

INTELLECTUAL CAPITAL EFFICIENCY AND MARKET STRUCTURE OF ISLAMIC COMMERCIAL BANKS IN INDONESIA

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Abstract

This study investigates the impact of Intellectual Capital on the market structure of Islamic commercial banks in Indonesia. Employing a quantitative approach, the research utilizes the Random Effect Model for panel data regression analysis, drawing on secondary data extracted from the annual reports of eight Islamic commercial banks in Indonesia. The findings reveal that Islamic banks in Indonesia predominantly operate within a monopolistic market structure. Among the dimensions of Intellectual Capital, Human Capital Efficiency (HCE) emerges as the sole factor exerting a positive and significant influence on market structure, significantly enhancing the value creation process within Islamic banking. In contrast, Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), and Relational Capital Efficiency (RCE) exhibit no discernible individual effects. These results underscore the necessity for regulators to delve deeper into market dynamics to foster a more competitive environment for Islamic banks. Furthermore, the findings advocate for regulatory support to facilitate the consolidation of Islamic banks, thereby enhancing Intellectual Capital efficiency. Such measures would enable Islamic banks to evolve into more efficient financial institutions, ultimately delivering greater societal benefits.

Keywords: *Intellectual Capital Efficiency; Market Structure; Sharia Bank*

Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh Modal Intelektual terhadap struktur pasar bank syariah di Indonesia. Dengan menggunakan pendekatan kuantitatif, penelitian ini menerapkan Random Effect Model untuk analisis regresi data panel, dengan data sekunder yang diambil dari laporan tahunan delapan bank syariah di Indonesia. Hasil analisis menunjukkan bahwa bank syariah di Indonesia sebagian besar beroperasi dalam struktur pasar monopolistik. Di antara dimensi Modal Intelektual, Human Capital Efficiency (HCE) muncul sebagai satu-satunya faktor yang memiliki pengaruh positif dan signifikan terhadap struktur pasar, secara substansial meningkatkan proses penciptaan nilai di perbankan syariah. Sebaliknya, Structural Capital Efficiency (SCE), Capital Employed Efficiency



(CEE), dan Relational Capital Efficiency (RCE) tidak menunjukkan efek individu yang signifikan. Hasil ini menegaskan perlunya pengambil kebijakan untuk menggali lebih dalam dinamika pasar guna mendorong lingkungan yang lebih kompetitif bagi bank syariah. Selain itu, temuan ini memberikan rekomendasi adanya dukungan regulasi untuk mendorong proses konsolidasi bank syariah, sehingga meningkatkan efisiensi Modal Intelektual. Langkah ini akan memungkinkan bank syariah berkembang menjadi lembaga keuangan yang lebih efisien dan memberikan manfaat yang lebih besar bagi masyarakat.

Kata kunci: Efisiensi Modal Intelektual; Struktur Pasar; Bank Syariah

INTRODUCTION

The banking sector plays a pivotal role in driving economic growth by facilitating the allocation of funds essential for market expansion (Ghaemi Asl et al., 2022; Wahyudi et al., 2021). In Indonesia, Islamic banks operate under imperfectly competitive market conditions, which enable them to impose higher fees on customers. However, this practice escalates the risk of repayment challenges, reflected in an elevated Net Performance Financing (NPF) ratio. The low level of competitiveness in the banking sector exacerbates these risks, disrupting the delicate equilibrium between competition and stability and ultimately undermining the efficiency and reliability of the financial system (Wahyudi et al., 2023).

In contrast, a more competitive Islamic banking market fosters a stable financial ecosystem. Heightened competition prevents any single institution from monopolizing the market, promoting greater interdependence among Islamic banks (Wahyudi et al., 2023). This interconnectedness enhances regulatory oversight, leading to improved market conditions while protecting the interests of both the banking sector and its customers. Nevertheless, despite their profitability, Islamic banks operating in monopolistic market structures often exhibit inefficiency (Adhikari, 2021). This inefficiency largely arises from inconsistent product development strategies (Sunarmo, 2018). A critical factor contributing to this inefficiency is the underutilization of Intellectual Capital (IC), which plays a fundamental role in driving innovation, enhancing expertise, nurturing human capital, and fostering robust customer relationships—all indispensable for maintaining a competitive advantage (Ishfahani et al., 2022).

Despite Indonesia's strong standing in the global Islamic finance knowledge index, the country's Islamic banking sector faces challenges in competing on an international scale (Suandi et al., 2022). Several underlying factors hinder the growth of Indonesia's Islamic financial sector, including limited skilled human resources, a lack of diversification in business models



and product offerings, and delays in adopting digital transformation (Septiani et al., 2021; Setyawati et al., 2019; Tarigan & Septiani, 2017). These challenges significantly affect customer-facing aspects, such as trust in Islamic banking institutions, professionalism in service delivery, and innovation in transaction contracts (Arno et al., 2021). Consequently, these limitations directly impede the growth trajectory of Indonesia's Islamic banking industry.

One of the critical indicators used to evaluate the progress of Islamic banking is its market share (Masrifah & Farich, 2023). As of August 2024, Islamic banking in Indonesia holds a market share of 7.33%, with the remainder dominated by conventional banks. This figure starkly contrasts with the 15% market share target outlined in the 2015 blueprint for Islamic banking development (Maspupah et al., 2022). Notably, Indonesia has fallen eight years behind in meeting this target. To address this gap, the government has pursued various initiatives, including the establishment of Islamic subsidiaries of conventional banks, converting conventional banks into Islamic institutions, and expanding Sharia Business Units (Nurwati et al., 2014). However, as illustrated in Figure 1, these measures have yet to produce a significant impact.

Based on Figure 1, in December 2022, the market share of Islamic banking increased by 0.82% from 2018 to 7%, following a three-year stagnation at approximately 6%. Despite this growth, a significant disparity persists between Islamic banking deposits and those of conventional banks, highlighting the considerable challenges Islamic banking faces in becoming the primary choice for customers. Within the banking literature, the competitiveness of the banking sector is often evaluated through a structural approach, which examines changes in market concentration and market power (Khoirunurrofik et al., 2020). Two key hypotheses—the efficiency hypothesis and the traditional hypothesis—have been developed to analyze the competitive structure of banking markets (Cupian & Abduh, 2017; Ganefi et al., 2020).

According to the efficiency hypothesis, a bank's competitiveness is primarily influenced by its operational efficiency; the more efficient a bank, the larger its market share (Hamza & Kachtouli, 2014). The current low market share of Islamic banks indicates inefficiencies in resource management. Conversely, the traditional hypothesis posits that market power in the banking sector is directly correlated with market concentration, i.e., the number of entities operating in the market (Ganefi et al., 2020). From this perspective, the performance of Islamic banks is significantly shaped by market concentration levels (Mateev et al., 2023). The current competitive structure of Indonesia's Islamic banking sector suggests a monopolistic competition



model characterized by intense competition (Cupian & Abduh, 2017; Khoirunurrofik et al., 2020; Sahut et al., 2015).

This monopolistic competition aligns with the reality of numerous Islamic commercial banks in Indonesia offering similar products in a highly competitive environment (Ganefi et al., 2020; Paulina, 2021). Research by Paulina (2021) revealed that the competitive intensity within Islamic banking remains low. Addressing this issue requires enhancing resource management efficiency and implementing robust competitive strategies. Modern competitive advantage increasingly relies on intangible assets over tangible ones (Asfarawenti & Saiful, 2019; Soewarno & Tjahjadi, 2020). One crucial intangible asset is Intellectual Capital (IC), which has been shown to positively influence efficiency in the banking sector (Yovita & Amrania, 2018; Rachmah et al., 2023).

Intellectual Capital (IC) encompasses intangible resources that drive a company's competitive advantage, including technology, customer data, brand reputation, and organizational culture (Hermawan, et al., 2021). The Islamic banking sector's reliance on sharia principles underscores the importance of IC in this industry (Ab. Aziz & Meor Hashim, 2017). IC comprises four key components: Human Capital, Structural Capital, Capital Employed, and Relational Capital (Ulum & Waluya Jati, 2016). The intense competition within the Islamic banking sector emphasizes the need to deliver superior value and excellence to customers (Arno et al., 2021). Research on the relationship between market structure and IC is essential because IC significantly influences value creation and strategic business positioning (Ljumović et al., 2022; Yilmaz & Acar, 2018). Moreover, the banking industry is among the sectors most dependent on effective IC management (Arifin, 2018; Oppong & Pattanayak, 2019).

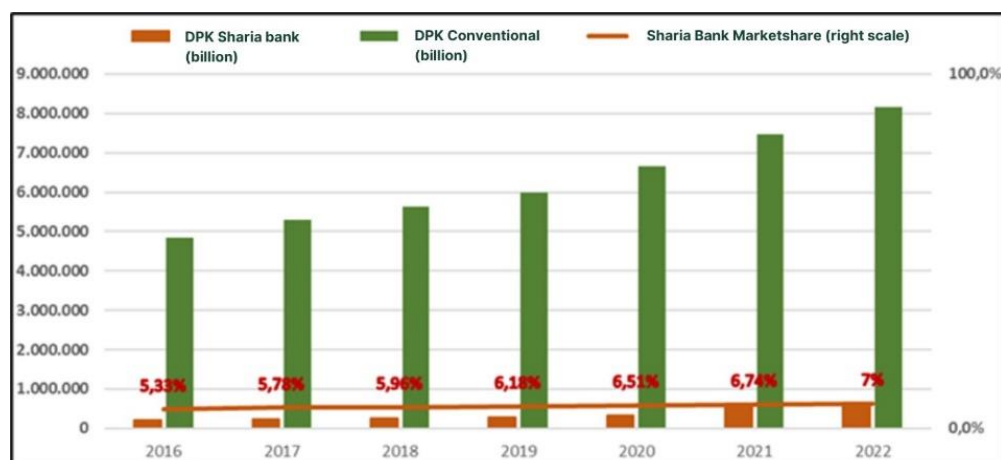


Figure 1. Comparison of DPK & Market Share of Banks in Indonesia 2016-2022

Sources: OJK (2024)



While prior studies have extensively examined Islamic banking's market structure, they predominantly focus on financial and macroeconomic performance (Cupian & Abduh, 2017; Ghaemi Asl et al., 2022; Hamza & Kachtouli, 2014; Khoirunurrofik et al., 2020; Sahut et al., 2015; Widarjono et al., 2023). Limited research explores the direct relationship between market structure and Intellectual Capital Efficiency. Some studies have investigated IC components individually—such as Human Capital, Structural Capital, Capital Employed, and Relational Capital—and their impact on market structure. For instance, Hashim et al. (2022) highlighted that Human Capital, defined as the collective knowledge of individuals within an organization, is a critical factor for competitive advantage. Similarly, Nawaz (2019) demonstrated that investments in Human Capital are crucial for sustaining strong market performance, particularly during financial crises.

Structural Capital, encompassing organizational knowledge like IT systems and corporate culture, also significantly impacts market performance. Yunis et al. (2018) found that leveraging IT enhances competitiveness and performance. Capital Employed, representing the financial and physical resources utilized by firms, aligns with the efficiency hypothesis in improving market share and performance (Cupian & Abduh, 2017). Additionally, Relational Capital, which pertains to a firm's relationships with external stakeholders, fosters competitive advantage through customer loyalty (Aklan et al., 2020; Prasojo et al., 2023).

The research gap addressed in this study focuses on assessing the impact of Islamic banking's intangible resources, particularly Intellectual Capital, on market structure using the Lerner Index—a metric rarely applied in this context. While existing research often employs broader indicators like concentration ratios or the Herfindahl-Hirschman Index (HHI), the Lerner Index provides a more detailed, company-specific measure of competition. The purpose of this research is to evaluate the influence of Intellectual Capital Efficiency on the competitive structure of Indonesia's Islamic banking sector and to determine how intangible asset management affects market dynamics. By examining these aspects, this study aims to offer actionable insights for policymakers and Islamic banking practitioners to enhance competitive advantage. This study bridges the gap by offering nuanced insights into Indonesia's Islamic banking sector's competitive dynamics.

The Lerner Index is widely regarded as a more precise measure of market competition compared to CR or HHI (Sahut et al., 2015). Higher Lerner Index values signify reduced competition among Islamic banks. Additionally, this study introduces the Modified Value Added Intellectual Capital (M-VAIC) model to evaluate IC efficiency comprehensively. Using annual reports from



2015–2022 for eight Islamic bank entities in Indonesia, this research provides a novel perspective on the role of intangible asset management in driving market efficiency. Practically, the findings illuminate the current state of Indonesia's Islamic banking market structure and highlight strategies for leveraging IC to enhance competitive positioning.

LITERATURE REVIEW

Market Structure

According to Hussain et al. (2020), market structure serves as a proxy for assessing market power or the degree of competition within an industry. Market structure holds a pivotal role in the banking sector as it elucidates market segmentation, product diversity, and competitive barriers (Maghfuriyah et al., 2019). Broadly speaking, competitive markets can be classified into two categories: perfectly competitive markets and imperfectly competitive markets, the latter encompassing monopolistic, oligopolistic, and monopolistic structures. Based on the findings of Cupian & Abduh (2017), the Islamic banking sector currently operates within an imperfectly competitive market, particularly under monopolistic competition (Khoirunurrofik et al., 2020; Sahut et al., 2015).

In a monopolistic market, inefficiencies arise as firms fail to operate at the minimum average cost, resulting in excess capacity—a clear indicator of suboptimal resource utilization (Pindyck & Rubinfeld, 2013). This inefficiency signifies that firms cannot fully capitalize on specific inputs, leading to reduced overall productivity. Conversely, resource efficiency in the banking sector is paramount as it directly bolsters a company's productivity (Khan et al., 2018). Optimized resource utilization not only stabilizes financial performance but also fortifies the sustainability of banking operations over the long term (Wahyudi et al., 2021). According to Sari et al. (2022), the degree of bank efficiency is inherently tied to the intensity of market competition. Greater competition incentivizes banks to enhance efficiency by adopting innovative technologies and implementing specialization strategies to refine customer service (Tan & Anchor, 2017).

Love and Martínez Pería (2015) argue that the Efficiency Structure (ES) theory provides a more precise framework for evaluating market dominance in the banking sector. Unlike traditional metrics such as the Concentration Ratio or the Herfindahl-Hirschman Index, the Lerner Index—utilized within the ES framework—assesses market power at the individual bank level (Khan et al., 2018). As posited by Lerner (1934) and further elaborated by Spierdijk and Zaouras (2017), the Lerner Index compares the price of a firm's output with its marginal cost, reflecting the optimal pricing achieved under conditions



of perfect competition. This metric offers a nuanced view of a bank's market power across a diverse array of products (Shaffer & Spierdijk, 2020). A positive Lerner Index value indicates that banks with substantial market power tend to secure higher profitability (McMillan & McMillan, 2016). The computation of the Lerner Index can be performed using the methodology outlined by Hawtrey and Liang (2008) as follows (Equation 1). LI is Lerner Index, TR is Total Revenue and TC is Total cost.

$$LI = \frac{TR-TC}{TR} \quad (1)$$

A higher Lerner Index value indicates a greater deviation from perfect competition, signifying an elevated degree of monopoly power within the company (Le et al., 2021). However, research by Soedarmono et al. (2011) highlights that the Lerner Index can also yield negative values under circumstances where banks operate inefficiently, incurring additional costs and providing services that exceed their generated revenue. Such inefficiency often arises when newly introduced products are accompanied by prohibitively high costs, as observed in the findings of Hamza and Kachtouli (2014).

According to Ousama et al. (2020), the term "intellectual capital" (IC) encompasses intangible assets and resources that enable a business to generate value, including management expertise, knowledge, systems, branding, and human resources. Therefore, IC can be understood as knowledge-based intangible assets that confer a competitive advantage to a company by enhancing its value. Pulic (1998) elucidates that the measurement of a company's IC is derived from three key components: Human Capital, Structural Capital, and Capital Employed. This measurement approach is widely recognized as VAICTM. The VAICTM method quantifies IC based on the ratio of a company's added value to each capital indicator, resulting in an efficiency ratio (Haris et al., 2019; Bayraktaroglu et al., 2019; Ulum et al., 2017).

Human Capital Efficiency and Islamic Banking Market Structure

As a knowledge-driven industry, the role of human capital in the banking sector is indispensable, as it serves as the focal point of interactions between stakeholders and plays a pivotal role in enhancing organizational performance (Volonté & Gantenbein, 2016). Human capital is instrumental in fostering the creation of new knowledge, which drives continuous innovation essential for navigating dynamic market conditions (Umar et al., 2022). Furthermore, by augmenting employee competence, human capital can generate added value



for the organization, particularly when coupled with technological innovation (Rachmah et al., 2023), ultimately delivering enhanced benefits for stakeholders. Research by Le et al. (2022) highlights that superior Human Capital Efficiency indicators exert a more substantial influence on banking efficiency than other elements of Intellectual Capital.

Several prior studies have explored the impact of Human Capital Efficiency on banking performance in fostering a competitive advantage (Meles et al., 2016). Research by Nawaz (2019) and Yarovaya et al. (2021) demonstrates that high human capital efficiency significantly enhances the performance of Islamic banks during periods of crisis, enabling them to outperform their competitors. This resilience is attributed to banks with greater human capital (HCE), which are more adept at managing credit risk and sustaining performance (Hasnaoui & Hasnaoui, 2022). Moreover, numerous studies have affirmed that Human Capital Efficiency positively influences the competitive performance of Islamic banks (Asare et al., 2017; Ayinaddis et al., 2024; Ljumović et al., 2022; Nawaz & Haniffa, 2017; Rahajeng & Hasibuan, 2020).

H1: Human Capital Efficiency has a positive and significant influence on the market structure of Islamic banking.

Structural Capital Efficiency and Islamic Banking Market Structure

The efficiency of a company's structural capital can be assessed through the calculation of Structural Capital Efficiency (SCE). Structural Capital encompasses the non-human knowledge assets of an organization, including databases, trademarks, organizational culture, information technology systems, and operational procedures. These elements extend beyond the individual contributions of the company's workforce, enhancing its operational capabilities and intellectual property (Asfarawenti & Saiful, 2019). Structural Capital Efficiency also reflects the impact of organizational and company resources that facilitate employee productivity (Rochmadhona et al., 2018). In the absence of an effective organizational culture, rules, and procedures, even well-trained and highly motivated employees will struggle to achieve optimal performance (Al-Musali & Ku Ismail, 2016). Thus, high Structural Capital Efficiency can significantly enhance a company's ability to allocate resources more effectively. This is corroborated by the research of Le et al. (2022), which found that structural capital efficiency plays a crucial role in enhancing allocative efficiency within the Vietnamese banking sector. Moreover, the integration of information technology has been shown to bolster company performance and competitiveness (Yunis et al., 2018). Several studies have also established that structural capital positively



influences a company's competitive performance (Commer et al., 2018; Nawaz & Haniffa, 2017; Tiwari & Vidyarthi, 2018).

H2: Structural Capital Efficiency has a positive and significant influence on the market structure of Islamic banking.

Capital Employed Efficiency and Islamic Banking Market Structure

Capital Employed measures the effectiveness with which a company generates added value from its physical and financial capital (Rahajeng & Hasibuan, 2020). From a resource-based perspective, inefficient utilization of physical and financial capital can undermine the performance of Intellectual Capital (IC) resources. In this context, financial capital is represented by the equity owned by the company (Yao et al., 2019), and to assess capital efficiency, Capital Employed Efficiency (CEE) is utilized. According to Pulic (1998), a company demonstrates efficient use of its capital when the return generated per unit of capital exceeds that of competing enterprises.

Tarigan and Septiani (2017) assert that Capital Employed Efficiency is a critical IC indicator that contributes to generating added value from the capital deployed. Pulic (1998) further emphasizes that in the financial sector, IC alone cannot create value-added; it requires the infusion of additional capitals. These supplementary capitals include a blend of physical and financial assets. Efficient utilization of these physical and financial resources can enhance the added value of intangible assets, as influenced by intangible factors such as management, operational strategies, and innovation within the company. Research by Yilmaz and Acar (2018) suggests that Capital Employed Efficiency exerts a significant positive impact on the performance of banking institutions. Similarly, Mohammad and Bujang (2019) highlight the pivotal role of capital-employed efficiency in bolstering the financial performance of the Malaysian financial sector. Consistent with these findings, other studies have demonstrated that Capital Employed Efficiency positively influences the competitive performance of Islamic banks (Asfarawenti & Saiful, 2019; Asutay & Ubaidillah, 2023; Ayinaddis et al., 2024).

H3: Capital Employed Efficiency has a positive and significant influence on the market structure of Islamic banking.

Relational Capital Efficiency and Islamic Banking Market Structure

Relational Capital represents a unique resource that a company leverages to cultivate relationships with various stakeholders, including customers, creditors, competitors, and regulators (Yao et al., 2019). This form of capital encompasses expenditures on advertising, sales, and marketing, all aimed at reinforcing long-term relationships and achieving sustainable



performance. As noted by Ur Rehman et al. (2022), the Islamic banking sector remains in its nascent stage, relying heavily on stable and enduring relationships with customers to foster loyalty and establish strong market connections. To assess the efficiency of Relational Capital, one can utilize Relational Capital Efficiency by dividing the company's value added by its total promotional expenses.

Numerous studies have highlighted the positive impact of Relational Capital Efficiency on firm performance. For instance, Xu and Wang (2019) found that RCE significantly influences ROA and ROE in a positive manner. Further research has also explored the relationship between RCE and competitive performance in Islamic banking, revealing a robust positive connection (Ab. Aziz & Meor Hashim, 2017; Ur Rehman et al., 2022; Yao et al., 2019). Additionally, Relational Capital Efficiency demonstrates a direct and positive relationship with firm performance, primarily through increased sales (McDowell et al., 2018).

H4: Relational Capital Efficiency has a positive and significant influence on the market structure of Islamic banking.

METHOD

This study seeks to test the aforementioned hypotheses and evaluate the relationships between variables using a quantitative approach. The population under consideration comprises Islamic banks in Indonesia, as registered with the Financial Services Authority (OJK). Sample selection was conducted through purposive sampling. The selection criteria stipulated that only Islamic commercial banks that consistently published annual financial reports from 2015 to 2022, along with the required data pertaining to the variables in this research, would be included. Based on these criteria, the study utilized data from eight Islamic banks: Bank Muamalat, BJB Syariah, Mega Syariah, Bank Victoria Syariah, Bukopin Syariah, BCA Syariah, BTPN Syariah, and Bank Syariah Indonesia. The data for BSI pertains to the period before its merger, as BSI was previously comprised of three separate Islamic banks: BRI Syariah, BNI Syariah, and Mandiri Syariah. Following the merger, the data was averaged across the three banks. Subsequently, a stationarity test using the Dickey-Fuller method was performed to ensure the data's stability and validity for subsequent analysis.

Panel regression analysis was employed due to the nature of the data, which includes both time-series and cross-sectional data. The analysis procedure involved several stages to determine the most suitable model. Three main steps are followed in selecting the most appropriate model for panel data. First, the Common Effect Model (CEM) is compared with the Fixed



Effect Model (FEM). If the CEM is found to be more appropriate, it will be used for further analysis. Second, the Random Effect Model (REM) is compared with the FEM. Third, the CEM is compared with the REM. To identify the optimal model, the Chow test and Hausman test are applied. These tests help ascertain whether the CEM or FEM is the most suitable model. Additionally, classical assumption tests are crucial in ensuring that the regression results are accurate, unbiased, and consistent in their estimations. Panel regression analysis aims to examine the impact of Intellectual Capital (HCE, SCE, CEE, & RCE) on Market Structure, as proxied by the Lerner Index, utilizing the following regression model (Equation 2).

$$LI_{it} = \beta_0 + \beta_1 HCE_{it} + \beta_2 SCE_{it} + \beta_3 CEE_{it} + \beta_4 RCE_{it} + \varepsilon_1 \tag{2}$$

RESULTS AND DISCUSSION

Model Selection Test

The findings of the study reveal several key aspects that align with the research objectives. First, the model selection tests, specifically the Chow and Hausman tests, were conducted to identify the most appropriate model for estimating regression on panel data. The Chow test is instrumental in determining the more suitable model between the Common Effect Model (CEM) and the Fixed Effect Model (FEM) (Basuki & Prawoto, 2016). In this test, if the Cross-section F Probability value exceeds 0.05, the CEM model is selected. Conversely, when the probability is less than 0.05, the FEM model is chosen. As shown in Table 1, the probability value is 0.0001, which is less than 0.05, thereby indicating that the Fixed Effect Model is the appropriate choice for this analysis.

Table 1. Chow Test and Hausman Test Results

Effect Test	Statistic	d.f	Prob.
Cross-section F	5.596158	(7.52)	0.0001
Cross-section Chi-square	35.93704	7	0.0000
Cross-section random	4.362420	4	0.3592

Sources: E-Views 12, Data Processed (2024)

The second test conducted was the Hausman test, which serves as an additional method for choosing between the Fixed Effect Model (FEM) and the Random Effect Model (REM). The hypotheses used in this test were H0: Random Effect Model and H1: Fixed Effect Model. If the probability value is less than alpha 0.05, H0 is rejected, suggesting that the Fixed Effect Model is the more appropriate model. Conversely, if the probability value exceeds 0.05, H0 is accepted, and the Random Effect Model is selected (Basuki & Prawoto,



2016). The obtained probability value is 0.3592, which is greater than 0.05. Hence, H0 is accepted, and H1 is rejected, confirming that the Random Effect Model is the suitable choice.

Based on the results of the Chow test and the Hausman test, the Random Effect Model (REM) was determined to be the most appropriate model. The Lagrange Multiplier test was not necessary, as it only compares the Common Effect Model (CEM) with the Random Effect Model, and the CEM had already been excluded in the Chow test (Gujarati, 2009).

Classical assumption tests typically encompass autocorrelation, heteroscedasticity, multicollinearity, and normality. However, these tests are not necessarily required for every linear regression model employing the Random Effects Model (REM) method. Gujarati (2003) noted that in constructing the Gauss-Markov Best Linear Unbiased Estimator (BLUE) theory, normality assumptions are not a prerequisite, thus making the normality test unnecessary in this data analysis. Furthermore, since autocorrelation typically arises in time series data, testing for autocorrelation in non-time series data (cross-sectional or panel) is generally deemed less relevant. In contrast, Gujarati & Porter (2009) explained that the REM regression model can address heteroscedasticity issues. Therefore, conducting the classical assumption tests within the REM model suffices for detecting multicollinearity (Basuki & Prawoto, 2016).

The multicollinearity test is used to assess the correlation between independent variables. To identify the potential for multicollinearity, the Variance Inflation Factor (VIF) value is examined. If the VIF value for each independent variable is less than 10, multicollinearity is absent. Conversely, if the VIF exceeds 10, it indicates the presence of multicollinearity (Basuki & Prawoto, 2016). As shown in Table 2, the Centered VIF values for all independent variables are below 10, confirming that there is no multicollinearity among the independent variables.

Table 2. Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.00120	4.91534	NA
HCE	0.00018	5.58049	1.89644
SCE	0.00083	3.68178	3.38372
CEE	0.00592	4.33453	1.77988
RCE	0.45871	4.00286	3.28096

Sources: E-Views 12, Data Processed (2024)



Panel Data Regression Analysis

Based on the panel data results selection test, the best model used for this study was the REM model. The panel data regression results in this study are presented in Table 3. Based on the regression output results in Table 3, it can be concluded that the HCE variable exhibits a significant probability ($p < 0.05$) of 0.0000, with a coefficient of 0.0882. This suggests that the HCE variable has a significant positive relationship with the market structure of Islamic banks. In contrast, the SCE variable shows an insignificant probability ($p > 0.05$) of 0.7585, with a coefficient of -0.0073, indicating an insignificant negative relationship with the market structure of Islamic banks. Similarly, the CEE and RCE variables also display probabilities greater than 0.05—0.1772 and 0.9918, respectively—along with coefficients of -0.1219 and -0.0060. These findings suggest that both the CEE and RCE variables have an insignificant negative relationship with the market structure of Islamic banks.

Table 3. Panel Data Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.3776	0.0437	8.6302	0.0000
HCE	0.0882	0.0150	5.8591	0.0000*
SCE	-0.0073	0.0238	-0.3088	0.7585
CEE	-0.1219	0.0892	-1.3656	0.1772
RCE	-0.0060	0.5921	-0.0102	0.9918
Uji F				
R-Squared			0.4715	
Prob (F-stat)			0.0000*	

Note: Independent variable: Lerner Index; Sign (*): Significance at 0.05 level

Sources: E-Views 12, Data Processed (2024)

On the other hand, according to the output results in Table 3, the probability value of the F-statistics is 0.0000, which is smaller than $\alpha: 0.05$. This indicates that the independent variables—HCE, SCE, RCE, and CEE—together exert a significant effect on the market structure of Islamic banking as measured by the Lerner index.

R Squared Test

The coefficient of determination, or model fit test, assesses how well the independent variables can explain variations in the dependent variable. Based on Table 3, the R-squared value is 0.4715, indicating that the independent variables in this study account for 47% of the variation in the dependent variable. Meanwhile, the remaining 53% is explained by other variables not included in this study.



DISCUSSION

The Effect of Human Capital Efficiency on the Market Structure of Islamic Banks

Based on the results of panel data analysis using the Random Effect Model, the first hypothesis in this study is supported. Human Capital Efficiency (HCE) has a positive and significant influence on the market structure of Islamic banking in Indonesia. This finding corroborates previous studies by Ljumović et al. (2022), Ur Rehman et al. (2022), and Yao et al. (2019), all of which confirmed a significant positive relationship between HCE and the enhancement of competitive performance within Islamic banking.

The results further highlight the importance of efficient human capital management in Islamic banking, as it generates added value that exceeds the costs incurred by the institution, thereby contributing to a more competitive market structure. This is attributed to the ability of human capital efficiency to foster sustainable competitive advantages through effective cost management, productivity improvements, and differentiation based on Islamic values. Such efficiencies not only strengthen the competitive position of Islamic banks but also underscore their role in an increasingly competitive market environment (Khoirunurrofik et al., 2020; Sahut et al., 2015).

Additionally, Kornitasari et al. (2022) emphasize that managing human resources according to Islamic values—such as honesty, responsibility, and professionalism—supports business efficiency by enhancing productivity and performance. The Islamic principles of justice, trustworthiness, and sustainability ensure that efficiency is not solely profit-driven but also considers collective well-being. This aligns with the maqasid al-shariah, which seeks to preserve religion, intellect, life, wealth, and lineage (Prasojo et al., 2023).

Efficient human capital also plays a critical role in reducing credit risk, which is a key concern in banking. Credit risk is particularly significant because loans and financing are the primary assets of banks. Furthermore, lower credit risk ultimately leads to higher returns from the financing provided by banks (Hasnaoui & Hasnaoui, 2022). Therefore, it is essential for employees to carefully select clients and manage risks, given that the majority of banking assets are tied to loan portfolios. This careful risk management is facilitated by skilled employees who can more effectively evaluate and mitigate loan risks. This result aligns with the findings of Haris et al. (2019), who assert that HCE is a critical indicator of Intellectual Capital (IC). Investments in HCE, such as employee education and skill development, lead to higher efficiency and sustainable performance for Islamic banks.



The validity of this finding is reinforced by data indicating that Indonesia leads in global Islamic finance knowledge indicators (Islamic Finance Development Indicator Report, 2022). One key metric in the report is the number of educational providers offering Islamic finance degrees. Indonesia scored 200, surpassing Malaysia (93), Bahrain and Jordan (71 each), and Saudi Arabia (68), which directly points to the availability of skilled human resources knowledgeable in Islamic finance and law in the country. As a knowledge-based service sector, human capital is an indispensable resource for Islamic banking (Ousama et al., 2020), as the industry requires the intellectual capabilities of its employees to generate added value and remain competitive.

To further maximize these resources, many Islamic banks have introduced Management Trainee programs, which provide fresh graduates with comprehensive experience and training across various areas of Islamic banking. This approach helps align their skills with the bank's needs and supports their progression to managerial roles. Research by Ying et al. (2019) indicates that managerial experience in business and industry can provide significant benefits to companies by contributing to sustainable performance. This experience allows managers to identify and assess external business pressures, thereby enhancing their ability to navigate complex business environments.

The Effect of Structural Capital Efficiency on the Market Structure of Islamic Banks

The results obtained from the panel data regression indicate that SCE does not significantly influence the market structure of Islamic banking in Indonesia. Consequently, the second hypothesis, which posits that SCE has a positive and significant impact, is rejected. The inefficiency of SCE suggests that the Islamic banking industry currently faces obstacles related to research, development, and operational business processes. Ma'rifa, H. S. (2023) asserts that Islamic banks incur high operational costs, signaling inefficiencies that drive them toward a concentrated market structure. A concentrated market structure occurs when a small number of Islamic banks control a large share of the market.

This finding further implies that structural capital in Islamic banking plays a more supportive rather than a driving role, indicating that Islamic banking still acts as a complement to the conventional banking industry (Maspupah et al., 2022). Moreover, the regulatory infrastructure within the banking industry tends to be relatively homogeneous between conventional and Islamic banking (Triyanta, 2009). This homogeneity may hinder product



innovation within Islamic banks, as they must adhere to Sharia regulations. However, Cupian & Abduh (2017) argue that to enhance market share, Islamic banks must strategically leverage structural capital in product innovation and service efficiency.

The Islamic banking market is characterized by unique factors, such as limited liquidity and concentrated competition, with trust playing a central role in shaping competitive dynamics. These elements make it difficult for structural improvements alone to exert a significant influence on market dynamics. Competitive strategies in Islamic banking often depend more on human interactions and customer relationships than on purely structural efficiencies. As such, structural capital, which represents the internal knowledge of the bank, does not impact on the competitive market structure.

To enhance the role of structural capital effectively, Islamic banks must integrate it more strategically with human and relational capital while promoting innovation that aligns with Sharia principles. Addressing these factors could better position structural capital to influence market competitiveness. This, in turn, could increase the strategic risks faced by Islamic banks. High strategic risks may arise from inadequate management information systems and the failure to anticipate shifts in the business environment, such as technological advancements and changes in competitive dynamics. The results of this study are consistent with prior research that indicates SCE has a negative and insignificant effect on the performance of financial institutions (Haris et al., 2019; Mohammad & Bujang, 2019; Oppong & Pattanayak, 2019).

Furthermore, this finding suggests that the current investment in structural capital within Islamic banking has yet to yield significant improvements in employee productivity. This observation is illustrated in Figure 2, which compares the research and development expenditures of all Islamic commercial banks in Indonesia with those of a conventional bank in KBMI 3, Bank Maybank Indonesia, which has lower total assets than BSI in 2021 (Kartika A, 2022).

Based on Figure 2, Structural Capital, as a business process that strengthens human resources to develop new products to attract customers, is inadequately implemented in Islamic banks. This is evident from the low total R&D expenditure of Islamic banks compared to conventional banks in Indonesia. This shortfall can directly impact the operational risk of Islamic banks through inefficient internal processes, leading to operational or system failures (OJK, 2016). For instance, a recent ransomware attack on BSI's mobile banking system resulted in financial losses and a tarnished bank reputation, leading to a decline in customer confidence (Ma'rifa H, 2023).

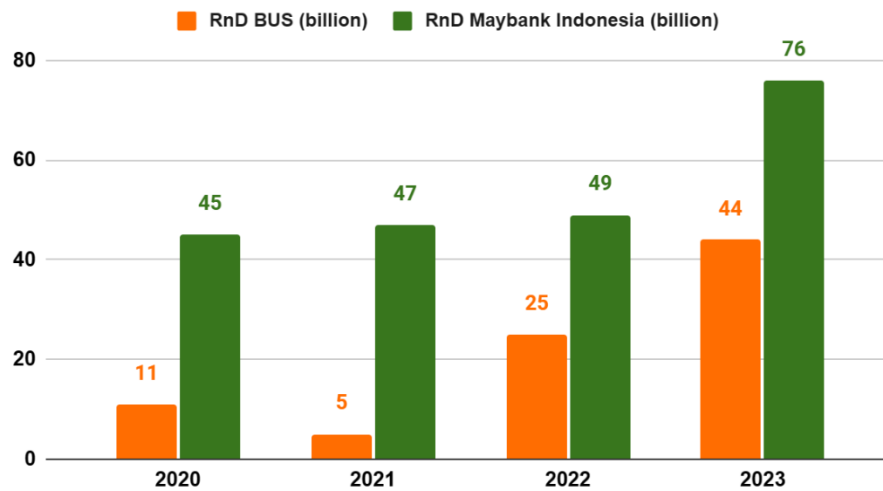


Figure 2. Comparison of R&D Expenses of BUS and Bank Maybank Indonesia
Sources: Maybank Indonesia Annual Reports

The low investment value may also be attributed to the relatively nascent stage of Islamic banks, as most of them were established in 2010 or earlier (Nasirwan et al., 2024). Consequently, Islamic banks must modernize their IT infrastructure to enhance their competitive performance (Asutay & Ubaidillah, 2023). Investment in information technology is crucial because it can positively influence the market structure of Islamic banks by increasing the efficiency of skilled IT staff and providing optimal services to bank customers through electronic channels such as ATMs and Internet banking, thereby supporting the business performance of Islamic banks (El-Bannany, 2012).

The Effect of Capital Employed Efficiency on the Market Structure of Islamic Banks

Based on the results from panel data regression analysis, a negative and insignificant relationship between CEE and the market structure of Islamic banking is observed. This finding aligns with several previous studies, such as Rahajeng & Hasibuan (2020) and Vidyarthi (2019). The insignificance of this relationship suggests that the utilization of working capital in Islamic banking in Indonesia has not made a significant impact. Additionally, the presence of unproductive assets in Islamic banks and a higher proportion of debt capital compared to investment capital are contributing factors to a less competitive market structure (Barak & Sharma, 2024).

Capital Employed measures the effectiveness with which a company generates added value from its physical and financial capital (Rahajeng & Hasibuan, 2020). From a resource-based perspective, the inefficient use of physical and financial capital can undermine the performance of Intellectual



Capital (IC) resources. In this context, financial capital is represented by the equity owned by the company (Yao et al., 2019). Capital Employed Efficiency (CEE) is used to calculate the efficiency of capital. According to Pulic A (1998), a company utilizes its capital more efficiently when the capital it employs generates a higher return compared to other enterprises.

This finding is consistent with the reality that some Islamic banks in Indonesia have established subsidiaries or spin-offs from conventional parent banks. Several prior studies have shown that spin-offs do not significantly affect the asset growth and profitability of Islamic banks, as it is questionable whether Islamic bank units in Indonesia can capture 50% of the assets of their parent banks (Al Arif et al., 2017; Pambuko et al., 2019). This is further substantiated by the fact that total Islamic banking assets constitute only 7.33% of the national banking assets, which amounted to 11.315 trillion in 2024.

Regarding the assets of Islamic banks, research by Syarif et al. (2023) indicates that some Islamic commercial banks allocate part of their assets to settle outstanding debts, which negatively impacts their ability to generate optimal returns. The leverage/debt ratio is a financial indicator used to assess the extent to which a bank relies on debt in its operations relative to its investment capital. The leverage ratio, calculated by the Debt-to-Equity Ratio (DER), is illustrated in Figure 3.

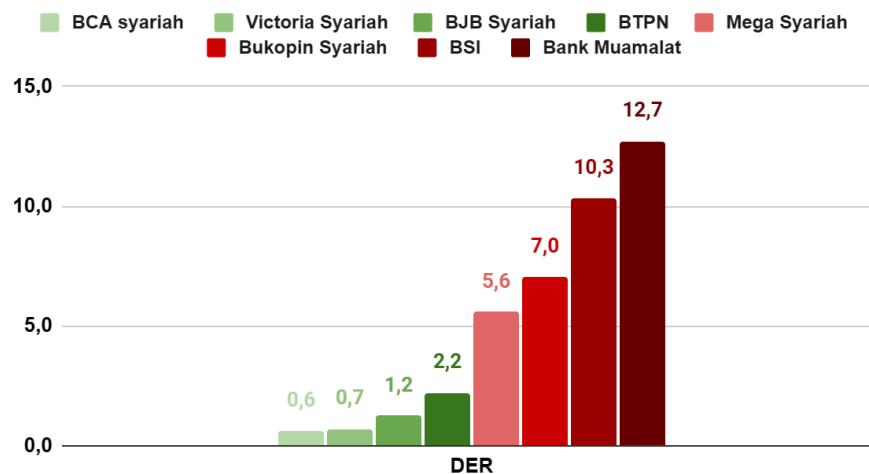


Figure 3. Average DER BUS 2015-2022
Sources: Sharia Bank Annual Reports

Referring to the OJK provisions, the minimum limit for the Islamic banking leverage ratio is 3% (OJK, 2019). However, among the banks sampled in this study, only four banks have an average Debt to Equity Ratio (DER) below 3%. This condition is not ideal for Islamic banks, as when the capital structure is predominantly composed of debt, it can elevate financial risks,

leading to inefficiencies in the bank’s operations. This, in turn, results in the overall inefficiency of Islamic banks, as reflected in the high BOPO ratio observed from 2015 to 2022, with an average of 88.75%.

According to the research by Pramesti & Damayanti (2023), the BOPO ratio is negatively correlated with the performance of Islamic banks. Specifically, a higher BOPO ratio leads to a lower Return on Assets (ROA), which, in turn, affects the market structure by reducing the competitiveness of Islamic banks. On the other hand, the elevated BOPO ratio is also influenced by internal factors, particularly within the operational processes of the Islamic banks themselves. In conducting their financing operations, Islamic banks must adhere to the principles of compliance risk management. Islamic banks utilize the Profit and Loss Sharing (PLS) scheme to provide their business services, which inherently involves higher risks, as exemplified by *Musyarakah* and *Mudharabah* financing instruments. Additionally, they adopt a cost-plus-profit scheme, as seen in *Murabahah* financing instruments. The total percentage of financing disbursed by Islamic banks during 2018-2022 is depicted in Figure 4.

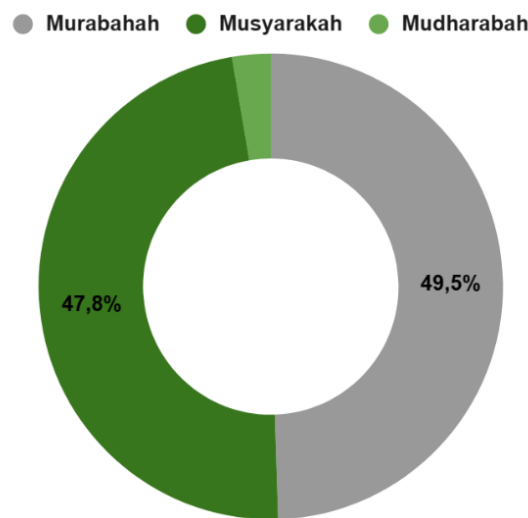


Figure 4. Average Sharia Bank Financing 2018-2022
Sources: OJK (2024)

Based on Figure 4, the percentage of financing disbursed under the Profit and Loss Sharing (PLS) scheme, such as *Musyarakah*, currently stands at 47.8% (Rp 195.269 billion), slightly lower than the profit-sharing-based financing like *Murabahah*, which accounts for 49.5% (Rp 202.223 billion) of the total financing disbursed by Islamic banks. Under the Profit and Loss Sharing principle, banks cannot precisely determine their profit rate, causing the expected profit-sharing rates for customers to fluctuate. Ultimately, this



variability can lead to higher operational burdens, as Islamic banks must utilize the Provision for Productive Asset Write-Off (PPAP)/reserve for losses to ensure the smooth disbursement of their financing (Yokoyama & Mahardika, 2019). This situation may result in less competitive returns offered by Islamic banks compared to conventional banks that utilize interest-based schemes.

The Effect of Relational Capital Efficiency on the Market Structure of Islamic Banks

The results of the panel data regression analysis indicate that RCE does not exert any influence on the competitive performance of Islamic banking in Indonesia, leading to the rejection of the fourth hypothesis, which posited a positive and significant effect. This finding is consistent with previous studies that suggest RCE in Islamic banks has no significant impact on firm performance (Asutay & Ubaidillah, 2023; Soetanto & Liem, 2019; Yao et al., 2019). This outcome implies that the added value derived from the relationship between Islamic banks and their external stakeholders (including society and other parties) has yet to positively influence the market structure, thereby resulting in a less competitive landscape. This is attributable to the reality in business operations, where not all investments in Intellectual Capital (IC) yield profits, as companies must consider trade-offs and prioritize urgency among the various IC indicators when allocating resources (Yao et al., 2019).

According to Ur Rehman et al. (2022), the Islamic banking sector remains in its introductory phase and is dependent on cultivating stable and sustainable relationships with customers to build loyalty and forge strong market ties. Furthermore, the findings of this study also carry implications for the implementation of risk management within Islamic banks, particularly with respect to reputation risk (OJK, 2016). The insignificance of RCE could exacerbate this risk, resulting in diminished stakeholder trust, customer attrition, and a potential decline in the performance ratings of Islamic banks.

The results of this study are, therefore, not entirely unexpected, considering that Islamic banks are still in the nascent stage of Indonesia's economic structure, which operates under a dual banking system (Ur Rehman et al., 2022). In this context, Islamic banks are relatively new compared to their conventional counterparts. Given the current economic structure, which does not yet fully support the growth of Islamic banks, these institutions must exert considerable effort to enhance their competitiveness. This is particularly challenging as consumers are more accustomed to the product offerings and easy access to financial products provided by conventional banks. This is



corroborated by the fact that the market share of Islamic banks presently constitutes only 7% of the national total.

Moreover, the lack of familiarity with Islamic bank products among the general population further exacerbates this issue, as evidenced by the low Islamic financial inclusion index, which stands at just 12.12% (OJK, 2022). According to Friderica Widyasari Dewi, the Executive Head of Financial Services Business Conduct Supervision, Consumer Education, and Protection at OJK, this figure remains significantly below the national average of 85.1%. As a result, the prevailing view among most consumers in Indonesia is that Islamic financial products are less customer-oriented and overly complex (Malini & Putri, 2020). Therefore, based on the foregoing, it will take a considerable amount of time for the public to fully comprehend and embrace Islamic banking products, as the integration of Sharia principles in banking remains a barrier to their widespread acceptance.

CONCLUSION

This study concludes that Islamic banks in Indonesia operate within a monopolistic market structure. Among the various indicators of Intellectual Capital, Human Capital Efficiency (HCE) emerges as the only factor that has a positive and significant impact on the market structure, contributing notably to the value generated by Islamic banking. In contrast, other indicators such as Structural Capital Efficiency (SCE), Capital Employed Efficiency (CEE), and Relational Capital Efficiency (RCE) do not show any individual effect on the market structure. Nevertheless, when considered collectively, all the Intellectual Capital variables significantly influence the market structure of Islamic commercial banks. These findings highlight the pivotal role of managing intangible assets, particularly Intellectual Capital, in shaping the competitive performance of Islamic banks.

The implications of these findings suggest that Islamic banks need to reorient their strategies toward customer-centric approaches to remain competitive in the evolving market. Investment in human capital (HC) has proven to be a key driver of competitive advantage. Furthermore, prioritizing investments in banking technology and research & development (R&D) is also crucial for ensuring sustained growth. To enhance financial performance, strategies such as promoting Current Account & Saving Account (CASA) products can effectively reduce the Cost of Funds. Strengthening collaborations with external stakeholders is also vital, as leveraging opportunities within banking products can foster greater cooperation and drive innovation. Additionally, regulators must further explore market dynamics to create a more competitive environment for Islamic banks, while



regulatory support for the consolidation of Islamic banks could enhance Intellectual Capital efficiency, enabling these institutions to become more efficient and provide greater societal benefits.

This study has several limitations. Notably, the measurement of Intellectual Capital (IC) remains reliant on traditional approaches due to constraints in data availability. Future research could benefit from adopting updated methods, such as E-VAIC+, to measure IC more accurately. Additionally, expanding the scope of future studies to include other relevant intangible variables, such as Good Corporate Governance, could offer a more comprehensive understanding of the factors influencing Islamic banking performance. Future researchers may also consider broadening their analysis to include Islamic Business Units (IUBUs) or Islamic Rural Banks (BPRS), providing more holistic insights into the Islamic financial industry in Indonesia.

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