Efficiency Analysis of Takaful Companies' Performance Using Stochastic Frontier Analysis Approach: A Comparison Between Southeast Asia and The Middle East Regions

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Abstract

This study aims to measure the efficiency of Takaful companies in Southeast Asia and the Middle East region. The efficiency level of Takaful companies in Southeast Asia and the Middle East region was examined from 2016 to 2020. The sample consisted of 23 companies in Indonesia, 14 in Malaysia, three in UEA, and 31 in Saudi Arabia. The efficiency value of Islamic insurance companies was calculated using the Stochastic Frontier Analysis (SFA) method, afterward, the Mann-Whitney test was performed. The results showed that the efficiency median value of the companies in Southeast Asia was lower compared to the Middle East with respective values of 0.26 and 0.32. It was concluded from the results of the Mann-Whitney test that the differences in the median efficiency value of Islamic insurance companies in Southeast Asia and the Middle East were not significant. The novelty of this research is to provide new and significant information on the performance of Takaful Companies during 2016-2020. The results of this study have significant implications for policymakers in each of the countries examined in order to understand the efficiency condition of Takaful companies in the region. Furthermore, policymakers particularly in Southeast Asia need to promote low-efficiency Takaful operators to expand their business. The lowest efficiency score for Takaful companies is in Indonesia, especially for small Takaful companies. The implication is that the Indonesian

government or related agencies need to increase the popularity of Takaful companies among the public so that income and efficiency increase.

Keywords: *efficiency; takaful companies; stochastic frontier analysis*

INTRODUCTION

Takaful or Islamic insurance is an insurance that complies with the Shariah principles. Members of Islamic insurance put money into a pool system to indemnify one another against loss or harm. Health, life, and general insurance requirements are covered by takaful policies (Kagan, 2021). This form of insurance mandates that all transactions be lawful and that all investments made to develop the premium be backed by legitimate trade or business-related activities that comply with Islamic finance law (Abdullah, 2012).

The operations of a takaful business have their own distinctive qualities. To begin, the takaful insurer needs to establish a distinct fund for policyholders, which will then be kept separate from the fund for stockholders. It enables the insurer to maintain its shareholders' fund while at the same time drawing money from policyholders for the purpose of supporting its insurance activities. The mudharabah model, also known as "profit-sharing," governs the distribution of operating earnings among policyholders, shareholders, and other stakeholders (Al-Amri et al., 2021). One of the most significant benefits of the Mudharabah model is that it gives managers of takaful companies the incentives they need to participate in productive operational activities in order to maximize the returns that capital providers receive (Kader et al., 2014).

Takaful's existence has currently become an important part of Islamic financial institutions globally, specifically in reducing financial risk and potential credit crises triggering banking run (Acharya et al., 2013; He & Manela, 2016). However, there is still a need to perform a further investigation on its importance in order to

achieve long-term growth in many aspects (Mayenkar, 2015). This is why this research focuses on comparing the efficiency of Takaful firms in Southeast Asia and the Middle East.

The study of the company's efficiency, such as Takaful companies, is crucial for assessing their performance and defining their competitiveness. In addition, the measurement of efficiency in takaful companies is an important indicator because it gives an overall picture of the company's ability to endure and thrive in the face of intense competition, which will eventually aid in the expansion of Indonesia's economy (Baroroh, 2022). It has been observed that using a parametric method with Stochastic Frontier Analysis (SFA) focusing on various countries is rare. Therefore, it is important to conduct investigations on the efficiency of Islamic insurance companies with cross-country comparisons, using the SFA method. When compared to other approaches, this one offers a number of benefits. The first step of the stochastic frontier analysis includes a term that is meant to represent disturbances, measurement errors, and uncontrolled exogenous shocks. Second, environmental variables are simpler to work with, they make it possible to statistically evaluate hypotheses, and they are much simpler to spot when they are acting as outliers (Coelli et al., 2005).

Secondary data in the form of financial statements of Islamic insurance companies in Southeast Asia and the Middle East was used for this study. The rationale for selecting these 2 regions was that they had the highest indexes out of a total of 48 countries measured according to the 2019 Islamic Finance Country Index (IFCI). The four countries with the highest scores in the two regions were Indonesia, Malaysia, Iran, and Saudi Arabia. However, Iran did not meet the criteria as a sample, which is the reason UEA was selected as an alternative. Most studies on insurance company effectiveness are in one country, and there are not many cross-

country studies (Coskun et al., 2021). It is essential in cross-national studies of business efficiency to exercise control over the circumstances of the business environment (Rubio-Misas, 2020; Shaddady, 2022). The novelty of this study is that it compares two regions, Southeast Asia and the Middle East, and it uses the stochastic frontier analysis method.

LITERATURE REVIEW

The overall cost efficiency (CE) score of a takaful insurer represents both the technical and allocative efficiencies of the company. The term "technical efficiency," or TE for short, refers to how effectively technology is utilized in the process of producing output from input. The term "allocative efficiency," or AE, refers to how effectively management selects the combination of inputs given the prices of those inputs. Because of either technical inefficiency or allocative inefficiency, or both, it is unlikely that all takaful insurers will be able to function at the production and cost frontiers simultaneously. If the costs of a Takaful company are comparable to the costs of a best practice company working under the same circumstances, then the Takaful company is considered to be cost-efficient (i.e., producing the same output bundle with the same input prices) (Kader et al., 2014).

When it comes to financial institutions and banks, efficiency ultimately results in an increase in the marginal profit. This is because there is a lower risk of failure (Akhter et al., 2017). Using non-parametric methods such as Data Envelopment Analysis (DEA), a number of studies (Rusydiana & Nugroho, 2017; Sunarsih & Fitriyani, 2018; Akhtar, 2018; Almulhim, 2019; Jaloudi, 2019) measured the effectiveness of Islamic insurance. These studies concentrated on specific countries, such as Indonesia, Malaysia, Jordan, and Saudi Arabia. Other studies analysed the effectiveness of

Islamic insurance utilizing DEA in conjunction with an intermediation strategy (Sunarsih & Fitriyani, 2018; Tuffahati et al., 2019). Another research on the effectiveness of Takaful in the Gulf countries discovered that the United Arab Emirates and Qatar have the most technically efficient insurance companies, while Saudi Arabia and the United Arab Emirates have the insurance companies that are the most cost-effective (Al-Amri, 2015).

Studies on insurance companies' efficiency have been conducted in the context of one country by comparing conventional and Shariah. According to research conducted by Ismail et al. (2011), which compared the effectiveness of Islamic and conventional insurance businesses operating in Malaysia from 2004-2009, the efficiency score of Takaful was found to be quite low. Almulhim's (2019) study comparing the effectiveness of Tafakul to that of conventional insurance in Saudi Arabia showed that Tafakul had a higher overall value than the conventional insurance business. Akhtar's (2018) research used DEA to investigate the performance of Saudi Arabian Takaful and conventional insurance companies between the years of 2010 and 2015. It was recommended that conventional insurance companies as well as Takaful insurance companies should adhere to the best practices in the business in order to increase their levels of efficiency and productivity.

Furthermore, Ulansari & Septiarini (2020) compared the efficiency of Shariah with conventional insurance companies in Indonesia from 2011 to 2018. The method used was SFA with input variables in the form of total capital and expenses, while the output was total income. The samples were 28 conventional and 12 takaful companies. The first consists of 21 life insurance and 7 general insurance, while the second consists of 9 Shariah life insurance and 3 Shariah general insurance companies. It was observed that there is

no difference in efficiency values between conventional and takaful companies (Ulansari & Septiarini, 2020).

Cross-country analysis of the insurance company's efficiency using the SFA approach is still rare. Nasution (2021) analyzes the efficiency of takaful companies in Indonesia and Malaysia using SFA. A study on the topic with a wide range countries involved was conducted by Coskun et al. (2021). They analyze 41 takaful companies from 16 countries. However, the approach is different from this study. They use a nonparametric method, the DEA. A wide range of cross-country study by Karbhari et al. (2018) analyzes the efficiency of the Takaful industry in the Middle East North Africa (MENA) and the Southeast East Asian (ASEAN) region from the period 2002-2013. Takaful insurer data was gathered from the World Islamic Insurance Directories (WIID). Based on 134 takaful companies from 21 countries, the DEA method was applied to estimate technical and scale efficiencies.

There is a strong possibility that Islamic finance is driving the expansion of commerce in insurance services. Al-Fori and Gani (2022) conducted research to determine whether or not Islamic finance encourages commerce in the Middle Eastern insurance services industry. It has been discovered that Islamic banking has a positively correlated and statistically significant relationship with both the exports and imports of insurance services. Other factors that are statistically significant determinants include economic sizes (both domestic and those of trading partners), growth in trading partners, the expense of doing business, legal rights, and financial freedom.

METHOD

This study uses secondary data gathered from financial statements on each firm's website. The sample years are 2016, 2017, 2018, and 2019. Three variables are used: capital, expenses, and

income, measured in millions of rupiah. The Takaful companies were active companies registered with authorized institutions in each country. The number sample from each country is 23 Takaful companies from Indonesia, 14 from Malaysia, three from UEA, and 31 from Saudi Arabia, respectively. Therefore, the efficiency of 37 takaful companies in Southeast Asia was compared with that of 34 in the Middle East.

These two regions namely ASEAN and the Middle East were selected because according to the 2019 IFCI, countries in the two regions contributed the highest index among a total of 48 measured. Indonesia, Malaysia, Iran, and Saudi Arabia are the top countries with the highest scores. After being studied, Iran did not fulfill the criteria, so UEA was selected as an alternative. The parametric SFA method was used to obtain the efficiency score, while the production function approach in determining the output-input variables was adjusted.

The efficiency value range from zero to one, such that as it goes closer to one, the company becomes more efficient. A standard SFA with a production function has the following general form:

$$Ln(Q) = \beta_0 + \beta_1 ln(P_1) + \beta_2 ln(P_2) + \beta_3 l_n(P_3) \dots \beta_n l_n(P_n) + E_n$$

P and Q are input and output variables, respectively.

$$E_n = V_i - U_i$$

The assumptions are:

$$U_i \sim iid|N(0, \sigma_u^2|$$
$$V_i \sim iid|N(0, \sigma_v^2|$$

Ui and Vi are distributed independently of each other.

In this study, the input variable was total income, while the outputs were total capital and expenses. The SFA function are expressed as follows:

$$Ln(Y) = \beta_0 + \beta_1 ln(X_1) + \beta_2 ln(X_2) E_n$$

Where:

Y: income

X_1: capital

X_2: expenses

The takaful companies' efficiency score was calculated using the Frontier 4.1 software and the descriptive statistics as well as boxplot of the efficiency score from the SFA method was performed to compare the efficiency of Takaful companies. Afterward, the normality test of two samples or the two regions were performed, and their efficiency values were compared using a statistical test. The hypothesis was whether there are differences in the efficiency values of takaful companies in the ASEAN and the Middle East regions. The mean t-test was used only when each sample meets the assumption of normality, otherwise a nonparametric test was utilized. The hypothesis for nonparametric test aformulated:

Ho: The median efficiency of takaful companies in the Middle East and Southeast Asia is similar .

H1: The median efficiency of takaful companies in the Middle East and Southeast Asia differs significantly.

This study calculates the efficiency score and then applies two independent sample tests to test the efficiency score between takaful companies in ASEAN and the Middle East. Other studies (Almulhim, 2019; Rabbaniyah & Afandi, 2019; Ulansari & Septiarini, 2020; Bansal & Singh, 2021; Hasanatina et al., 2021) use two-stage analysis, which, after calculation of the efficiency score, regression analysis is conducted. However, only some studies use the parametric method to calculate the efficiency score. The input and output variables in the calculation of the efficiency score also differ from one another. The method used in Nasution (2021) is similar to

SFA but has no two-stage analysis. The difference is in the input and output variables. He uses total assets and expenses as input and claims and premiums as output variables. However, he did not compare the two samples using hypothesis testing.

RESULT AND DISCUSSION

Descriptive Statistics

The total number of companies that met the criteria from ASEAN and Middle East was 70, as presented in **Table 1**. They are 23 takaful companies in Indonesia, as well as 14, 3, and 30 from Malaysia, UEA, and Saudi Arabia, respectively. The total observations were 280 since the number of companies analyzed was 70 with four sample years (2016, 2017, 2018, 2019).

Table 1
Number of study objects by region

Region	Country	Observation	Observation	Data availability
Southeast Asia	Indonesia	23	37	
	Malaysia	14		
Middle East	Saudi Arabia	30		2016-2019
	UEA	3	33	
Observation		$i = 70$		t = 4 years
		n = 70 x 4 = 280		

Source: Author calculation (2021)

Companies that have the highest revenue values in each country are shown in **Table 2**. The data are in millions of rupiah. The highest income is takaful company from Saudi Arabia, Bupa Arabia for Cooperative Insurance company. Malaysia is on positioned second, and Indonesia and UEA follow it. The four companies in the table generally have an increasing trend in income during the study

period, except for Takaful Emarat, which income decreased in the third year and increased again in the fourth year.

Table 2
List of takaful companies with the highest income per country

Company	Year	Income (Y)	Capital (X1)	Expense (X2)
Prudential Life Assurance	2016	2,350,649	7,519,888	1,258,176
(Indonesia)	2017	2,421,782	2,518,136	6,334,699
	2018	2,564,012	2,013,026	1,481,679
	2019	2,828,419	1,631,794	1,313,051
Etiqa Family Takaful	2016	11,282,749	6,266,464	1,011,793
Berhad	2017	12,739,515	6,221,285	1,134,794
(Malaysia)	2018	13,802,376	5,806,837	1,292,828
	2019	16,725,685	6,343,615	1,505,023
Bupa Arabia for	2016	29,944,454	7,834,563	27,416,941
Cooperative Insurance	2017	30,038,803	8,971,967	28,091,156
Company	2018	31,890,945	9,949,735	30,007,639
(Saudi Arabia)	2019	36,730,641	11,720,198	34,147,503
Emarath Takaful	2016	1,746,816	560,154	1,609,898
(UEA)	2017	1,943,091	587,167	1,858,558
	2018	1,420,074	651,178	1,852,023
	2019	1,889,037	467,675	2,086,407

Note: in millions of rupiah
Source: Primary data processed (2021)

Econometric Model

A comparative analysis of the efficiency of takaful companies' performance in Southeast Asia and the Middle East was performed using the SFA method. After converting all existing secondary data into natural logarithms, the data was processed using Frontier 4.1 software. One of the outputs of this software was the estimation result of the econometric model which revealed the extent to which the independent or input variable affects the dependent or output. It is important to note that all data obtained from the financial

statements of every company were converted into Rupiah before processing.

Table 3
Estimation results with maximum likelihood estimation method

	Coefficient	**Standard- error**	*t*-ratio
Constant	2.6238	2.4305	1.0795
Capital (X1)	0.4177	0.0699	5.9722
Expenses (X2)	0.5365	0.0498	13.1542
Sigma-squared	2.1951	0.6835	3.2112
Gamma	0.8883	0.0455	19.5182
LR		79.4605	

Source: Primary data processed (2021)

It was observed that the *t*-table, in **Table 3**, with 5% alpha was 1.960, indicating that there was a significant effect of capital and expenses on income. The estimated value of the beta parameter for capital was 0.4177, indicating that when the total capital increases by 1%, the total income tends to increase by 0.4177%. Meanwhile, the coefficient of expenses indicated that when there was an increase of 1%, the total income increased by 0.5365%. This means that the relationship between total capital and income was positive, and it is in accordance with the theory that as the capital increases, the income also rises. It was also observed in the positive relationship between total expenses and income that increasing expenses with good efficiency are usually followed by an increase in income. This simply means that when the increase in expenses occurs in order to expand the volume of revenue, it tends to have a positive impact on the company's income.

The Likelihood Ratio (LR) value was compared to the Kodde-Palm table (Kodde & Palm, 1986) to see whether the data was suitable for the Frontier model. It was observed that the critical value

with 5% alpha and df=1 was 2.706. The degree of freedom was the number of restrictions in the Frontier output. Since LR (79.4605) > critical value, Ho is rejected, indicating that the model fits the data.

Also, the Gamma coefficient value was 0.8883, indicating that 88.83 % of the error term was caused by technical inefficiency. This means that the inability of insurance companies to generate optimal revenue of 88.83% was caused by technical inefficiency and the remaining 11.7% was due to risk.

Efficiency Analysis with Stochastic Frontier Analysis (SFA)

The efficiency value range is a score from 0 to 1, and it was observed that as the values get closer to 1, the company becomes more efficient, and vice versa. SFA was conducted for panel data, which are in the form of numbers in the financial statements converted into Rupiah. Based on the output of Frontier 4.1 software, 28 companies out of 70 have efficiency values that were above the average of 0.3695 or 36.95%.

The proportion of takaful companies that are above the average efficiency was 50% for each ASEAN and Middle East. Furthermore, all the three takaful companies in UEA scored above the average efficiency of which 14 out of the 28 came from the ASEAN region and was dominated by Malaysia, while only two Indonesian takaful companies above average, for efficiency.

It was further observed that the highest efficiency value in a takaful companies in Southeast Asia is Prudential BSN Takaful Berhad Malaysia with value of 0.9187, while the lowest was Asuransi Simas Jiwa Indonesia with 0.0431. The highest efficiency value of takaful companies in the Middle East region is in UEA, namely Bupa Arabia For Cooperative Insurance Company with a value of 0.5433, while the lowest was in Saudi Arabia, namely Sabb Takaful with 0.1737.

The descriptive statistics on the comparison of the technical efficiency of takaful companies in Southeast Asia and the Middle East are shown in **Table 4** and **Figure 1**.

Table 4
Descriptive statistics of takaful companies efficiency score

	Southeast Asia	*Middle East*
Mean	0.3927407	0.3434991
Standard Error	0.04753046	0.01842179
Median	0.2664190	0.3228501
Standard Deviation	0.289116499	0.105825129
Range	0.875587855	0.36957215
Maximum	0.9186994	0.5433106
Minimum	0.0431115	0.1737385
Count	37	33

Source: Primary data processed (2021)

A total of 37 and 33 takaful companies were studied in the Southeast and East Asia region, respectively. It was observed that the average technical efficiency of the companies in Southeast Asia is 0.05 points higher than the Middle East. For example, the maximum technical efficiency value in the Middle East is 54% and for Southeast Asia is 90%. It is also observed that the minimum value of technical efficiency in Southeast Asia is smaller compared to the Middle East. Based on the higher standard deviation and interquartile range (IQR) values for Southeast Asia, their company's technical efficiency is more varied compared to the Middle East.

Figure 1
Box plot efficiency score of takaful companies
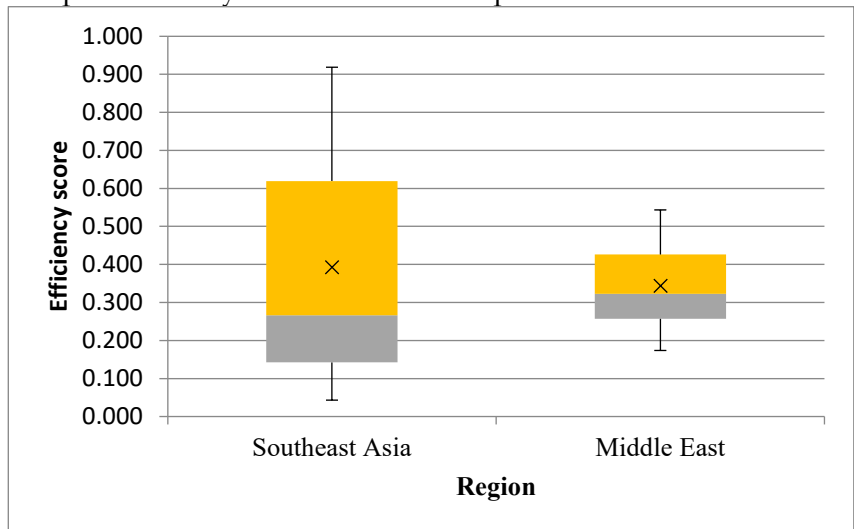
Source: Primary data processed (2021)

It was observed that the whisker boxplot length for Southeast Asia data is longer than the Middle East. This means that the distribution of the technical efficiency score of Southeast Asian takaful companies is more varied compared to the Middle East region. Furthermore, the x symbol in the boxplot indicates that the central tendency measured by the average efficiency value of takaful companies in Southeast Asia was slightly higher than in the Middle East. The average efficiency value of each country is presented in **Table 5**.

Table 5
Mean efficiency score for each country

Country	Mean Efficiency Score	n
Malaysia	0,6824	14
UEA	0,4266	3
Indonesia	0,3695	23
Saudi Arabia	0,3352	30

Source: Primary data processed (2021)

Based on the descriptive statistics for each country, Malaysia occupies the top position as the country with the most efficient takaful companies. Malaysia is one of the countries that give takaful insurers tax advantages. It helps them become more cost-efficient than others. UAE is positioned second after Malaysia. UAE, and also Malaysia, allow managers choice over the type and mix of takaful business models that can be used (Kader et al., 2014).

Compared to the result from Nasution's (2021), finding of this study is far from similar. The sample used in Nasution (2021) was ten takaful companies from Indonesia and 11 from Malaysia. With sample years of 2016-2020, the mean efficiency score of Indonesia's takaful is 0,6306, while Malaysia's is 0,6160. The difference exists due to the different samples included in the analysis. It affects the efficiency score because the efficiency score is relative. Different output and input variables also may affect the difference. They use total assets and total expenses as input; and claim and premium as output variables.

Comparison between Efficiency Score of Shariah Insurance in ASEAN and the Middle East

Efficiency is defined as the company's ability to optimally produce several outputs using specific inputs, or the ability to optimally manage existing inputs to produce a certain number of outputs. The differences in efficiency between Takaful companies in Southeast Asia and the Middle East are presented descriptively with numbers and pictures. The difference is then formally being test with hypothesis tests. The comparison between efficiency in of the two was clearly shown in **Table 4** and **Figure 1** in the previous subsection.

Table 6
Normality test results

	ASEAN	*The Middle East*
W-stat	0.869743505	0.961521018
p-value	0.000471136	0.285223238
alpha	0.05	0.05
normal	no	yes

Source: Primary data processed (2021)

Mann Whitney test was utilized to test the significant difference between the efficiency of the insurance companies in Southeast Asia and the Middle East. Based on the Saphiro Wilk normality test shown in **Table 6**, the efficiency score of the Southeast Asia region did not meet the normality assumption, hence, the t-test was not used. Mann Whitney was used for examining the median value of the two samples, while the *t*-test was used to analyse the mean value. According to the asymmetric data distribution pattern shown in the boxplot, the median was preferred to be used as a comparison of the concentration's size. The median value for the ASEAN region was 0.26, while the Middle East was 0.32 as presented in **Table 7**.

Table 7
Mann-Whitney test results

	Southeast Asia	Middle East
Count	37	33
Median	0.2664	0.3228
Rank sum	1267	1218
U	657	564
p-value (one-tail)	0.5883 (Do not reject Ho)	

Source: Primary data processed (2021)

It was observed that the p-value of the Mann-Whitney test was lesser than alpha with 5%. Therefore, it was concluded that the technical efficiency value of Middle East and Southeast Asian Takafulcompanies is not significantly different from the 5% alpha.

When the analysis was performed using the t-test, similar results were recorded as Mann-Whitney.

The use of SFA to examine Takaful efficiency is still rare so this study examined the efficiency of Takaful companies by comparing two regions such as ASEAN and the Middle East using the SFA method. These two regions are based on the 2019 IFCI data. It was observed that the countries in the two regions have the highest indexes among the 48 measured. Furthermore, the four countries with the highest scores were Indonesia, Malaysia, Iran, and Saudi Arabia. However, Iran was unable to meet the criteria as a sample after being studied, hence UEA was selected as an alternative.

In the study by Ulansari & Septiarini (2020), total capital and expenses were utilized as the input, while total income was used as the output variable. Wangi & Darwanto (2020) employed the SFA method with income as output, while net claims, general and administrative expenses, assets, and paid commissions were considered as the capital input. Furthermore, Coskun et al. (2021) analyzed three input variables, such as net claims, incurred, operating expenses, and provision as well as two output variables, which include gross contributions and investment income using DEA.

The efficiency value of takaful companies from the two regions is calculated simultaneously in the Frontier software. The relative efficiency values were obtained for all units of analysis. Thus, we can see the efficiency position of each sample unit compared to the entire sample. Although there is no significant difference between the efficiency scores of takaful companies in ASEAN and the Middle East, it can be seen that the most efficient takaful companies come from Malaysia. In addition, 50 percent of takaful companies with above-average efficiency also come from Malaysia. Coskun et al.'s (2021) research using Data Envelopment Analysis (DEA) conclude

that the efficiency of takaful companies in Malaysia is higher than in Saudi Arabia, Indonesia, and the UAE. Coskun's analysis involves 16 countries from 2009-2014. In this study, Saudi Arabia is more efficient than Indonesia, which is contrary to this study. The sample of takaful companies from each country differs between this study and Coskun et al.'s (2021).

The takaful businesses of Malaysia were active in Southeast Asian markets. Corporate governance factors in Malaysia have a significant impact on the effectiveness of takaful companies. These corporate governance factors include the size of the board of directors, the ratio of non-executives to executives on the board of directors, and the ratio of Muslim directors to non-Muslim directors. Other corporate governance factors in Malaysia include the ratio of Muslim directors to non-Muslim directors (Lee et al., 2019).

If the lowest efficiency of the two research areas is compared, then ASEAN is lower than the Middle East. Using the DEA non-parametric method, Al-Amri (2015) concluded that Saudi Arabia occupies the most efficient position among the Gulf Cooperation Council countries. The insurance industry in Saudi Arabian is the largest and oldest insurance market in the GCC. Among the GCC countries, the takaful company from Saudi Arabia has an efficiency score of more than 0.80 (Al-Amri, 2015). In this study, the highest efficiency score from Saudi Arabia does not exceed 0.60. Saudi Arabia's average efficiency is also the lowest after Malaysia, UEA, and Indonesia. This difference is due to the efficiency score that is a relative value, so the value can be different if the samples analyzed are also different. According to Akhtar (2018), market share and profitability are essential factors in determining the efficiency of conventional and takaful companies in Saudi Arabia .

Bansal & Singh (2021) comprehensively analyze the efficiency of 60 insurance companies in GCC, including 26 companies listed on

the Saudi Stock Exchange and 17 companies listed on the UEA Securities Exchange. They use a two-stage analysis which is DEA in the first stage and Tobit regression in the second stage. From Tobit regression, they found that competition and financial freedom may encourage efficiency.

The takaful company with the lowest efficiency comes from Indonesia. This has be a concern for the Takaful industry in Indonesia to improve its efficiency. Indrarini (2019) conclude that the efficiency of Takaful companies in Indonesia is significantly affected by ROE and total assets. These findings are different from Lee et al. (2019), who concluded that asset size does not significantly affect efficiency. However, both studies use the DEA approach to calculate the efficiency score. Using sample of conventional and family takaful companies in Indonesia, Hasanatina et al. (2021) concluded that total assets and investment expenditures significantly affect the technical efficiency resulted from SFA method.

Research conducted by Karbhari et al. (2018) on takaful insurers in the MENA and ASEAN regions revealed that certain factors ought to be taken into consideration in order to improve efficiency. They came to the conclusion that product specialization was the root cause of inefficiency in takaful. The size of the board has a positive effect on efficiency. There is a possibility that mergers and acquisitions, possibly facilitated by international foreign participation, could become a solution for the industry to continue growing and supporting itself. Consolidation will result in the creation of a platform that is stronger, more sustainable, and more resilient than what is currently experienced in several markets including Malaysia and the GCC.

CONCLUSION

Descriptively, the average efficiency score of ASEAN Takafulcompanies was higher than the Middle East. However, the central tendency based on the median value showed the opposite. It was observed that several companies have very low and high efficiency values of 0.04 and 0.91, respectively in Southeast Asia. This is in contrast with the characteristic of the score in the Middle East as the Shariah insurance efficiency has a narrower range with minimum and maximum values of 0.17 and 0.54, respectively. Based on the Mann Whitney test, it was concluded that the differences in the median efficiency values between ASEAN Takafulcompanies and the Middle East were not significant.

Based on descriptive statistics for each country, Malaysia is positioned at the top. Takaful in Malaysia is the most efficient, compared to UEA, Indonesia, and Saudi Arabia. Other studies find Indonesia is better than Malaysia. The difference exists due to the nature of the efficiency score resulting from SFA or DEA. The score is relative. The different samples included will raise the different scores. Different output and input variables also affect the difference.

The range of the efficiency values was wider in ASEAN Takafulcompared to the Middle East. This is due to fact that insurance has not become a lifestyle, specifically in Indonesia. The calculation of the efficiency of the insurance company needs to be done periodically to continuously monitor the level of efficiency and how it is relative to other companies.

This study uses capital and expenses as input and income as output variables. Different samples and input and output variables raise different conclusions about the efficiency score because of the relative nature of the score. Further study could provide empirical analysis or simulation to compare efficiency scores when input

variables and output differ. The two-stage analysis also needed to understand more profound the efficiency score more.

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REFERENCES

Abdullah, S. (2012). Risk management via takaful from a perspective of maqasid of shariah. *Procedia - Social and Behavioral Sciences*, *65*, 535–541. https://doi.org/10.1016/j.sbspro.2012.11.161

Acharya, V. V., Almeida, H., & Campello, M. (2013). Aggregate risk and the choice between cash and lines of credit. *The Journal of Finance*, *68*(5), 2059–2116. https://doi.org/10.1111/jofi.12056

Akhtar, M. H. (2018). Performance analysis of Takaful and conventional insurance companies in Saudi Arabia. *Benchmarking: An International Journal*, *25*(2), 677–695. https://doi.org/10.1108/BIJ-01-2017-0018

Akhter, W., Pappas, V., & Khan, S. U. (2017). A comparison of Islamic and conventional insurance demand: Worldwide evidence during the Global Financial Crisis. *Research in International Business and Finance*, *42*, 1401–1412. https://doi.org/10.1016/j.ribaf.2017.07.079

Al-Amri, K. (2015). Takaful insurance efficiency in the GCC countries. *Humanomics*, *31*(3), 344–353. https://doi.org/10.1108/H-05-2014-0039

Al-Amri, K., David Cummins, J., & Weiss, M. A. (2021). Economies of scope, organizational form, and insolvency risk: Evidence from the takaful industry. *Journal of International Financial Markets,*

Institutions and Money, *70*, 101259. https://doi.org/10.1016/j.intfin.2020.101259

Al-Fori, A., & Gani, A. (2022). The effect of Islamic finance on trade in insurance services in selected countries in the Middle East region. *Journal of Financial Economic Policy*, *14*(6), 778–795. https://doi.org/10.1108/JFEP-04-2022-0091

Almulhim, T. (2019). Analysis of Takaful vs. Conventional insurance firms' efficiency: Two-stage DEA of Saudi Arabia's insurance market. *Cogent Business & Management*, *6*(1), 1633807. https://doi.org/10.1080/23311975.2019.1633807

Bansal, R., & Singh, D. (2021). Efficiency drivers of insurers in GCC: An analysis incorporating company-specific and external environmental variables. *Cogent Economics and Finance*, *9*(1), Article: 1922179. https://doi.org/10.1080/23322039.2021.1922179

Baroroh, H. (2022). Comparative efficiency analysis of sharia insurance and conventional insurance in Indonesia. *Jurnal Ilmiah Ekonomi Islam*, *8*(3), 3182–3188. https://doi.org/10.29040/jiei.v8i3.5952

Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & George E. Battese. (2005). *An introduction to efficiency and productivity analysis* (T. J. Coelli, D. S. Prasada Rao, C. J. O'Donnell, & G. E. Battese, Eds.). Springer US. https://doi.org/10.1007/0-387-25895-7_9

Coskun, A., Habibniya, H., & Keceli, Y. (2021). An efficiency analysis of takaful insurance industry: A comparative study. *Journal of Asian Finance*, *8*(7), 111–0120. https://doi.org/10.13106/jafeb.2021.vol8.no7.0111

Hasanatina, F. H., Budiantoro, R. A., & Oktavia, V. (2021). Two stage analysis: Analisis technical efficiency pada perusahaan asuransi jiwa konvensional dan syariah, 2012-2020 [Two stage analysis: Analysis of technical efficiency in conventional and sharia life insurance companies, 2012-2020]. *Proceedings Ihtifaz: Islamic Economics, Finance and Banking*, 149–162.

http://seminar.uad.ac.id/index.php/ihtifaz/article/view/6057

He, Z., & Manela, A. (2016). Information acquisition in rumor-based bank runs. *The Journal of Finance*, *71*(3), 1113–1158. https://doi.org/10.1111/jofi.12202

Indrarini, R., Canggih, C., & Rusmita, S. A. (2019). Efficiency determinants of Islamic insurance in Indonesia. *KnE Social Sciences*, 175–175. https://doi.org/10.18502/kss.v3i13.4204

Ismail, N., Alhabshi, S. O., & Bacha, O. (2011). Organizational form and efficiency: The coexistence of family takaful and life insurance in Malaysia. *Journal of Global Business and Economics*, *3*(1), 122–137. https://econpapers.repec.org/RePEc:grg:01biss:v:3:y:2011:i:1:p:122-137

Jaloudi, M. M. (2019). The efficiency of Jordan insurance companies and its determinants using DEA, slacks, and logit models. *Journal of Asian Business and Economic Studies*, *26*(1), 153–166. https://doi.org/10.1108/jabes-10-2018-0072

Kader, H. A., Adams, M., Hardwick, P., & Kwon, W. J. (2014). Cost efficiency and board composition under different takaful insurance business models. *International Review of Financial Analysis*, *32*, 60–70. https://doi.org/10.1016/j.irfa.2013.12.008

Kagan, J. (2021, July 21). *What is takaful insurance and how does it work?* [HTML]. Investopedia. https://www.investopedia.com/terms/t/takaful.asp

Karbhari, Y., Muye, I., Hassan, A. F. S., & Elnahass, M. (2018). Governance mechanisms and efficiency: Evidence from an alternative insurance (Takaful) market. *Journal of International Financial Markets, Institutions and Money*, *56*, 71–92. https://doi.org/10.1016/j.intfin.2018.02.017

Kodde, D. A., & Palm, F. C. (1986). Wald criteria for jointly testing equality and inequality restrictions. *Journal of the Econometric*

Society, *54*(5), 1243–1248. https://www.jstor.org/stable/1912331

Lee, H. S., Cheng, F. F., Har, W. M., Nassir, A. M., & Razak, N. H. A. (2019). Efficiency, firm-specific and corporate governance factors of the Takaful insurance. *International Journal of Islamic and Middle Eastern Finance and Management*, *12*(3), 368–387. https://doi.org/10.1108/IMEFM-06-2018-0187

Mayenkar, S. S. (2015, October 6). Global Takaful industry poised to be at $25.5b by 2020. *Gulf News*. https://gulfnews.com/business/global-takaful-industry-poised-to-be-at-255b-by-2020-1.1596226

Nasution, Z. (2021). Sharia insurance efficiency in Indonesia and Malaysia using the stochastic frontier approach analysis. *Asian Journal of Islamic Management (AJIM)*, *3*(2), 123–136. https://doi.org/10.20885/ajim.vol3.iss2.art5

Rabbaniyah, L., & Afandi, A. (2019). Analisis efisiensi perbankan syariah di Indonesia metode Stochastic Frontier Analysis [Analysis of the efficiency of Islamic banking in Indonesia using the Stochastic Frontier Analysis method]. *Proceeding of Conference on Islamic Management, Accounting, and Economics (CIMAE)*, 200–211. https://journal.uii.ac.id/CIMAE/article/view/13149

Rubio-Misas, M. (2020). Ownership structure and financial stability: Evidence from Takaful and conventional insurance firms. *Pacific-Basin Finance Journal*, *62*, 101355. https://doi.org/10.1016/j.pacfin.2020.101355

Rusydiana, A. S., & Nugroho, T. (2017). Measuring efficiency of life insurance instution in Indonesia: Data Envelopment Analysis approach. *Global Review of Islamic Economics and Business*, *5*(1), 12–24. https://doi.org/10.14421/grieb.2017.051-02

Shaddady, A. (2022). Business environment, political risk, governance, Shariah compliance and efficiency in insurance companies in the MENA region. *The Geneva Papers on Risk and*

Insurance - Issues and Practice, 47(4), 861–904. https://doi.org/10.1057/s41288-021-00232-8

Sunarsih, S., & Fitriyani, F. (2018). Analisis efisiensi asuransi syariah di Indonesia tahun 2014-2016 dengan metode Data Envelopment Analysis (DEA) [Analysis of the efficiency of Islamic insurance in Indonesia in 2014-2016 using the Data Envelopment Analysis (DEA) method]. *Jurnal Ekonomi & Keuangan Islam*, 4(1), 9–21. https://doi.org/10.20885/jeki.vol4.iss1.art2

Tuffahati, H., Mardian, S., & Suprapto, E. (2019). Pengukuran efisiensi asuransi syariah dengan Data Envelopment Analysis (DEA) [Islamic insurance efficiency measurement with Data Envelopment Analysis (DEA)]. *Jurnal Akuntansi Dan Keuangan Islam*, 4(1), 1–24. https://doi.org/10.35836/jakis.v4i1.27

Ulansari, D. R., & Septiarini, D. F. (2020). A comparative study of the efficiency of conventional and Sharia insurance in Indonesia. *Jurnal Keuangan Dan Perbankan*, 24(2), 202–213. https://doi.org/10.26905/jkdp.v24i2.3165

Wangi, D. M. & Darwanto. (2020). Analisis efisiensi asuransi umum syariah dan konvensional di Indonesia [Analysis of the efficiency of general sharia and conventional insurance in Indonesia]. *Human Falah*, 7(1), 85–102. https://doi.org/10.30829/hf.v7i1.5822