Східній Азії посилив інтерес до того, як ці установи зберігають продуктивність, дотримуючись принципів шаріату. Однак конкретний внесок науково-дослідної діяльності (НДДКР) та рішення Шаріатської наглядової ради (SSB) залишаються недостатньо вивченими, особливо в різних регуляторних контекстах. Розуміння цієї динаміки має важливе значення для підвищення конкурентоспроможності й стійкості ісламських банків.

У цьому дослідженні розглянуто вплив R&D й SSB на діяльність ісламських банків в Індонезії та Малайзії. Воно спрямоване на те, щоб визначити, як ці фактори по-різному впливають на роботу ісламських банків, відображаючи відмінності в національній політиці. Використана модель змішаного методу, що інтегрує кількісний і якісний підходи. У кількісному аналізі використано цілеспрямовану вибірку ісламських банків Індонезії та Малайзії, а панельні дані представлені відповідно до Міжнародних стандартів фінансової звітності (МСФЗ) за 2016–2022 роки. Оцінка узагальненого методу моментів (GMM) застосована для оцінки впливу R&D та SSB. Додаткові якісні висновки взяті зі спостережень та обширного огляду літератури для контекстуалізації висновків.

Результати свідчать, що НДДКР не має значного впливу на діяльність банків в Індонезії, але має позитивний ефект у Малайзії, що підкреслює важливість сприятливого політичного середовища. Роль SSB залишається життєво важливою для управління, але варіюється залежно від інституційного контексту.

Ці висновки мають практичні наслідки для політиків, органів регулювання й менеджерів банків, підкреслюючи необхідність розробки інноваційної політики, адаптованої до національного контексту, додержуючись при цьому дотримання шаріату. Дослідження доповнює літературу, надаючи порівняльний погляд на те, як R&D та SSB спільно формують ефективність ісламських банків.

Ключові слова: дослідження та розробки, розмір шаріатської наглядової ради, ефективність ісламського банкінгу, загальний актив, порівняльний аналіз, узагальнений метод моментів (GMM), Індонезія, Малайзія

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