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Analysis Of Financial Distress Accuracy Level In The Textile And Garment Sector

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Abstract

Introduction/Main Objectives: The Indonesian Textile and Garment Industry is currently experiencing a severe crisis characterized by mass layoffs and factory closures. This situation is driven by the influx of imported products and declining export demand, making financial distress prediction crucial for stakeholders. The objective of this study is to compare the accuracy of three prediction models—Springate, Zmijewski, and Grover—in detecting financial distress.

Background Problems: The crisis has caused widespread financial instability in the sector, raising the question: Which prediction model provides the most accurate early warning for financial distress in Textile and Garment companies listed on the Indonesia Stock Exchange (IDX)?

Research Methods: This research adopts a quantitative approach. The population includes all Textile and Garment companies listed on IDX, with 11 companies selected through purposive sampling, resulting in 44 data units. Data analysis techniques include descriptive statistics, the Shapiro-Wilk normality test, and One-Way ANOVA to compare the models' predictive capabilities.

Finding/Results: The results indicate significant differences among the three models. The Zmijewski model achieved the highest accuracy at 100% with zero error, followed by the Grover model at 82% accuracy (18% error). The Springate model performed the worst, with only 9% accuracy and a 91% error rate.

Conclusion: The study concludes that the Zmijewski model is the most accurate and reliable tool for predicting financial distress in Indonesia's Textile and Garment sector. Its adoption can help stakeholders implement timely interventions to mitigate risks and maintain business continuity.

Keywords: *Financial distress*, Springate Model, Zmijezwki Model, Grover Model.

Introduction

In an increasingly competitive and dynamic business climate, a company's ability to maintain financial health is the primary foundation for ensuring its business continuity (going concern). Companies are not only required to be able to generate profits but must also be adept at managing capital structure, liquidity, and solvency to avoid the risk of failure. Failure to manage these crucial aspects can drag a company into a serious state of financial difficulty. This challenge is a major focus for labor-intensive industries in Indonesia, where the Textile and Textile Product (TPT) or garment sector plays a strategic role. Historically, the TPT industry has been one of the national manufacturing pillars that contributes significantly to the Gross Domestic Product (GDP), absorbs a large number of workers especially female workers and is one of the country's flagship non-oil and gas export commodities. The stability of this sector has a broad multiplier effect on the national economy.

However, behind this strategic role, the Indonesian TPT industry has been facing a threatening crisis phenomenon in recent years. Pressure from the global market, post-pandemic supply chain disruptions, economic slowdowns in major export destination countries (such as the United States and Europe), and tight competition with imported products flooding the domestic market have created a "perfect storm" for many businesses in this sector. The real phenomenon confirming the severity of this pressure is the wave of factory closures and mass layoffs (PHK). TEMPO (2024),reported that several Textile and Pre-textile Industry (TPT) Associations revealed that 60 domestic textile companies have collapsed in the last two years. Quoted from TEMPO (2024), approximately two hundred and fifty thousand people were directly affected by these closures.

The climax of this phenomenon was dramatically confirmed through the case of one of the largest and most iconic entities in the industry, PT Sejahtera Bintang Abadi Tekstil Tbk or SBAT, which was declared bankrupt by the Central Jakarta District Court. One of the textile giants in Bandung had apparently stopped operations since 2024, as reported by Haya (2025). The SBAT case serves as a clear warning sign that even large-scale companies with a long history are not immune to the risk of bankruptcy. This series of events is the final manifestation of a process known in financial literature as financial distress (financial difficulty). Financial distress is not a single event but a gradual process that indicates a decline in a company's financial health. As revealed by Muslimin & Bahri (2023), financial distress is the stage that occurs before bankruptcy or liquidation. This process often begins with the inability to pay short-term obligations (liquidity problems), continues to failure to pay debt interest, and finally leads to insolvency, where total liabilities exceed total assets. The impact of financial distress does not stop at the company entity itself. The ripple effect is very broad, including the loss of investor confidence, mass layoffs that increase unemployment and create social problems, disruption of the supply chain (unpaid creditors and suppliers), and the loss of potential tax revenue for the state.

Given these highly detrimental consequences, the ability to detect financial distress early on becomes an urgent necessity. This is where the important role of prediction tools or early warning systems lies. By detecting signs of distress earlier, management has the opportunity to take necessary corrective actions, whether through operational, financial, or strategic restructuring, before the company reaches the point of no return. To answer this need, various studies have developed quantitative models to predict financial distress. In this study, the focus will be limited to three models that have been tested and widely used: the Springate model, the Zmijewski model (X-Score), and the Grover model (G-Score). These three models were chosen because they use different combinations of financial ratios to assess various aspects of a company's health, ranging from profitability, liquidity, to capital structure.

Nevertheless, the application of these models in various recent studies (in the last five years) shows inconsistent results. The accuracy level of a model is apparently not universal and highly depends on the context of its application, especially industry characteristics. A model that is accurate in one sector may not be reliable when applied in another sector. For example, the study by Fitriani & Huda (2020), which analyzed manufacturing companies in general, found that the Zmijewski model had the most superior accuracy level, even reaching 100% in their sample, outperforming the Springate model. This finding contrasts with the study by Wahyuni & Rubiyah (2021), which specifically compared the four models (including Springate, Zmijewski, and Grover) in the plantation sector. In their study, none of the three models were the most accurate ; instead, another model (Altman) showed the highest accuracy (76.00%).

On the other hand, the Springate model showed its superiority in a different sector. Oliviana & Pandin (2023) 's research on the food and beverage sub-sector found that the Springate S-Score model (80%) was more accurate. The popularity of the Springate model in sectoral analysis is also supported by the research of Indriani et al. (2023) in the property sector and Suadnyana & Musmini (2022) in the tourism sector. Melissa & Banjarnahor (2020)'s research on the Manufacturing sector showed an accuracy level for the Zmijewski model of (80%). In contrast, the Grover model was superior in the Financial sector **(**Mufidah & Handayani (2024); Sriwahyuni et al. (2025)), and in the retail sector Elia & Rahayu (2021) The diversity of results from these recent studies (Fitriani & Huda (2020); Listyarini, (2020); Wahyuni & Rubiyah 2021); Oliviana & Pandin (2023)) clearly shows a research gap. Bukhori et al., (2022) also recognized this limitation, noting that their study was restricted to the manufacturing sector from 2016 to 2019, and recommended that subsequent studies explore different sectors and timeframes.. This difference can be explained because each industry has unique operational characteristics and financial structures. The benchmark financial ratio considered "healthy" in the capital-intensive property industry Indriani et al. (2023) is certainly different from the tourism service industry Suadnyana & Musmini (2022). Therefore, the accuracy level of the Springate, Zmijewski, and Grover models is very likely to differ when applied to the labor-intensive TPT industry, which has specific inventory turnover.

Given the real crisis phenomenon currently hitting the Indonesian textile and garment industry (mass layoffs, factory closures, and the Sritex bankruptcy case) , and the strong empirical evidence that prediction model accuracy is highly sectoral , it becomes very important and urgent to conduct a comparative test. Research is needed to specifically identify which model among Springate, Zmijewski, and Grover has the highest and most reliable accuracy level for predicting financial distress in companies in the Indonesian textile and garment sector.

Research Methods

Population and sample

The population in this study includes all go public issuers engaged in the Textile and Garment sector listed on the Indonesia Stock Exchange (IDX). The total population of 19 companies was determined based on the list of companies included in that sector during the research period. The selection of objects in this study was carried out using the purposive sampling technique , which is a method of sample selection based on certain criteria set by the researcher. This technique was chosen because not all populations have characteristics that match the phenomenon that is the focus of the research. Based on these criteria, the researcher determined 11 companies as the research objects, with a total of 44 samples used in the analysis.

Descriptive Statistics

Descriptive statistical analysis is employed to provide a comprehensive overview of the dataset. This includes presenting key metrics such as the mean, standard deviation, as well as the range defined by the minimum and maximum values Annisa & Ghozali (2020) The results of this test can only be applied to draw conclusions about the information the researcher has and not general conclusions.

Normality Test

The data normality test is a data distribution test used to detect whether the data from the sample in this study is normally distributed or not. To assess data distribution, this research utilizes the Shapiro-Wilk method. As noted by Sarjono & Julianita (2022), this test is highly effective and widely adopted for normality testing, particularly in studies involving smaller sample sizes (specifically where n < 50). Data is said to be normally distributed if the significance value (Sig.) is more than 0.05 or 5%. Conversely, if the resulting significance value is less than 0.05 or 5%, the data is not normally distributed Annisa & Ghozali (2020).

Difference Test

This study aims to compare the accuracy levels of the three models (Springate, Zmijewski, and Grover) , which means comparing more than two sample groups. Referencing Annisa & Ghozali (2020), the One-Way ANOVA serves as the appropriate parametric test when the objective is to evaluate mean differences across three or more independent groups. However, the One-Way ANOVA test has the basic assumption that the data must be normally distributed. If the results of the normality test (Shapiro-Wilk) show that the data is not normally distributed (Sig. value < 0.05), then hypothesis testing must be carried out using a non-parametric statistical test. As an alternative to One-Way ANOVA, Sugiyono (2019) states that the Kruskal-Wallis test (one-way analysis of variance based on ranks) is the most appropriate non-parametric statistical technique to test the difference between three or more independent sample groups whose data are not normally distributed.

Accuracy Test and Prediction Model

To test the hypothesis and determine which model is the best, this study uses the calculation of the accuracy level and type 2 error. Wahyuni & Rubiyah (2021) state that the highest accuracy level indicates that a prediction model has the most prediction precision based on all existing samples. A prediction is said to be correct if the predicted condition (healthy or distress) is the same as the actual condition. The accuracy level test can be performed after accumulating the calculation results based on the cut-off value of each financial distress prediction method. The highest accuracy level indicates the most accurate prediction model. Consistent with the research by Fahma & Setyaningsih (2019), the accuracy level of the financial distress prediction analysis method can be calculated using the following formula:

$$\text{Accuracy Level} = \frac{\text{Number of Correct Predictions}}{\text{Number of Samples}} \text{X } 100\%$$

Besides the accuracy of each model, the error rate is also a consideration. The error rate indicates the percentage of prediction errors of a model. According to the methodology used by Fahma & Setyaningsih (2019), the error rate is calculated overall (not Type I or Type II) as follows:

$$\text{Error Rate} = \frac{\text{Number of Incorrect Predictions}}{\text{Vumber of Samples}} \text{X } 100\%$$

Discussion

Description of Research Objects

Descriptive Statisticel Analysis

Table 1. Descriptives Test

	N	Minimum	Maximum	Mean	Std. Deviation
Springate	44	0,68	1,91	1,3446	0,40028
Zmijewski	44	0,28	1,89	1,0939	0,42448
Grover	44	0,01	1,89	1,0705	0,51432
Valid(Listwise)					

Source: Author's Work, 2025.

Based on the results of the descriptive statistical test in the table above, the amount of data (N) used in this study is known to be 44 data. For the Grover model, the lowest value (Minimum) is -0.40, the highest value (Maximum) is 0.35, the average value (Mean) is -0.1709, and the standard deviation is 0.17173. For the Zmijewski model, the lowest value (Minimum) is -1.78, the highest value (Maximum) is 2.92, the average value (Mean) is 0.8250, and the standard deviation is 1.14418. For the Springate model, the lowest value (Minimum) is -1.33, the highest value (Maximum) is 0.69, the average value (Mean) is -0.2289, and the standard deviation is 0.44964. The number of valid and simultaneously analyzed data (Valid N (listwise)) also shows the number 44, which confirms that there is no missing data among the three variables.

Table 2. Normality Test

	Kelompok	Shapiro-Wilk		
		Statistic	df	Sig.
Var1	Springate	0,121	28	0,056
	Grover	0,100	23	0,572
	Zmijewski	0,172	35	0,076

Source: Author's Work, 2025.

Based on the normality test results carried out using the Shapiro–Wilk method with a significance level of 0.05 , it was found that the Springate method has a significance value of 0.056, the Grover method is 0.572, and the Zmijewski method is 0.076. The criteria for this test stipulate that the data distribution is deemed normal when the significance level (Sig.) exceeds 0.05. Conversely, if the Sig. value falls below the 0.05 threshold, the data does not meet the normality assumption. Based on these results, all significance values of the three methods are above 0.05: 0.056 for Springate, 0.572 for Grover, and 0.076 for Zmijewski. Thus, it can be concluded that the data from the three methods Springate, Grover, and Zmijewski are normally distributed.

Difference Test (One way Anova)

The One-Way ANOVA or Analysis of Variance test is used for testing more than two samples ; in this study, the One-Way ANOVA test is used to determine the comparison of the Springate, Zmijewski, and Grover models in predicting financial distress in Textile and Garment companies.

Table 3. Defference Test

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,284	2	0,979	3,274	0,043
Within Groups	16,272	83	0,005		
Total	17,555	85			

Source: Author's Work, 2025.

The results derived from the One-Way ANOVA analysis serve to verify if statistically significant discrepancies exist in the predictive capabilities of the Springate, Zmijewski (X-Score), and Grover (G-Score) models regarding financial distress. Interpretation of this test relies on the Sig. value: a result exceeding 0.05 implies no substantial variance between the models. However, a value below 0.05 confirms a significant difference in their prediction performance between the models in predicting financial distress. Conversely, if the significance value (Sig.) is less than 0.05, there is a significant difference between the models in predicting financial distress. Based on the results of the One-Way ANOVA test output, a Sig. value of 0.043 is obtained , which is less than 0.05 (Sig. < 0.05). This indicates that H1 is accepted, meaning there is a significant difference between the Springate, Zmijewski, and Grover models in predicting the level of financial distress in Textile and Garment companies listed on the Indonesia Stock Exchange (IDX) for the 2021–2024 period.

Accuracy Level Test

Table 4. Tingkat Accuracy and Error Rate of Finansial Distress prediction

	Springate	ZmiJewski	Grover
Akurasi	9%	100%	82%
Eror	91%	0%	18%

Source: Author's Work, 2025.

Based on the Table above, the test results provide information regarding the comparison of the accuracy and error rates of the three financial distress prediction methods. The Zmijewski method (X-Score) showed the highest accuracy rate of 100% with an error rate of **0%**. The Grover method (G-Score) has an accuracy rate of 82% with an error of 18% , while the Springate method showed the lowest accuracy rate, namely 9%, with an error of 91%. Overall, the Zmijewski method (X-Score) showed the best performance in predicting financial distress compared to the Grover and Springate methods. This result indicates that the Zmijewski model is more reliable in identifying a company's financial condition than the other two models. The Zmijewski method occupies the highest accuracy level in this study compared to other methods due to several key factors.

Prediction Model Recommendation

Based on the analysis results of the accuracy level and error rate of the three financial distress prediction models tested—Springate, Grover (G-Score), and Zmijewski (X-Score)—it can be recommended that the Zmijewski model (X-Score) is the most superior and feasible prediction tool to use in identifying potential financial difficulty in companies in the Textile and Garment sector listed on the Indonesia Stock Exchange (IDX) for the 2021–2024 period. The Zmijewski model (X-Score) showed the highest accuracy rate of 100% with a prediction error rate of 0% , which reflects the reliability and consistency of this model in mapping a company's financial condition more accurately than the other two models. The Grover method (G-Score) is in second place with an accuracy rate of 82% and an error rate of 18% , while the Springate method showed the lowest accuracy rate, namely 9%, with an error rate of 91%.

This aligns with the research conducted by Panai et al., (2023), which found that the Zmijewski model is superior to other models in predicting financial distress. Not only that, according to Listyarini, (2020)'s research, which analyzed manufacturing companies in general, the Zmijewski model had the most superior accuracy level, even reaching 100% in her research sample. The superiority of the Zmijewski (X-Score) model makes it a robust and adaptive analytical tool for stakeholders such as creditors, investors, and company management particularly when facing high market uncertainty. By utilizing a probit analysis approach, this model does not require data normality, making it highly effective for detecting financial distress in the textile and garment sector, which often experiences cash flow volatility and fluctuating leverage. Its consistent accuracy makes this model a crucial validation instrument for assessing solvency stability and ensuring business continuity (going concern) amidst fierce competition in labor-intensive industries.

Conclusion

This study aims to determine whether there is a difference in scores assessed from the accuracy level among the Springate, Zmijewski, and Grover models in predicting financial distress , and to find out which prediction model is the most accurate in predicting the condition of financial distress in Textile and Garment companies in Indonesia listed on the IDX for the 2021–2024 period. Based on the research results, it can be concluded that there is a significant difference in the prediction results among the three models. Furthermore, based on the accuracy level and error rate, the Zmijewski model is proven to be the best model in predicting financial distress in Textile and Garment companies during the research period. Although this research was carried out systematically, there are several limitations that need to be considered. This study only includes companies in the Textile and Garment sector during the 2021–2024 period and only uses three assessment methods. Therefore, future research is recommended to expand the prediction model to include models such as the Altman Z-Score and Ohlson (O-Score) to enrich the comparison results and improve the validity of financial distress predictions.

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