The Efficiency of Islamic General Insurance Using Data Envelopment Analysis (DEA): Evidence From Indonesia

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ARTICLE INFO

ABSTRACT

Purpose – The purpose of this study is to analyze the efficiency level of sharia general insurance in Indonesia.

Methodology/approach – This study uses the Data Envelopment Analysis (DEA) method with output orientation. The objects in this study were 8 general insurance companies in Indonesia during the 2015-2020 period. The variables used consist of input variables (total assets, capital/equity, operating expenses, claim payments) and output variables (investment income, tabarru' funds, profit).

Findings – There are three Sharia General Insurance Companies in efficient condition during the study period, namely Allianz Utama Indonesia Insurance, Sinar Mas Insurance, and Bumiputeramuda General Insurance. In addition, there were five companies in an inefficient condition during the study period, namely PT Asuransi Bringin Sejahtera Artamakmur, PT Asuransi Ramayana, PT Asuransi Staco Mandiri, PT Asuransi Umum Mega, and PT Asuransi Wahana Tata.

Novelty/value – The contribution of this research is to provide an efficiency analysis of Sharia General Insurance companies in Indonesia using several inputs and outputs. Keywords Efficiency, Islamic Insurance, Data Envelopment Analysis (DEA).

INTRODUCTION

The insurance industry is an important element in the financial system, including the Islamic insurance industry. The sharia insurance industry has grown quite rapidly in the world, including in Indonesia (Al Arif & Firmansyah, 2021). The role of insurance companies is very important in economic development, namely obtaining premiums from the community to carry out their operations as managers of loss risk(Abdin, Prabantarikso, Fahmy, & Farhan, 2022). Premiums obtained from the community must be used by the company efficiently to be able to provide all the obligations of the insured and obtain optimal profits(Ul din, Regupathi, & Abu-Bakar, 2017).

Insurance companies need to pay attention to efficiency in carrying out their operational activities(Abdin, Prabantarikso, Fahmy, & Farhan, 2022). The level of efficiency is used by policyholders and stakeholders to determine the company's performance, so that they can have more confidence in the company(Abdin Z. , Prabantarikso, Wardhani, & Endri, 2021)and able to generate higher profits for the company(Endri, Ridho, Marlapa, & Susanto, 2021). In addition,

efficiency models and measures also serve to consider the importance of strategic decision making for the company's operational activities(Benyousef & Hemrit, 2019). Therefore, measuring the level of efficiency in the insurance industry is very important to do(Robielos & Bravante, 2020).

The existing literature has widely used the Data Envelopment Analysis (DEA) method to examine the efficiency of insurance companies in various countries(Abdin, Prabantarikso, Fahmy, & Farhan, 2022)in Indonesia;(Bansal & Singh, 2021)in GCC Countries;(Naushad, Faridi, & Faisal, 2020)in Saudi Arabia;(Nourani, Kweh, & Devadason, 2020)in Malaysia;(Robielos & Bravante, 2020)in the Philippines;(Benyousef & Hemrit, 2019)in Saudi Arabia, however, studies related to efficiency in Islamic insurance companies are still limited compared to conventional insurance companies. This study fills the research gap by providing empirical evidence regarding the efficiency level of Islamic insurance companies in Indonesia.

In contrast to previous studies, this study uses variables consisting of input variables (total assets, capital/equity, operating expenses, and claims payments), as well as output variables (investment income, tabarru' funds, and profit). The selection of this variable is based on several variables that have been used by previous researchers(Abdin, Prabantarikso, Fahmy, & Farhan, 2022);(Benyousef & Hemrit, 2019);(Nourani, Kweh, & Devadason, 2020). The population used in this study is sharia general insurance companies in Indonesia during the 2015-2020 period, the selection of this object is because the business activities of sharia general insurance companies in Indonesia are not accompanied by investment products and are more focused on mutual assistance among insurance participants. The data used in this study comes from secondary data obtained from annual financial reports published through the official website of each company.

This study uses Data Envelopment Analysis (DEA) to measure the efficiency value of sharia general insurance companies in Indonesia. The DEA method is the most appropriate tool for analyzing company efficiency(Gharakhani, Eshlaghy, Hafshejani, Mavi, & Lotfi, 2017). This non-parametric approach has several advantages over other methods. First, this method can use multiple input and output variables(Benyousef & Hemrit, 2019). Second, this method does not require a functional relationship between input and output variables(Cummins & Misas, 1999).

LITERATURE REVIEW
In measuring the level of performance of an entity, efficiency is closely related to productivity because efficiency describes the comparison between inputs and outputs(Abdin, Prabantarikso, Fahmy, & Farhan, 2022). Efficiency calculations are carried out to produce maximum output using the smallest cost(Jaouadi & Zorgui, 2014).

Efficiency can be measured by two approaches, namely the input-oriented approach, and the output-oriented approach. An input-oriented approach is used when an entity will reduce the level of the proportion of inputs to produce optimal output, while an output-oriented approach is used when an entity will maximize its profits with existing inputs.(Coelli, Rao, O'Donnell, & Battese, 2005). In this study, the output orientation is used because the company can maximize its profits by managing the same inputs. There are two methods to measure the level of efficiency, namely through parametric and non-parametric approaches(Dong, Hamilton, & Tippett, 2014). The approach commonly used to measure efficiency is a non-parametric approach using the Data Envelopment Analysis method(Abdin, Prabantarikso, Fahmy, & Farhan, 2022). During the 1993-2018 period, there were 132 studies in the insurance sector in various countries. This study applies the DEA method to measure the efficiency of the company using different inputs and outputs(Kaffash,

Azizi, Huang, & Zhu, 2019).

METHOD
Population and Sample

The population used in this study is sharia general insurance companies in Indonesia because the business activities of sharia general insurance companies in Indonesia are not accompanied by investment products and are more focused on mutual assistance among insurance participants. The sampling method used is a purposive sampling technique with the following criteria:
- Sharia general insurance company in Indonesia operating in the 2015-2020 period.
- Sharia general insurance company that presents complete financial statements for the 2015-2020 period.
- Sharia general insurance company that presents financial statements with positive profits in the 2015-2020 period.

Based on the above criteria, there are 8 sharia general insurance companies in Indonesia that are used as research samples. The sharia general insurance companies that are used as samples in this study include:

Table 1

Data on Sharia General Insurance Companies that are Dessicion Making Units (DMU)

DMU	Sharia General Insurance Company
1	PT Allianz Utama Indonesia
2	PT Bringin Sejahtera Artamakmur
3	PT Asuransi Ramayana
4	PT Asuransi Sinar Mas
5	PT Asuransi Staco Mandiri
6	PT Asuransi Umum Bumiputeramuda
7	PT Asuransi Umum Mega
8	PT Asuransi Wahana Tata

The data used in this study comes from secondary data obtained from the annual financial statements of sharia general insurance for the 2015-2020 period which are published through the official website of each company. Efficiency measurements in this study were processed using the Data Envelopment Analysis Program (DEAP) 2.1 Version application. The sample companies in DEAP are called Decision Making Units (DMU). A DMU with an efficiency value of 1 (one) indicates that the DMU is efficient, while a DMU with an efficiency value of less than 1 (one) is an inefficient DMU.

Operational definition
The operational definition and measurement scale of variables in this study are as follows:
1. Input variables
- Total Assets, which is something owned by the company in developing, creating products, and other activities.
- Capital/Equity, namely the amount of rights or interests of the company owner in the company's assets.
- Operating Expenses, namely costs that must be incurred in the interest of the smooth running of the company's operations. Operating expenses include salary expenses, advertising expenses, rental expenses, to equipment expenses.

- Claim Payment, which is a payment given by the insurance party to the participant at the request of compensation in accordance with the insured loss based on the policy (claim).

2. Output variables
- Investment Income, which is the result of an entity's activities in investing in its assets.
- Tabarru' Fund, namely funds that come from the contributions of the participants for the purpose of helping among the participants whose use mechanism is in accordance with the agreed tabarru' contract.
- Profit, which is the profit the company gets from the business activities it carries out

It contains reserarch design, population, sample, techniques of data collection and analysis, in Calibri 12. It does not need to present any research method for conceptual article/ literature study, it is only result and discussion ritght after introduction.

RESULT AND DISCUSSION
Result

1. Efficiency Results

This study uses Data Envelopment Analysis (DEA) with the assumption of Variable Return to Scale (VRS) to measure the efficiency value of sharia general insurance companies in Indonesia. This model assumes that the company has not or is not operating at an optimal scale so that the ratio between the addition of inputs and outputs is not the same, every 1% addition of input can increase output by more than 1% (increasing return to scale) or less than 1% (decreasing return to scale).). The results of the efficiency measurement with the VRS method will distinguish the efficiency values into two, namely Pure Technical Efficiency (PTE) and Scale Efficiency (Scale Efficiency).

The next step is to determine which DMUs are efficient and technically inefficient. DMUs with efficient status are DMUs with a value of >1 and vice versa with values <1 are DMUs with efficient status. Table 2 shows the efficiency values for each DMU for the 2015-2020 period. Table 2 informs that the sharia general insurance companies that achieved inefficient status were PT Asuransi Ramayana (inefficient in 2015, 2017, 2018, and 2019), PT Asuransi Staco Mandiri (efficient in 2015), PT Asuransi Umum Mega (efficient in 2015). 2015, 2016 and 2018). there were 2 DMUs that were inefficient in terms of scale in 2015 namely DMU 3 (PT Asuransi Ramayana) and DMU 5 (PT Asuransi Staco Mandiri). There was 1 DMU that was inefficient in terms of scale in 2016 namely DMU 7 (PT Asuransi Umum Mega). There was 1 DMU that was inefficient in terms of scale in 2017, namely DMU 3 (PT Asuransi Ramayana). There were 3 DMUs that were inefficient in terms of scale in 2018, namely DMU 3 (PT Asuransi Ramayana) and DMU 7 (PT Asuransi Umum Mega). There was 1 DMU that was inefficient in terms of scale in 2019, namely DMU 3 (PT Asuransi Ramayana). There are 4 DMUs that are inefficient in terms of scale in 2020, namely DMU 2 (PT Asuransi Bringin Sejahtera), DMU 3 (PT Asuransi Ramayana), DMU 5 (PT Asuransi Staco Mandiri), and DMU 8 (PT Asuransi Wahana Tata). There was 1 DMU that was inefficient in terms of scale in 2019, namely DMU 3 (PT Asuransi Ramayana). There are 4 DMUs that are inefficient in terms of scale in 2020, namely DMU 2 (PT Asuransi Bringin Sejahtera), DMU 3 (PT Asuransi Ramayana), DMU 5 (PT Asuransi Staco Mandiri), and DMU 8 (PT Asuransi Wahana Tata). There was 1 DMU that was inefficient in terms of scale in 2019, namely DMU 3 (PT Asuransi Ramayana). There are 4 DMUs that are inefficient in terms of

scale in 2020, namely DMU 2 (PT Asuransi Bringin Sejahtera), DMU 3 (PT Asuransi Ramayana), DMU 5 (PT Asuransi Staco Mandiri), and DMU 8 (PT Asuransi Wahana Tata).

Table 2
Sharia General Insurance Efficiency Results

YEAR	DMU	CRS TE	VRS TE	Scale	Condition	Causes of inefficiency
2015	1	1	1	1	-	-
	2	1	1	1	-	-
	3	0.997	1	0.997	DRS	Scale
	4	1	1	1	-	-
	5	0.983	1	0.983	DRS	Scale
	6	1	1	1	-	-
	7	1	1	1	-	-
	8	1	1	1	-	-
2016	1	1	1	1	-	-
	2	1	1	1	-	-
	3	1	1	1	-	-
	4	1	1	1	-	-
	5	1	1	1	-	-
	6	1	1	1	-	-
	7	0.919	1	0.919	DRS	Scale
	8	1	1	1	-	-
2017	1	1	1	1	-	-
	2	1	1	1	-	-
	3	0.893	1	0.893	DRS	Scale
	4	1	1	1	-	-
	5	1	1	1	-	-
	6	1	1	1	-	-
	7	1	1	1	-	-
	8	1	1	1	-	-
2018	1	1	1	1	-	-
	2	1	1	1	-	-
	3	0.795	1	0.795	DRS	Scale
	4	1	1	1	-	-
	5	1	1	1	-	-
	6	1	1	1	-	-
	7	0.710	1	0.710	DRS	Scale
	8	1	1	1	-	-
2019	1	1	1	1	-	-
	2	1	1	1	-	-
	3	0.742	1	0.742	DRS	Scale
	4	1	1	1	-	-
	5	1	1	1	-	-
	6	1	1	1	-	-

	7	1	1	1	-	-
	8	1	1	1	-	-
2020	1	1	1	1	-	-
	2	0.980	1	0.980	DRS	Scale
	3	0.904	1	0.904	DRS	Scale
	4	1	1	1	-	-
	5	0.980	1	0.980	DRS	Scale
	6	1	1	1	-	-
	7	1	1	1	-	-
	8	0/921	1	0.921	DRS	Scale

Information :

CRS TE : Technical Efficiency with Constant Return to Scale (CRS)

VRS TE : Technical Efficiency with Variable Return to Scale (VRS)

SE : Scale Efficiency

DRS : Decreasing Return to Scale

2. Peer Group

Determination of peer groups is used as a reference for DMUs that experience inefficiency to improve their efficiency. Firm Peer shows companies that can be a reference for inefficient DMUs to become efficient. and Firm Peer Weight is the peer weight that must be achieved by DMU according to the reference company.

Table 3

Peer Group Weight

Year	DMU	Company	Firm Peers			Firm Peer Weight		
2015	3	Ramayana	2	6		1,149	0.694	
	5	Independent Staco	4	1	2	0.017	0.547	0.571
2016	7	Mega	2	3	1	0.653	0.037	0.125
2017	3	Ramayana	6	5	4	0.378	1.575	0.046
2018	3	Ramayana	6	5	2	0.002	1,223	1.131
	7	Mega	4	6	1	0.015	0.072	1,817
2019	3	Ramayana	5	2		1.079	0.910	
2020	2	Bringin Prosperity	6			0.938		
	3	Ramayana	4	6		0.179	0.947	
	5	Independent Staco	6	1		0.213	0.966	
	8	Tata rides	7	6	1	0.169	0.160	0.054

Information :

DMU : Decision Making Unit

Firm Peers : Reference company

Firm Peer Weigh : reference company weight

Table 3shows the Peer Group that is used as a reference for inefficient DMUs to improve their efficiency. DMU 3 (PT Asuransi Ramayana) can look at peer companies DMU 2 (PT Asuransi Bringin Sejahtera) and DMU 6 (PT Asuransi Umum Bumiputeramuda) for efficiency improvements. Likewise,

other DMUs that experience inefficiency can see the company's peers in the table. From the results of the peer group, it shows that the company that became the first ranked peer group during the research period was DMU 6 (PT Asuransi Umum Bumiputeramuda) because it became a benchmark 8 times during the 2015-2020 period. This can also be seen from the many awards achieved by PT Asuransi Umum Bumiputeramuda, such as the award given by "Infobank" for financial performance with the "Excellent" predicate in 2019. In addition, The company also won the Best Syariah 2018 award for the "Sharia Insurance" category in the "Sharia General Insurance with Assets More Than IDR 100 Billion". This award was given by Investor Magazine based on the assessment of independent judges to the best companies in the sharia sector for their performance achievements throughout 2019-2020.

3. Target Setting

To be efficient, the input variable must be changed according to the projected value. There are two types of change, radial movement i.e. the amount of input that can be reduced by keeping the output constant. and slack movement, namely the number of inputs that can be reduced (excluding radial movement) because to achieve projected value there is still an excess of input. The following is the determination of targets for repairing DMUs that are experiencing inefficiency.

Table 4
Determination of 2015 Improvement Targets
(in million rupiah)

DMU	Variable	Original Value	*Radial Movement*	*Slack Movement*	Targets
3 (PT Asuransi Ramayana)	Capital	124.863	-396,883	-13,307	111.158
	Total Assets	54,306	-172.614	0	54.133
	Payment of claims	20,581	-65.418	-9.986	10,528
	Operating expenses	25,164	-79.985	-5,658	19,425
5 (PT Asuransi Staco Mandiri)	Capital	58.718	-996	0	57,721
	Total Assets	37,740	-640	-405	36,694
	Payment of claims	2,502	-42.453	-319	2,140
	Operating expenses	3,724	-63	0	3.660

Table 5
Determination of Improvement Targets for 2016
(in million rupiah)

DMU	Variable	Original Value	Radial Movement	Slack Movement	Targets
7 (PT Mega General Insurance)	Capital	166,456	-13,475	0	152,980
	Total Assets	98.085	-7,940	0	90.144
	Payment of claims	19,092	-1,545	-5.707	11.839
	Operating expenses	19,823	-1,604	0	18,218

Table 6
Determination of Improvement Targets for 2017
(in million rupiah)

DMU	Variable	Original Value	Radial Movement	Slack Movement	Targets
3 (PT Asuransi Ramayana)	Capital	175,979	-18,776	0	157.202
	Total Assets	107,411	-11,460	0	95.950
	Payment of claims	56,922	-6.073	-35,172	15,675
	Operating expenses	23,673	-2.525	-3.636	17,510

Table 7
Determination of Improvement Targets for 2018
(in million rupiah)

DMU	Variable	Original Value	Radial Movement	Slack Movement	Targets
3 (PT Asuransi Ramayana)	Capital	204.718	-42.045	0	162,672
	Total Assets	111,558	-22,912	0	3.573
	Payment of claims	23,392	-4,804	-14,452	4134
	Operating expenses	30,470	-6,258	-11,565	12,646
7 (PT Mega General Insurance)	Capital	153.308	-44.495	0	108,812
	Total Assets	112.119	-32.541	0	79,577
	Payment of claims	12.183	-3,535	-6.206	2,440
	Operating expenses	3.060	-888	-115	2.056

Table 8
Determination of Improvement Targets for 2019
(in million rupiah)

DMU	Variable	Original Value	*Radial Movement*	*Slack Movement*	Targets
3 (PT Asuransi Ramayana)	Capital	221.031	-57.046	0	163.984
	Total Assets	112.677	-29.081	0	83,595
	Payment of claims	33.333	-8,603	-18,945	5.784
	Operating expenses	38,934	-10,048	-8.852	20.032

Table 9
Determination of Improvement Targets for 2020
(in million rupiah)

DMU	Variable	Original Value	*Radial Movement*	*Slack Movement*	Targets
2 (PT Asuransi Bringin Sejahtera)	Capital	108,819	-2.133	-11,738	94,947
	Total Assets	33,156	-650	0	32,505
	Payment of claims	10,249	-200	-2.714	7.333
	Operating expenses	19,457	-381	-1.121	17,954
3 (PT Asuransi Ramayana)	Capital	214.273	-20,538	0	193.734
	Total Assets	129,802	-12,441	-15,872	101.487
	Payment of claims	30,409	-2,914	-13,305	14,188
	Operating expenses	24,773	-2.374	-383	22014
5 (PT Asuransi Staco Mandiri)	Capital	84,002	-1,699	-3.077	79,224
	Total Assets	52,514	-1.062	0	51.451
	Payment of claims	1,855	-37	0	1.817
	Operating expenses	8,798	-178	-4.013	4.606
8 (PT Asuransi Wahana Tata)	Capital	61,860	-4,889	-7.317	49,653
	Total Assets	32,850	-2,596	0	30,253
	Payment of claims	6.089	-481	-3,899	1,708
	Operating expenses	3837	-303	0	3.533

Discussion

In 2015 the average efficiency of sharia insurance in Indonesia was 0.998. From 2016 to 2018 it decreased sequentially to 0.990, 0.987, 0.938. In 2019 it increased to 0.968 and in 2020 it increased

to 0.973. Overall, sharia general insurance companies in Indonesia have not reached an efficient level during the 2015-2020 period. This shows that sharia general insurance companies have not managed inputs including total assets, capital, claim payments, and operating expenses optimally to produce maximum output of investment income, tabarru' funds, and profit.

This result is in line with several previous studies that measure the efficiency of Islamic insurance in Indonesia. Research result (Sabiti, Effendi, & Novianti, 2017)shows that sharia life insurance companies and sharia general insurance companies in Indonesia have not reached an efficient level.(Indrarini & Sophisticated, 2019)measuring the efficiency of sharia insurance in Indonesia for the period 2012-2016, the results show that in general sharia insurance in Indonesia has not been efficient.

Based on the financial development report published on the official website of the Financial Services Authority (OJK), global economic conditions over the last five years have affected the performance of the industrial sector in Indonesia. In 2015 there were two companies that experienced inefficiency, namely PT Asuransi Ramayana and PT Asuransi Staco Mandiri. This year, the national macroeconomic condition weakened due to the weak economic growth of Indonesia's trading partners, such as the United States, China and Singapore. In addition, economic growth until the end of 2015 was 4.74% from the previously estimated 5.5%. This condition had a negative impact on the performance of the industrial sector, including the insurance industry. This can be one of the factors that cause some Islamic general insurance companies to be inefficient.

In 2016, the national economic growth reported by the Central Statistics Agency increased from the previous year by 4.88% to 5.02%, but this increase was still below the estimated target. This led to an economic slowdown, which had an impact on the performance of the business world as a whole, including sharia insurance. This year, PT Asuransi Umum Mega is an inefficient company.

In 2017 the Indonesian economy continued to show a stable performance. This shows the process of domestic economic recovery. In addition to the increasing growth rate, Indonesia's economic improvement is also shown by the improvement in the trade balance which experienced a surplus compared to 2016. This also has a positive impact on the industrial sector, including the sharia insurance industry. This year PT Asuransi Ramayana is in an inefficient condition.

In 2018 the Performance of the Non-Bank Financial Industry (IKNB) also recorded positive growth with the total asset value increasing 6.18% to Rp2,349.53 trillion. The non-bank financial services sector that experienced the largest increase in assets was the insurance industry (www.ojk.go.id). However, this year there are still sharia general insurance companies that experience inefficiency, namely PT Asuransi Umum Mega and PT Asuransi Ramayana.

Based on the 2019 Indonesian Islamic financial development report, the number of Sharia IKNB entities also increased. At the end of 2019, the increase in the number of entities reached 7.07% compared to the previous year. In addition, the total assets of Sharia IKNB reached IDR 105.562 trillion. The largest contributor to the share of assets is Sharia Insurance, which is Rp. 45.45 trillion or 43% of the total assets of Sharia IKNB. This shows that sharia insurance companies are growing and

developing for the better. In 2019, there is an inefficient sharia insurance company, namely PT Asuransi Ramayana.

In 2020 the world was shocked by the arrival of the COVID-19 pandemic which had an impact on various sectors including sharia insurance in Indonesia. However, even though this condition is very concerning, the sharia general insurance industry in Indonesia during 2020 is still good. This is evident from data from the Indonesian General Insurance Association (AAUI) as of February 2021, showing that sharia general insurance assets as a whole increased by 5.6% from Rp. 157.93 trillion to Rp. 166.78 trillion compared to the previous year. In 2020 there are several sharia insurance companies that are not yet efficient, namely PT Asuransi Bringin Sejahtera, PT Asuransi Ramayana, PT Asuransi Staco Mandiri, and PT Asuransi Wahana Tata.

CONCLUSION

This study uses a sample of 8 companies from the total number of sharia general insurance, namely 29 companies. Therefore, the results of this study do not represent the overall efficiency of sharia general insurance in Indonesia. In general, the efficiency of Sharia General Insurance companies in Indonesia during the 2015-2020 research period has not been efficient. The results of this study are in accordance with research conducted by(Sabiti, Effendi, & Novianti, 2017)which shows that sharia insurance companies in Indonesia have not reached the level of efficiency. There are three Sharia General Insurance Companies in efficient condition during the study period, namely Allianz Utama Indonesia Insurance, Sinar Mas Insurance, and Bumiputeramuda General Insurance. In addition, there were five companies in an inefficient condition during the study period, namely PT Asuransi Bringin Sejahtera Artamakmur, PT Asuransi Ramayana, PT Asuransi Staco Mandiri, PT Asuransi Umum Mega, and PT Asuransi Wahana Tata. Sharia General Insurance Company which is in an inefficient condition because the company is still wasteful in using the input variables of total assets, capital, operating expenses, and claim payments. So it is necessary to reduce input so that the company becomes efficient.

For the future research, it is expected to add input and output variables to measure the level of efficiency of insurance companies, besides that it is also possible to use Islamic insurance research objects in several other countries.

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