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# Analysis of Efficiency in Sharia Life Insurance in Indonesia Using Data Envelopment Analysis (DEA) Method

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## Abstract

This study aims to analyze the efficiency level of Sharia life insurance and examine the influence of input and output variables on the growth rate of Sharia life insurance. The input variables consist of operating expenses, Tabarru' funds, and total assets, while the output variable consists of business income. The study uses secondary data derived from the financial reports of Sharia life insurance companies during the 2018-2023 period. The objects in this research include five Sharia life insurance companies. To assess the efficiency level, the study employs the Data Envelopment Analysis (DEA) method, utilizing two model approaches: Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS). The results indicate that out of the five Sharia life insurance companies, only PT. Capital Life Syariah stands out, as it achieved a 100% efficiency level during the six-year period under both the CRS and VRS models.

**Keywords:** Efficiency; Sharia Life Insurance; Data Envelopment Analysis (DEA); CRS; VRS

## 1. Introduction

The measurement of the level of efficiency of Islamic insurance is very important, because the level of efficiency is useful to know how the managerial ability of Islamic insurance companies in optimising their resources [8]. Efficiency in Islamic insurance can be reflected by good fund management by maintaining the supply of tabarru' funds to pay benefits/claims and increasing its income to continue to grow [1]. Efficiency is one of the success measurement tools aimed at productive activities to measure a performance, both the performance of the accountability centre level, managerial performance, and economic performance in a company. Efficiency in Islamic life insurance companies is very important because it can increase profitability, provide competitive advantage, and ensure sustainable operations. Efficiency can also enable companies to provide better benefits to customers with more affordable premiums and improve service and product innovation. In addition, efficiency also helps companies to better fulfil their sharia and social responsibility obligations.

Insurance is also a form of risk control by transferring risk from one party (the insured) to another party (the insurer), in this case to the insurance company. The insurer is willing to bear a number of losses that may arise in the future after the insured agrees to pay money called premiums [9]. In this case, the author wants to see if there is a problem between the output and input variables by measuring using a graph. However, to measure and see the average level of development of Islamic life insurance that occurs in Indonesia using the financial statements of each insurance company. The following are the results of the graph test of the five companies, the variables used in the measurement are the relationship between operating expenses, tabarru's funds and total assets to operating income from 2018-2023:



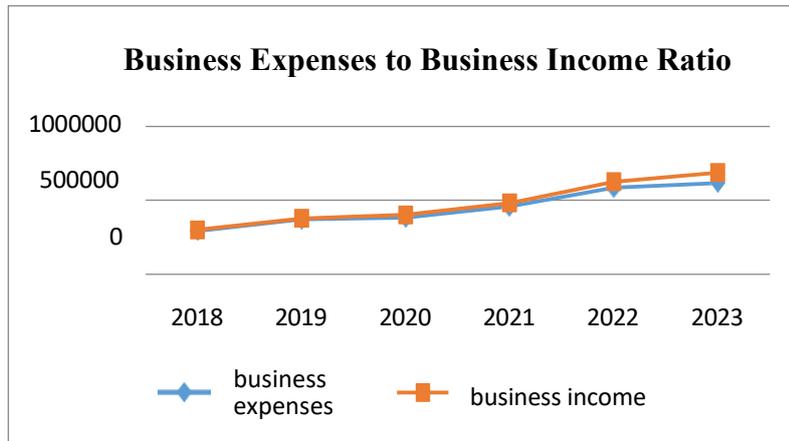


Figure 1.1 Graph of Operating Expenses against Operating Income

Figure 1.1 it can be seen that the variable between operating expenses and operating income of the five Islamic life insurance companies in 2018-2023 fluctuates experiencing a fairly small difference between operating expenses and operating income. With the amount of business expenses incurred every year increasing, but does not have an effect on business income which also increases every year. Behind the amount of business income that increases every year and tends to be high compared to the amount of business expenses incurred, it is possible that between the two variables there is no problem.

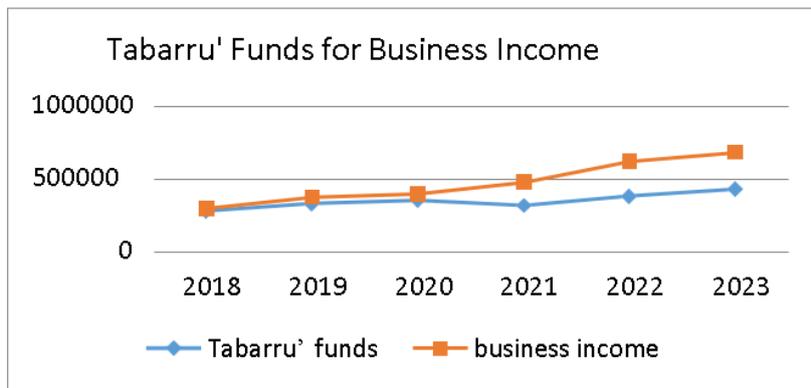


Figure 1.2 Graph of Tabarru' Fund against Business Income

Figure 1.2, it can be seen that the variable between tabarru's funds on operating income from five Islamic life insurance companies from 2018-2023 fluctuates experiencing a fairly small difference in 2018-2020, but from 2021-2023 it changes to experience a large difference. Where the tabarru' fund variable had decreased in 2021 and increased again for the following year. While the variable business income from 2018-2023 continues to increase and the difference is greater than the tabarru fund', it is possible that between the two variables there is no problem.

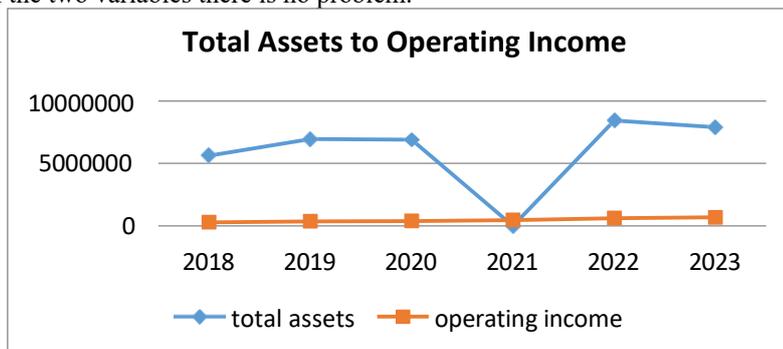


Figure 1.3 Graph of Total Assets to Operating Income

Figure 1.3, it can be seen that the variable between total assets and business income of the five Islamic life insurance companies from 2018-2023 tends to experience a large enough difference. Where the total asset variable decreased in 2021 and rose again for 2022-2023. Meanwhile, the variable operating income from 2018-2023 continues to increase and the difference is greater than the total assets, allowing the two variables to experience problems.

The methods in measuring the efficiency level are parametric and non-parametric methods. The difference is that parametric method uses econometric approach with statistical assumption test. The non-parametric method does not require statistical assumptions. Parametric methods are measured using the Distribution Free Analysis (DFA) method and the Stochastic Frontier Analysis (SFA) method. Meanwhile, non-parametric only consists of one method, namely Data Development Analysis (DEA). Data Envelopment Analysis (DEA) is a mathematical programming technique used to evaluate the relative efficiency of a collection of decision-making units (DMUs) in managing resources (inputs) of the same type so that they become results (outputs) of the same type, where the relationship of the function form from input to output is unknown. This study aims to obtain the efficiency level of Islamic life insurance companies in Indonesia with CRS model and to obtain the efficiency level of Islamic life insurance companies in Indonesia with VRS model.

## 2. Literature Review

### 2.1 Islamic Insurance

According to [4] The main principle in Islamic insurance is ta'awwunu 'ala al birr wa al-taqwa (help each other in goodness and piety) and al-ta'min (security). This principle of mutual assistance makes insurance participants like a big family that guarantees each other and bears risks. This is because the contract made in sharia insurance is a takafuli contract (mutual bearer), not a tabaduli contract (mutual exchange) which has been used by conventional insurance, namely the exchange of premium payments with insurance money.

Sharia life insurance has the main purpose of providing services, protection, and assistance in dealing with the disaster of death and personal accident by paying contributions through contracts that are in accordance with sharia principles [1].

### 2.2 Concept of Efficiency

Efficiency in general is the comparison between output and input. A company can be said to be efficient if it is able to manage inputs optimally to produce maximum output [3]. The level of efficiency of Islamic insurance will describe the performance of Islamic insurance itself. A company can be said to be efficient if its dual value is equal to 1 (100 per cent efficiency value). However, there are still some Islamic insurance whose efficiency value is less than 100 per cent, which means it is still less efficient [7].

The measurement of efficiency in both conventional and sharia insurance industry also becomes urgent considering the tight competition in Indonesia's insurance industry. Therefore, the measurement of efficiency in sharia insurance can be an important indicator in seeing the ability of the sharia insurance industry to survive and face intense competition so that it can ultimately help Indonesia's economic growth [7].

## 3. Research Method

The type of research used by the author in this study is a quantitative approach using the Data Envelopment Analysis (DEA) method. The research aims to show the development of efficiency in the research of Islamic life insurance companies. The sampling method used in this research is purposive sampling. Five Islamic Life Insurance in Indonesia is the object of this research, where the sample is Asuransi Takaful Keluarga, Al Amin Islamic Life Insurance, Asuransi Keluarga Indonesia, Bumiputera Islamic Life Insurance, and Capital Life Syariah, the sample is taken because it has provided financial statements during 2018-2023. In this study, there are two types of variables, namely: Input variables are influencing factors such as Operating Expenses, Tabarru's Fund and Total Assets. And the output variable is the result or response of the influenced process such as Operating Income.

## 4. Result and Discussion

The calculation of the efficiency of the five Islamic Life Insurance using Data Envelopment Analysis (DEA)[8], using three input variables and one output variable, namely: Operating Income, Operating Expenses, Tabarru' Fund, and Total Assets. The calculation of efficiency in sharia life insurance using Data Envelopment Analysis uses four variables, namely business expenses, tabarru' funds, and total assets as input variables, while business income is the output variable.

The criteria for acceptance and rejection of the hypothesis with the calculation of efficiency using Data Envelopment Analysis in this study is if a period of Islamic Life Insurance is worth 100% then it is declared efficient, while a period worth between 0% and 100% is declared inefficiency. Besides that, there are also actual and target numbers, the actual numbers are the numbers of inputs and outputs owned, while the target numbers are the numbers suggested by DEA so that the inputs and outputs become

efficient. Meanwhile, To Gain and Achieve are the percentage in the addition of the target in order to reach the one produced by the DEA calculation.

## 5. Conclusion

The results of the analysis of the efficiency of Sharia Life Insurance in Indonesia in the period 2018-2023 with the Data Envelopment Analysis (DEA)[9] method and the discussion that has been done. For Constant Returns to Scale (CRS), input and output orientation have years with the same efficiency results from 5 companies, namely: PT. Asuransi Takaful Keluarga there are 3 years that show the efficiency level which are 2018, 2020, and 2022 where 2018 is the most efficient year. PT Asuransi Jiwa Syariah Al Amin has 2 years that show the efficiency level, namely 2022 and 2023 where 2023 is the most efficient year. PT Asuransi Keluarga Indonesia has 1 year that shows the efficiency level, namely 2019 where 2019 is the most efficient year. PT Asuransi Jiwa Syariah Bumiputra has 1 year that shows the efficiency level, namely 2018 where 2018 is the most efficient year. PT. Capital Life is a company that shows the level of efficiency from 2018-2023 where 2018 is the most efficient year.

For Variable Returns to Scale (VRS), input and output orientation have years with the same efficiency results from 5 companies. PT Asuransi Takaful Keluarga has 4 years that show the efficiency level, namely 2018, 2019, 2020, and 2021 where 2018 is the most efficient year. PT Asuransi Jiwa Syariah Al Amin has 4 years that show the efficiency level, namely 2018, 2020, 2022 and 2023 where 2018 is the most efficient year. PT Asuransi Keluarga Indonesia there are 4 years that show the level of efficiency, namely 2018, 2019, 2020, and 2019 where 2018 is the most efficient year. PT Asuransi Jiwa Syariah Bumiputra has 3 years that show the efficiency level, namely 2018, 2022, and 2023 where 2018 is the most efficient year. PT. Capital Life is a company that shows the level of efficiency from 2018-2023 where 2018 is the most efficient year.

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