REVEALING BANKRUPTCY PREDICTION IN STATE-OWNED ENTERPRISES: ACCURACY COMPARISON OF ALTMAN, SPRINGATE, AND ZMIJEWSKI MODELS

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ABSTRACT

Research Objectives – This study aims to predict the bankruptcy of PT Garuda Indonesia, Tbk., using the Altman model, the Springate model, and the Zmijewski model.

Method – This research employs a quantitative descriptive method, utilizing the Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score) models as analytical tools.

Research Findings – The analysis using the Altman, Springate, and Zmijewski models indicates that PT Garuda Indonesia Tbk., was at risk of bankruptcy from 2016 to 2020, with the majority of indicators pointing to financial distress.

Theory and Practical Implications - This study enhances the understanding of bankruptcy prediction models. Practically, Garuda's management needs to improve efficiency, investors should evaluate risks, and the government should design supportive policies.

Novelty - The novelty of this study lies in the comparative use of three bankruptcy prediction models to analyze PT Garuda Indonesia, Tbk., providing new insights for management, investors, and the government in addressing bankruptcy risks.

INTRODUCTION

In the era of globalization marked by uncertainty, corporate sustainability has become a central issue in both economic and social fields. Economic crises, global pandemics such as COVID-19, and rapidly changing market dynamics have placed many companies in critical conditions, including the threat of bankruptcy. Bankruptcy not only affects the business entity itself but also has significant impacts on stakeholders, including investors, creditors, employees, and the broader society. One of the early indicators of potential bankruptcy is financial distress, a condition in which a company experiences financial difficulties in meeting its obligations to creditors. In this context, bankruptcy prediction through financial statement analysis serves as a crucial tool for management, investors, and regulators to take proactive measures. This study is relevant to current trends, where major corporations, including state-owned enterprises (SOEs) such as PT Garuda Indonesia Tbk., face serious challenges in maintaining financial stability. Therefore, this research aims to provide in-depth insights into bankruptcy prediction, focusing on predictive models developed by Altman, Springate, and Zmijewski.

Several previous studies have examined bankruptcy prediction using the Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score) models. However, the findings of these studies often show variations in prediction accuracy. Fitriani and Huda (2020) used the Springate method to predict financial distress at PT Garuda Indonesia, Tbk., for the 2012-2018 period and found that the company was at risk of financial difficulties. On the other hand, Marlina (2019) employed the Altman method for the 2013-2017 period and concluded that PT Garuda Indonesia, Tbk., was in financial

distress. Zakkiyah (2014) compared the Zmijewski and Altman models in textile and garment companies, indicating signs of business failure and potential bankruptcy. Nevertheless, these studies have several limitations. First, most studies utilized only one or two predictive models without comprehensively comparing them. Second, previous research tended to focus on shorter time periods, making it less reflective of long-term trends. Third, some studies did not consider external factors such as pandemics or economic crises that could influence a company's financial condition. Therefore, more holistic and comparative research is needed to identify the most accurate predictive model in the context of modern companies.

The theoretical foundation used in previous studies, such as the Altman, Springate, and Zmijewski models, has its respective strengths and weaknesses. The Altman (Z-Score) model, developed in 1968, is one of the first widely used predictive models. However, it is often criticized for being less sensitive to changes in the modern business environment. The Springate (S-Score) model, designed for manufacturing companies, also has limitations in its application to service industries such as air transportation. Meanwhile, the Zmijewski (X-Score) model, which employs a probit approach, is considered more flexible but requires more complex data for analysis. Additionally, most previous studies compared only two models without involving all three simultaneously. This has created a gap in the literature, as there has not been a comprehensive study comparing these three models in the context of SOEs operating in the air transportation industry. Therefore, this study aims to address this gap by conducting a more in-depth comparative analysis.

The novelty of this study lies in the comparative approach applied by utilizing three predictive models simultaneously—Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score)—to analyze bankruptcy predictions for PT Garuda Indonesia, Tbk., during the 2016-2020 period. This study also considers the impact of the COVID-19 pandemic as an external variable affecting the company's financial condition. Furthermore, it makes an original contribution to knowledge by evaluating how each model performs in the context of the aviation industry, which has been rarely explored in previous literature. The findings of this study are expected to provide clearer insights into the predictive patterns generated by these three models, making them a valuable reference for management, investors, and regulators in strategic decision-making. Thus, this study offers a new perspective that distinguishes it from previous research.

The main objective of this study is to analyze bankruptcy predictions based on the Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score) models for PT Garuda Indonesia, Tbk., during the 2016-2020 period. This study also aims to provide recommendations to company management in identifying early signs of financial distress and taking anticipatory steps to prevent bankruptcy. The limitations of this research include: (1) the study's focus on a single company, PT Garuda Indonesia, Tbk., which may limit the generalizability of the findings to other companies; (2) the use of secondary data from published financial statements, which may not fully reflect the company's internal conditions; and (3) limitations in considering non-financial factors such as risk management, government regulations, and market dynamics. Nevertheless, this study is expected to provide valuable insights for stakeholders in understanding bankruptcy risks and formulating appropriate mitigation strategies.

METHOD

This study employs a quantitative approach with a descriptive-comparative research design. The quantitative approach was chosen because this study aims to measure and analyze numerical data derived from the financial statements of PT Garuda Indonesia, Tbk., for the 2016-2020 period. A descriptive-comparative research design is used to compare relevant variables, namely the Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score) models in predicting the company's potential bankruptcy. Previous studies, such as those conducted by Fitriani and Huda (2020) and Marlina (2019), have also used a similar approach to analyze companies' financial conditions. The primary reason for using this method is its ability to provide objective and measurable results through statistical analysis. Additionally, the quantitative approach enables researchers to identify patterns and trends in financial data, serving as a basis for making accurate predictions.

The data collection techniques in this study involve two main methods: literature review and documentation. The literature review is conducted by reading and analyzing relevant literature, such as theories on bankruptcy prediction and models developed by Altman, Springate, and Zmijewski. Meanwhile, the documentation method is used to collect secondary data in the form of PT Garuda Indonesia, Tbk.'s financial statements, obtained from the company's official website and the Indonesia Stock Exchange (IDX). This secondary data includes information on total assets, total liabilities, net profit, and other financial indicators required for analysis. The use of secondary data allows researchers to obtain a comprehensive overview of the company's financial condition without having to collect data directly in the field.

The analytical tools used in this study are the Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score) models. These three models were selected due to their different approaches in predicting bankruptcy, allowing researchers to compare the accuracy levels of each model. The Altman (Z-Score) model utilizes five key financial ratios, such as working capital/total assets and market value of equity/book value of debt, to generate a score indicating the company's financial condition. The Springate (S-Score) model focuses on four financial ratios, including net profit before interest and taxes/total assets. Meanwhile, the Zmijewski (X-Score) model uses three main variables: return on assets (ROA), debt ratio, and current ratio. Data analysis is conducted by calculating the values of each model based on the collected financial data. The results are then compared to determine which model is the most accurate in predicting PT Garuda Indonesia, Tbk.'s potential bankruptcy.

The research framework can be visualized in a flowchart illustrating the relationship between research variables. First, financial data is obtained from secondary sources, then processed using the three predictive models. Each model generates a score or index indicating whether the company is financially healthy, in a gray area, or at risk of bankruptcy. The results from the three models are then compared to determine the accuracy level of each. This operational framework not only helps in understanding the analytical process but also provides a clear overview of how bankruptcy prediction can be systematically conducted. A visual representation of the research framework can be presented to strengthen the methodological explanation in this study.

RESULTS AND DISCUSSION

This study aims to analyze and predict the bankruptcy potential of PT Garuda Indonesia, Tbk. using three bankruptcy prediction models: Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score). The analysis covers the period from 2016 to 2020, encompassing five years of the company's financial performance. The financial data used in this study is sourced from PT Garuda Indonesia, Tbk.'s audited annual financial statements. These audited financial statements provide accurate and reliable information regarding the company's financial condition throughout the study period.

The use of these three bankruptcy prediction models aims to provide a comprehensive overview of PT Garuda Indonesia, Tbk.'s bankruptcy potential. Each model has its own strengths and limitations in identifying the factors influencing bankruptcy. By applying multiple models simultaneously, it is expected that more accurate and relevant results can be obtained. This study will discuss the calculation results of each model, compare and analyze differences between the models, and provide implications and recommendations based on the research findings.

Altman (Z-Score) Model. The Altman (Z-Score) model is one of the most commonly used bankruptcy prediction models. This model utilizes five financial ratios to predict the likelihood of a company going bankrupt within the next two years. The calculation results are presented in the following table:

Table 1 Altman (Z-Score) model calculation results

No	Year	Z-Score	Description
1	2016	0,93	Bankrupt
2	2017	1,31	Grey Area
3	2018	2,32	Grey Area
4	2019	2,98	Bankrupt
5	2020	-0,16	Bankrupt

Source: www.idx.co.id, Indonesia Stock Exchange, processed data in 2025

The Z-Score calculation results indicate that PT Garuda Indonesia, Tbk. experienced fluctuations in bankruptcy potential during the 2016–2020 period. In 2016, 2019, and 2020, the company was predicted to be in a bankrupt state as its Z-Score was below 1.10. In 2017 and 2018, the company was in the grey area, with Z-Scores between 1.10 and 2.60.

A low Z-Score in 2016, 2019, and 2020 suggests that the company had poor financial performance and was at high risk of bankruptcy. Several factors influencing the Z-Score include a decline in working capital, low retained earnings, and high debt levels.

Springate (S-Score) Model. The Springate (S-Score) model is an alternative bankruptcy prediction approach developed by Gordon Springate in 1978. This model also utilizes financial ratios but employs a different formula and emphasis compared to the Altman model. Springate's model uses four key financial ratios to identify potential bankruptcy and generates a score indicating the company's financial health. The following table presents the calculation results for PT Garuda Indonesia, Tbk., during the 2016–2020 period.

Table 2 Springate (S-Score) model calculation results

No	Year	S-Score	Description
1	2016	0,580	Bankrupt
2	2017	0,545	Bankrupt
3	2018	0,653	Bankrupt
4	2019	0,998	Halthy
5	2016	-0,662	Bankrupt

Source: www.idx.co.id, Indonesia Stock Exchange, processed data in 2025

The S-Score calculation results indicate that PT Garuda Indonesia, Tbk. also faced financial distress based on this model. In 2016, 2017, 2018, and 2020, the company was predicted to be bankrupt as its S-Score was below 0.862. Only in 2019 did the company demonstrate financial health with an S-Score above 0.862. A low S-Score in most of the study years suggests that the company had difficulties in asset management, profitability, and liquidity. The increase in the S-Score in 2019 indicates an improvement in the company's financial performance, though unfortunately, this improvement was not sustained in the following year.

Zmijewski (X-Score) Model. The Zmijewski (X-Score) model, developed by Zmijewski in 1984, is a bankruptcy prediction model that uses three financial ratios. Unlike the Altman and Springate models, the Zmijewski model applies different variable selections and weighting, focusing on profitability, leverage, and liquidity. The calculation results for PT Garuda Indonesia, Tbk., during the 2016–2020 period are shown in the following table.

Tabel 3 Zmijewski (X-Score) model calclation results

No	Year	(X-Score)	Description
1	2016	-0,148	No Bankrupt
2	2017	-0,018	No Bankrupt
3	2018	0,772	Bankrupt
4	2019	0,701	Bankrupt
5	2020	3,460	Bankrupt

Source: www.idx.co.id, Indonesia Stock Exchange, processed data in 2025

The X-Score calculation results show different outcomes compared to the other two models. In 2016 and 2017, the company was predicted not to experience bankruptcy, as its X-Score was below 0. However, in 2018, 2019, and 2020, the model indicated a potential risk of bankruptcy, as the X-Score exceeded 0. The differences in results using the Zmijewski model may be due to variations in the variables and weightings used in this model compared to the Altman and Springate models. The Zmijewski model places greater emphasis on profitability, leverage, and liquidity ratios.

Comparison of Models and Further Analysis. After examining the bankruptcy prediction results of PT Garuda Indonesia, Tbk., using three different models—Altman (Z-Score), Springate (S-Score), and Zmijewski (X-Score)—it is now time to compare them side by side. The following table presents the bankruptcy prediction results for PT Garuda Indonesia, Tbk., over the 2016-2020

period based on these three models. This comparison is crucial as each model employs different financial approaches and variables in its calculations.

The Altman (Z-Score) model places greater emphasis on a company's liquidity and short-term profitability. The Springate (S-Score) model, on the other hand, assigns a higher weight to working capital and total assets, reflecting its focus on efficiency and growth. Meanwhile, the Zmijewski (X-Score) model highlights leverage and the company's ability to meet its financial obligations. By comparing the results from these three models, it becomes evident that differences in variable focus lead to potentially varying interpretations of a company's financial health and help identify key areas of concern in each model's assessment.

Table 4 Coparison of PT Garuda Indonesia, Tbk.,'s bankruptcy prediction results

No	Yaer	Altman (Z-Score)	Springate (S-Score)	Zmijewski (X-Score)
1	2016	Bankrupt	Bankrupt	No Bankrupt
2	2017	Grey Area	Bankrupt	No Bankrupt
3	2018	Grey Area	Bankrupt	Bankrupt
4	2019	Bankrupt	Healthy	Bankrupt
5	2016	Bankrupt	Bankrupt	Bankrupt

Source: www.idx.co.id, Indonesia Stock Exchange, processed data in 2025

From the table above, differences in prediction results among the three models can be observed. The Altman and Springate models tend to indicate bankruptcy more frequently than the Zmijewski model. This discrepancy is likely due to variations in the variables and weightings used in each model. The Altman and Springate models place greater emphasis on ratios related to a company's liquidity and solvency, whereas the Zmijewski model focuses more on profitability and leverage.

Model Accuracy Based on Previous Research. Several studies have compared the accuracy of these three models in predicting corporate bankruptcy. According to Altman (1968), the Z-Score model has an accuracy rate of approximately 80-90% in predicting bankruptcy among manufacturing companies. However, other studies have shown that its accuracy may decline when applied to companies in the service or airline sectors (Grice & Ingram, 2001). The Springate model, developed by Springate (1978), has a lower accuracy rate than Altman's model but remains effective in assessing a company's working capital efficiency (Hossari & Rahman, 2005). Meanwhile, the Zmijewski model (1984) was designed to address biases in previous models and places a greater focus on profitability and leverage, making it potentially more suitable for industries with unique financial structures, such as airlines (Shumway, 2001).

In the context of PT Garuda Indonesia, Tbk., these differing prediction results indicate that the Altman and Springate models are more conservative in classifying a company as bankrupt, whereas the Zmijewski model provides a more flexible assessment. Therefore, in evaluating bankruptcy, it is essential not to rely solely on one model but rather to use a comparative approach to obtain a more comprehensive understanding.

CONCLUSION

Based on a comparative analysis using the Altman, Springate, and Zmijewski models, it can be concluded that PT Garuda Indonesia, Tbk., faced a significant risk of bankruptcy during the 2016-2020 period. The three models show variations in their predictions, reflecting differences in focus and the variables used. The Altman model tends to be more conservative, often indicating a grey area, while the Springate model consistently predicts bankruptcy, and the Zmijewski model shows fluctuations. Nevertheless, the majority of indications from all three models point to substantial financial distress for Garuda Indonesia, Tbk.,. This highlights the need for strategic actions by management to improve financial performance, including enhancing efficiency, better debt management, and potential business diversification. This study provides valuable insights for management, investors, and relevant stakeholders in understanding the risks faced by Garuda Indonesia, Tbk., although further analysis considering external and internal factors is highly recommended.

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