EQUITY
Vol. 28, No.1, 2025, 51-68
DOI: 10.34209/equ.v28i1.10594
P-ISSN 0216-8545 | E-ISSN 2684-9739

Uploaded : February 2025
Accepted : April 2025
Published : April 2025

POST-COVID-19 FINANCIAL DISTRESS ANALYSIS: INSIGHTS FROM INDONESIAN TRANSPORTATION SUB-SECTOR COMPANIES

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Abstract

The objective of this study is to analyze the prediction of financial distress in transportation sub-sector companies listed on the Indonesia Stock Exchange for the period 2021-2023 using four prediction models: Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score), and Grover (G-Score). The study will calculate the level of accuracy. The analysis utilizes secondary data, specifically financial reports from 12 companies, constituting a total sample of 36. The findings indicate that the Zmijewski and Grover model exhibits the highest accuracy rate of 76%, followed by zmijewski with 71%, springate with 46%, and Altman with 26%. These results suggest that the Zmijewski and Grover model is appropriate model for use in the transportation sub-sector in Indonesia during the observed period. The implications of this research suggest that Zmijewski and Grover's model can be utilized by companies to evaluate financial conditions proactively, by investors to assess investment risks, and by regulators to ensure the stability of the transportation sub-sector. However, this study also underscores that Zmijewski and Grover's model cannot be generalized to all sectors, emphasizing the necessity for further research to test the model in other sectors by considering both financial and non-financial variables.

Keywords: Financial Distress; Accuracy; Post-covid; DAR; Net Profit.

Abstrak

Penelitian ini bertujuan untuk menganalisa prediksi financial distress pada perusahaan sub-sektor transportasi yang terdaftar di BEI periode 2021–2023 menggunakan empat model prediksi, yaitu Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score) dan Grover (G-Score) kemudian menghitung tingkat akurasi. Data analisa merupakan data sekunder berupa laporan keuangan dari 12 perusahaan dengan total sampel 36. Hasil penelitian menunjukkan bahwa model Zmijeski dan Grover memiliki tingkat akurasi tertinggi sebesar 76%, diikuti oleh zmijewski 71%, springate 46% dan Altman 26%. Temuan ini mengindikasikan bahwa model zmijewski dan Grover adalah model yang sesuai untuk digunakan pada sub-sektor transportasi di Indonesia dalam periode tersebut. Implikasi penelitian ini adalah model Zmijewski dan Grover dapat dimanfaatkan oleh perusahaan untuk mengevaluasi kondisi keuangan secara preventif, oleh investor untuk menganalisis risiko investasi, dan oleh regulator untuk menjaga stabilitas sub-sektor transportasi. Namun, penelitian ini juga menekankan bahwa model Zmijewski dan Grover tidak dapat digeneralisasi untuk semua sektor, sehingga penelitian lanjutan disarankan untuk menguji model tersebut pada sektor lain dengan mempertimbangkan variabel keuangan maupun non-keuangan.

Kata Kunci: *Financial Distress; Akurasi; Post-Covid; DAR; Net Profit.*

Cited this as: Maharani, N., Mulyadi, N.P., & Valdiansyah, R.H. 2025. Post-Covid-19 Financial Distress Analysis: Insights from Indonesian Transportation Sub-Sector Companies. *Equity,* 28(1), 51-68. doi.org/10.34209/equ.v28i1.10594

INTRODUCTION

The incapacity of a business to fulfill its financial commitments, such as keeping liquid assets and fulfilling credit, is referred to as financial hardship.For a wide range of stakeholders, including creditors, investors, shareholders' financial forums, suppliers, customers, and regulators, predicting financial distress is essential.Stakeholders share the same objective, which is the expansion of the company, although having distinct interests from their duties (Dwiarti et al., 2021). The repercussions of financial distress extend beyond the immediate entity, as it poses a substantial risk to financial institutions, potentially leading to partial or complete loss of loans, which in turn can exert significant pressure on other creditors, consequently generating ripple effects that can adversely impact the broader economic landscape (Balasubramanian et al., 2019).

Stakeholders' main concern is keeping an eye on the company's financial performance. Predicting financial difficulty that may result in business failure is therefore crucial. This forecast aids stakeholders in recognizing business risks and developing countermeasures (Hassan et al., 2024). Conducting financial distress prediction analysis provides stakeholders with a valuable tool to assess the financial condition of a company, serving as an early warning signal and providing a foundation for informed decision-making (Yazdanfar & Öhman, 2020). Moreover, the ability to predict financial distress in advance is of significant importance to regulators, practitioners, and academics, as it has the potential to exert a substantial influence on the financial system (Balasubramanian et al., 2019).

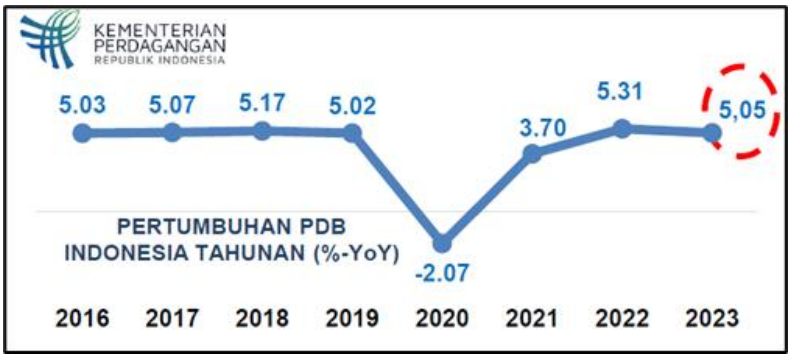

Figure 1. Yearly Growth of Indonesian GDP

Source: (Badan Kebijakan Perdagangan Kementerian Perdagangan RI, 2024)

The ongoing impact of the pandemic on the economy is evident in the analysis of Indonesia's GDP growth from 2021 to 2023. Figure 1 illustrates that while Indonesia's GDP growth exhibited an increase in 2021 and 2022, it experienced a decline of 0.26 points in 2023. Conversely, the transportation sector exhibited an augmented level of contribution to the value of the GDP, both at constant prices and at current prices (Figure 2).

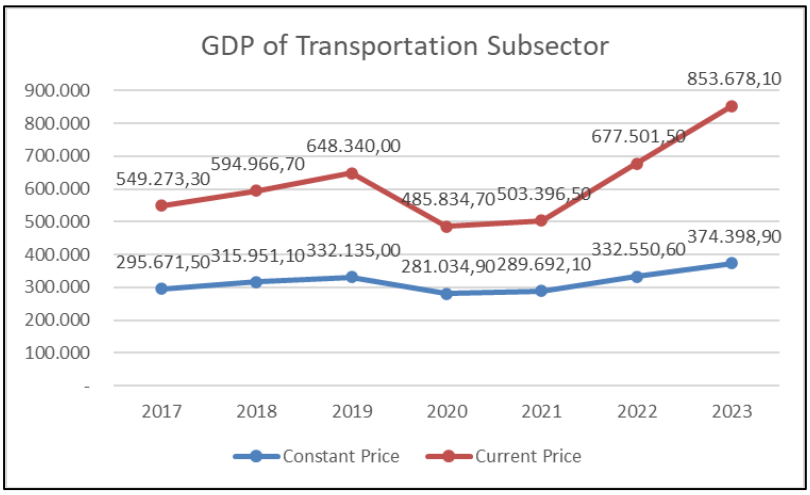

Figure 2. Transportation GDP (in Billion Rupiah)
Source: www.bps.go.id (Research Data, 2025)

The transportation sector has been the most adversely affected, with a growth rate of -16.7% in Q3 2020. This was followed by the accommodation and food services sector, which experienced a growth rate of -11.86%, and corporate services, which recorded a growth rate of -7.61%. Figure 3 illustrates the growth of five sectors in Indonesia that encountered the most significant decline in Q3 2020 during the period of the pandemic. The transportation sector, in particular, has been particularly hard-hit by the Large-Scale Social Restrictions (PSBB) policy, which was implemented on April 10, 2020 (Wijaya, 2020). In 2021, while the five sectors demonstrated improvements, the transportation sector exhibited the most modest growth at -0.72%, while the trade sector exhibited the most substantial growth at 5.16%. A marked shift towards positive growth was observed in 2022 and 2023, with the transportation sector emerging as the leading growth sector among the five sectors.

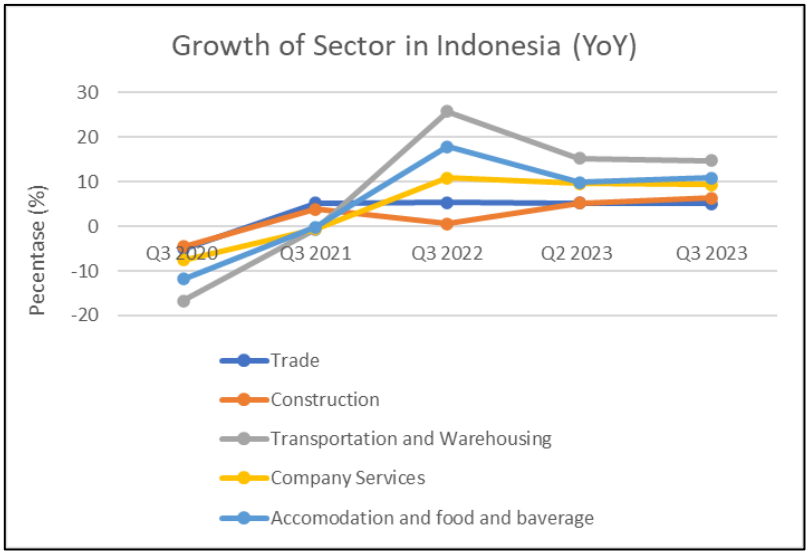

Figure 3. Growth of Sector in Indonesia (yoy)
Source : (Badan Kebijakan Perdagangan Kementerian Perdagangan RI, 2024)

In the context of the Indonesian economy's recovery from the impacts of the global pandemic (Covid-19) from 2021 to 2023, PT Garuda Indonesia Tbk (GIAA) initiated a PKPU (Penundaan Kewajiban Pembayaran Utang) at the conclusion of 2021, seeking a provisional legal safeguard against its creditors while formulating a strategy for debt restructuring. As of September 2021, Garuda Indonesia recorded a negative equity of US$ 2.82 billion, equivalent to IDR 40.04 trillion, a figure that surpasses the previous record held by PT Asuransi Jiwasraya for an SOE. Deputy Minister of SOE II Kartika Wirjoatmodjo further elaborated that Garuda Indonesia's financial situation can be characterized as technically bankrupt, with a substantial portion of its debt comprising aircraft leases, amounting to IDR 128 trillion. The company is currently engaged in negotiations with the lessor to discuss potential restructuring measures (Wareza, 2021).

Furthermore, PT Airasia Indonesia Tbk (CMPP) encountered a net loss from 2021 to 2023, with a recorded loss of Rp1.08 trillion in 2023, marking a 34.5% decrease from the previous year. This decline in revenue has been attributed to insufficient funds to cover the Company's expenses, which have increased by 44% to IDR 7.33 trillion. Notably, financial expenses have seen a 10% rise since the previous year and have continued to rise since 2021.In response to this financial distress, the Company has announced plans to enhance cost efficiency and engage in debt restructuring with vendors, particularly aircraft lessors (Bloomberg Technoz, 2023).

The transportation subsector plays a pivotal role in economic activity, facilitating the movement of goods and people and serving as a critical link in global supply chains. This subsector demands substantial investments in infrastructure and fixed assets that are essential for generating sales, such as vehicle fleets, terminals, and transportation routes. The transportation subsector's unique characteristics include a high degree of corporate asset ownership but also a relative illiquidity and a long life cycle. Consequently, companies in this sector depend on significant external resources to acquire investment assets. This pattern often leads to a high debt-to-equity ratio, a feature that distinguishes the transportation subsector from other industries. Conversely, the profitability of transportation companies is often influenced by fixed costs, fuel expenses, and labor costs. Additionally, the sector is susceptible to liquidity constraints, as evidenced by the suboptimal current ratio.

Research on the measurement and prediction of financial distress has produced equivocal findings, reflecting variations in the accuracy of various prediction models depending on the context and data used. A comparative analysis of the Altman, Springate, Zmijewski, and Grover models has identified the Zmijewski model as the most effective (Alamsyah et al., 2019; Bunker et al., 2024), followed by the Springate model (Lestari et al., 2021), the Altman model (Mustafa et al., 2022), and the Grover model (Ishak et al., 2024). When the four models are incorporated with the Ohlson model, the resulting Zmijewski model demonstrates a high value (Lutfiyyah & Bhilawa, 2021). In a comparative analysis conducted by (Salim & Ismudjoko, 2021; Supitriyani et al., 2022), the Altman, Springate, Zmijewski, and Ohlson models were evaluated. The findings indicated that the Altman and Ohlson models emerged as the most effective, as reported by (Salim & Ismudjoko, 2021). Conversely, the analysis conducted by (Supitriyani et al., 2022) identified the Altman

model as the most suitable.

Financial distress prediction models have the capacity to assist in the early detection of financial distress, facilitating the evaluation of financial conditions and the analysis of financial performance. This, in turn, enables the formulation of accurate decisions. The present study underscores the significance of predicting financial distress, particularly in light of the suboptimal condition of transportation companies in the context of a stabilizing Indonesian economy. Moreover, the observed variation in financial distress research outcomes underscores the necessity for context-specific evaluation in determining the most effective model for financial distress prediction.

LITERATURE REVIEW

Signal Theory

Signal theory posits that signals serve as a conduit for the transmission of information among parties engaged in business processes, with the objective of mitigating information asymmetry arising from incomplete or inaccurate information. This theory entails the sender (i.e., the "signaler") disseminating the signal to the receiver, who then interprets the signal (Shahid et al., 2024).The effectiveness of five distinct signal components in mitigating information asymmetry is highlighted by this theory: observation, cost, credibility, frequency, and consistency (Kharouf et al., 2020). The issue of asymmetric information can be addressed through the lens of signal theory, which involves the provision of financial decisions such as dividend policy, capital structure, and transparency of financial statements (Ross, 1977). Companies that receive positive signals will experience cost reductions, while negative signals will result in increased costs.This theory is instrumental in informing business decisions. Companies employ annual financial reports as a means of communication, through which managers can shape the future and shareholders can be motivated (Hermuningsih et al., 2022).

Financial Distress

The period of time before financial difficulty and liquidation is known as financial distress. It is typified by major, though manageable, obstacles, such as trouble paying suppliers, bank failures, or payroll issues. Companies encountering financial distress typically exhibit net losses and confront substantial financial difficulties but have not yet reached the point of financial distress (Platt & Platt, 2002). This condition can also be characterized as a state in which the liquidation of total assets falls short of the total value of debt, and the company's operating cash flow remains below its net worth. Persistent adherence to these criteria can ultimately result in forced liquidation or financial distress (Balasubramanian et al., 2019).

According (Aviantara, 2023; Kaiser, 2001), the following are the main markers of financial distress: (1) Non-profitability, which suggests that the likelihood of failure increases with unprofitability. (2) Debt, indicating that the likelihood of default increases with the amount of debt in the company's capital structure. (3) Cash flow issues, indicating that inadequate cash flow makes it harder to secure outside funding. (4) Company age: The older a company is, the less likely it is to fail.

(5) The impact of company size on entry and exit in financial difficulty is inversely U-shaped. (6) The shareholders' legal status (the presence of shareholders has a detrimental effect on financial distress) (7) Creditor count (a high creditor count will assist the company in escaping financial difficulties) (8) Diversification: Businesses that are highly diversified are less likely to face financial difficulties.

Prediction Method of Financial Distress

This study uses four financial distress models, namely Altman (Z-Score), Springate (S-Score), Zmijewski (X-Score) and Grover (G-Score).

Table 1. Prediction Method of Financial Distress

No	Method	Ratio	Indicator	Source
1	Altman (Z-Score) = $1.2X_1$ + $1.4X_2$ + $3.3X_3$ + $0.6X_4$ + $1.0X_5$	X_1 : WCTA X_2 : RE/TA X_3 : ROTA X_4 : MVE/TL X_5 : TATO	Z < 1,81 is financial distress 1,81 > Z < 2,99 is grey area (potentially will distress) Z > 2,99 is no financial distress	(Altman, 1968) (Liang et al., 2020) (Dolinšek & Kovač, 2024)
2	Springate (S-Score) = $1,03X_1$ + $3,07X_2$ + $0,66X_3$ + $0,4X_4$	X_1 : WCTA X_2 : ROTA X_3 : ROL X_4 : TATO	S-Score > 0.826, is no financial distress; S-Score <= 0.826 is financial distress	(Springate, 1978) (Bărbută-Misu & Madaleno, 2020) (Vuk et al., 2024)
3	Model Zmijewski X = -4,3 – $4,5X_1$ + $5,7X_2$ - $0,004X_3$	X_1 : ROA X_2 : DAR X_3 : CR	X-Score < 0 is no financial distress X-Score ≥ 0 is financial distress	(Zmijewski, 1984) (Toudas et al., 2024) (Fauzi et al., 2021)
4	Model Grover G=$1.650X_1$ + $3.404X_2$ + $0.016X_3$+ 0.057	X_1 : WCTA X_2 : ROTA X_3 : ROA	G ≤ -0,02 is financial distress G ≥ 0,01 is no financial distress	(Grover, 2003) (Martini et al., 2023) (Marsenne et al., 2024)

Which is,

WCTA : Working Capital / Total Assets
RE/TA : Retained Earnings/Total Assets
ROTA : Earnings Before Interest and Taxes / Total Assets
MVE/TL : Market Value of Equity / Book Value of Total Liabilities
TATO : Sales / Total Assets
ROL : Net profit before tax / current liabilities
ROA : Net Profit/Total Assets
DAR : Total Debt/Total Assets
CR : Total Debt/Total Assets

Each financial distress prediction model utilizes a distinct combination of financial ratios to assess the financial health of a company.The Altman Z-Score model, for instance, employs five ratios: working capital to total assets, retained earnings to total assets, and market value of equity to book value of total liabilities. This multifaceted approach enables the model to capture aspects of profitability, solvency, and operational efficiency. In contrast, the Springate model (S-Score) employs a more streamlined approach, utilizing only four ratios that highlight a company's capacity to generate profit before tax and interest on assets, as well as its liquidity.Conversely, the Zmijewski model places greater emphasis on profitability, debt structure, and liquidity, thereby offering a more pertinent framework for assessing a company's short-term resilience. The Grover Model, a derivative of the Z-Score, employs three primary ratios that underscore profitability and asset utilization efficiency.The utilization of distinct ratios in each model illuminates their respective foci and utilities.

The transportation subsector is capital intensive, requiring significant investments in assets for its fleet of activities to generate sales. Consequently, the sector frequently demonstrates high levels of leverage, rendering the DAR and MVE/TL ratios crucial for evaluating the risk of financial distress. The business model of this sector is heavily influenced by external factors, including economic conditions, fuel prices, and regulatory changes that lead to fluctuations in demand. These variations impact profitability ratios such as RE/TA, ROTA, ROL, and ROA, which are used to calculate the efficient use of assets and debt in generating revenue. Given the substantial long-term investments associated with infrastructure and operating costs, liquidity ratios, such as WCTA and CR, assume considerable importance in evaluating short-term financial stability within the context of high fixed cost conditions, thereby mitigating financial risks.Furthermore, the activity ratio TATO, as incorporated in the Zmijewski model, plays a pivotal role in assessing operational efficiency within the transportation subsector, with the objective of optimizing asset utilization for enhanced sales generation. These financial ratios are incorporated within the four financial distress prediction models, which will be subjected to analysis in this study

RESEARCH METHODOLOGY

Population and Sample

The financial statements of transportation subsector companies registered on the Indonesia Stock Exchange (www.idx.co.id) for the years 2021–2023 are the particular secondary data used in this study. Twelve businesses over a four-year period make up the sample size of 36.

The transportation subsector, which exhibited the lowest growth in 2020 and the highest growth in 2022-2023 among the other four sectors (Figure 3), possesses unique financial characteristics. As illustrated by the cases of PT Garuda Indonesia (Persero) Tbk and PT Air Asia Indonesia Tbk, the decision to finance assets using debt can have a significant impact on a company's profitability.Furthermore, the transportation sector, which is subject to volatile market conditions influenced by external factors such as the global economy and regulatory policies, is particularly vulnerable. The transportation sector encountered challenging circumstances

during the pandemic period, leading to diverse financial performance patterns due to constrained community mobility and economic activit (Saraung, 2023). As an issuer listed on the Indonesian stock exchange, it is imperative to assess the financial condition by employing methods such as Altman, Springate, Zmijewski, and Grover to predict financial distress.

Research Framework

The accuracy level of the transportation subsector business data acquired from the Indonesia Stock Exchange was determined using the Altman, Springate, Zmijewski, and Grover financial distress models.

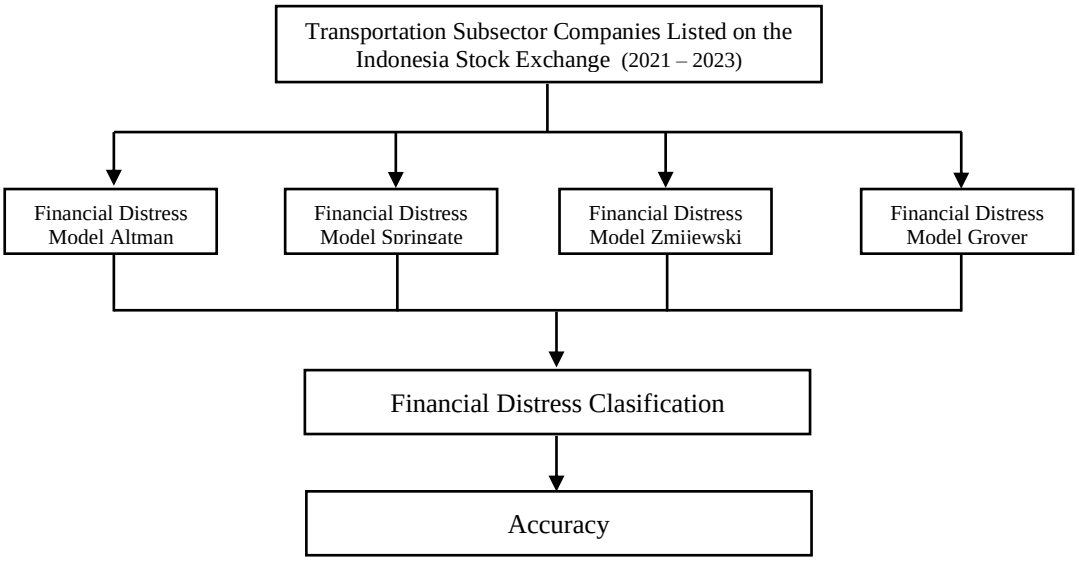

Figure 4. Research Framework
Source: Figure by Authors, 2025

Accuracy

The accuracy level of the financial distress prediction model is calculated using the following formula:

$$\boldsymbol{Accuracy\ Level} = \frac{\boldsymbol{Total\ of\ Correct\ Prediction}}{\boldsymbol{Total\ of\ Sample}} \boldsymbol{X}\ \mathbf{100\%}$$

Source : (Gusni et al., 2019), (Ishak et al., 2024), (Lestari et al., 2021)

In this study, the accuracy indicator utilizes financial ratios. Given that financial distress does not constitute default, it merely serves as an indication. Consequently, financial ratios are employed as an initial detection tool that can be used to assess a company's financial condition. Accuracy calculations are performed in two instances, employing the DAR and Net Profit indicators.The initial accuracy assessment utilizes the DAR value, with values exceeding 1 indicating potential financial difficulties, and values below 1 indicating the absence of such difficulties (De Mooij & Hebous, 2018; Fitriana, 2024).The number of correct predictions is

determined by comparing the prediction results from the model with the results obtained from the DAR.Additionally, the Net Profit indicator is employed. In the event that the profit is negative, it is categorized as having potential financial difficulties (Indriyanti & Gustyana, 2021; Salim & Ismudjoko, 2021).The number of correct predictions is defined as the condition where the prediction results from the model align with the value of the results obtained from the profit conditions.

RESULT AND DISCUSSIONS

Descriptive Statistics

As illustrated in Table 2, the total number of samples evaluated in this study encompasses 36 transportation sub-sector companies. The minimum value of the Altman model is observed in PT Air Asia Indonesia Tbk in 2021, while the maximum value is attributed to PT Express Transindo Utama Tbk in 2021. The Springate model similarly exhibited a minimum value of PT AirAsia Indonesia Tbk in 2021, while the maximum value was recorded by PT Express Transindo Utama Tbk in 2021.The Zmijewski model demonstrated a minimum value of PT Express Transindo Utama Tbk in 2021 and a maximum value by PT Express Transindo Utama Tbk in 2022. The Grover model, on the other hand, has a minimum value attributed to PT Air Asia Indonesia Tbk in 2021 and a maximum value at PT Express Transindo Utama Tbk in 2021.The distribution of the mean and standard deviation across the four models reveals that the Springate model has the widest range of values, significantly different from the other models. The Grover model, however, exhibits the most concentrated data distribution.

Table 2. Descriptive Statistics

Category	N	Minimum	Maximum	Mean	Std. Deviation
Altman	36	-5,3848	10,8876	0,5135	2,9066
Springate	36	-2,4374	17,3884	0,5432	3,0213
Zmijewski	36	-14,3360	-4,0713	-6,5960	2,3973
Grover	36	-3,1284	8,1019	0,0649	1,6915

Source: Data Analysis with Eviews 13, 2025

Prediction of Financial Distress

As illustrated in Table 3, the financial distress prediction models yield a variety of results. The most noteworthy result is the Zmijewski Model, where all 36 samples exhibit results indicating an absence of financial difficulties or healthy conditions. The Altman Model, on the other hand, indicates the potential for financial distress in 30 samples.

Table 3. Result of Financial Distress Prediction

	Altman	Springate	Zmijewski	Grover
Financial Distress	30	28	0	13
No Financial Distress	3	8	36	23
Grey Area	3	0	0	0
Total (N)	36	36	36	36

Source: Table by authors, 2025

As illustrated in Table 2, the Altman model demonstrates an mean value of 0,5135, with a total of 23 companies attaining values above this benchmark. The company is designated as being in a healthy condition or greay area are 6 companies and in being financial distress are 17 companies. While 13 other companies with lower values are classified being in financial distress. The mean value of the Springate model is 0.5432, with 10 companies above this value and 26 below. This value is less than 0.826, indicating that 26 companies are in clear financial distress, while the other 10 companies, 8 are in a healthy condition and 2 others in financial distress. The Zmijewski model, on the other hand, exhibits an mean value of -6.5960, falling short of the zero threshold. Consequently, the company predicted by Zmijewski is not bankrupt, with 25 companies having values above the mean. The Grover model displays an mean value of 0.0649, with 21 companies above and 15 below the mean. The mean value exceeds 0.01, indicating that 21 companies are deemed to be in a state of financial health, while the remaining 12 companies are experiencing financial distress and 2 companies are financial health.

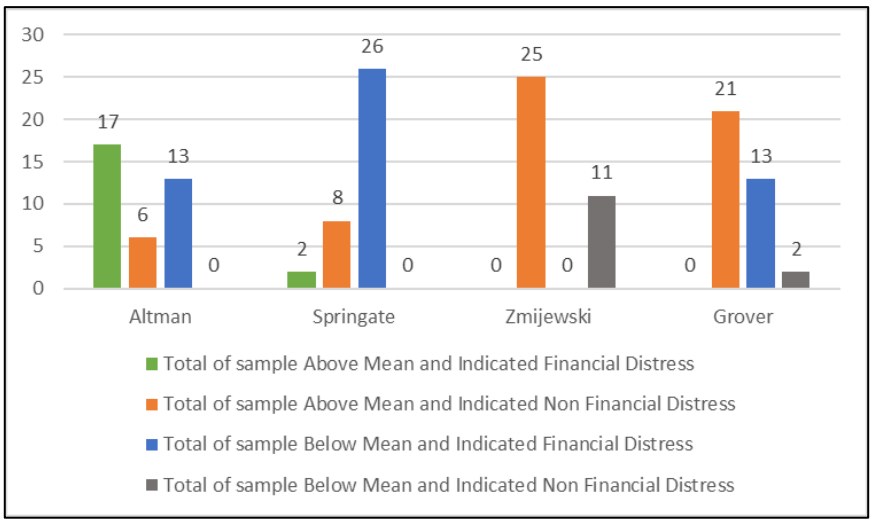

Figure 5. Diagram of Mean Value of Financial distress Prediction Model
Source: Figure by authors, 2025

Subsequent to ascertaining the outcomes of the financial distress prediction model, the accuracy test calculation is executed in Table 4. This evaluation is conducted to ascertain which model provides results that are most proximate to the actual condition of the Company. In comparing true and false predictions, this study utilizes the value of financial statements, namely the debt to asset ratio. A debt-to-asset ratio greater than 1 is considered risky, indicating a company's solvency is in trouble, which leads to financial instability and increases the risk of financial distress (De Mooij & Hebous, 2018; Fitriana, 2024). A high DAR suggests a heightened risk of debt default, implying that the company must generate profits proportional to the amount of debt incurred. A high DAR value can lead to financial hardship for the company (Kristanti & Pancawitri, 2024). In addition to utilizing the DAR value, researchers conducted an accuracy test with the Net Profit value indicator. A positive net profit value signifies a healthy company condition, while a negative profit value indicates a company in financial distress (Indriyanti & Gustyana, 2021; Salim & Ismudjoko, 2021)

Table 4 . Accuracy Level

	Altman	Springate	Zmijewski	Grover
Accuracy_DAR				
Correct Prediction	9	14	30	29
Incorrect Prediction	27	22	6	7
Total Sample	36	36	36	36
Accuracy Level_1	25%	39%	83%	81%
Accuracy_Net Profit				
Correct Prediction	10	19	25	26
Incorrect Prediction	26	17	11	10
Total Sample	36	36	36	36
Accuracy Level_2	28%	53%	69%	72%
Average of Accuracy	**26%**	**46%**	**76%**	**76%**

Source: Table by authors, 2025

The results of the accuracy test, employing the DAR value, indicate that the model demonstrates the highest level of accuracy, with a value of 83%. The Grover model exhibits an accuracy of 81%, while the Springate and Altman models each achieve an accuracy of 39%.Conversely, when the net profit value is considered, the Grover model attains the highest accuracy value of 72%. The Zmijewski and Springate models each achieve an accuracy of 69%, while the Altman model records an accuracy of 28%. Following the implementation of the averaging process on the model accuracy tests, the zmijewski and grover models emerged as the most accurate, exhibiting an average accuracy of 76% each.Consequently, the analysis of the financial distress model in the transportation subsector company for the period 2021 - 2023 yielded the zmijewski and grover models as the most accurate. The accuracy of the zmijewski model aligns with prior research conducted (Alamsyah et al., 2019; Bunker et al., 2024; Lutfiyyah & Bhilawa, 2021; Muzanni & Yuliana, 2021). Conversely, the accuracy of the grover model aligns with the findings reported in previous studies by (Gusni et al., 2019; Ishak et al., 2024; Nayan et al., 2024; Pratiwi et al., 2023).

This outcome aligns with the principles of signalling theory, which posits that the market exhibits a positive response to the capacity of transportation subsector enterprises to overcome economic challenges in the aftermath of the pandemic. The enhancement in the company's financial condition is evident from the decline in the Debt to Asset Ratio (DAR). Companies frequently engage in debt restructuring, particularly debt owed to lessors for assets utilized in revenue generation. This phenomena is especially noticeable in light of Indonesia's expanding GDP, especially in the transportation industry, and the financial standing of businesses in that sector that had losses in 2021 and 2023. Despite experiencing negative profits, these companies demonstrated an upward trend in their financial condition, indicating an effort to avert financial distress.

The Zmijewski model demonstrated an accuracy of 83% when evaluated using the DAR methodology. Among the four models employed to forecast financial distress, only the Altman and Zmijewski models incorporate leverage ratios. The

Altman model utilizes the MVE/TL ratio, whereas the Zmijewski model employs the DAR ratio. The transportation subsector, characterized by the funding of fixed assets, such as fleets and infrastructure, through long-term debt, exhibits high leverage values. This excessive reliance on debt can render companies susceptible to financial challenges (Lucky & Michael, 2019). The MVE/TL ratio, which compares the market value of equity to liabilities, is a crucial metric. When this ratio is lower, the market value of equity is comparatively smaller than the book value of liabilities, suggesting elevated financial risk or distress. Conversely, DAR calculates the extent to which assets are financed by debt. The volatile business conditions of the transportation subsector, compounded by the lack of stability in the Indonesian capital market, result in the market value of equity failing to accurately reflect the true condition of a company. Furthermore, the transportation subsector is characterized by a significant asset base that is financed through debt. The DAR value, by contrast, is aligned with the real condition of the company, reflecting the proportion of debt to assets. This value is not influenced by stock price volatility, making it a reliable metric for assessing financial risk. Consequently, the DAR metric emerges as a more pertinent indicator for the transportation subsector when benchmarked against the MVE/TL metric. This observation substantiates the Zmijewski model's superiority in terms of accuracy when evaluated against its counterparts.

In the Net Profit indicator, Grover's model demonstrates the highest level of accuracy, with a value of 72%.Net profit is a measure of a company's profitability, and the four financial distress models all utilize profitability ratios. The Altman model employs RE/TA and ROTA, the Springate model utilizes ROTA and ROL, the Zmijewski model uses ROA, while Grover's model employs ROTA and ROA. The Altman model employs the calculation of Retained Earnings and Earning Before Interest and Tax (EBIT), which are then compared to total assets. The Springate model utilizes a similar approach, comparing EBIT to assets and EBT to current liabilities. The Zmijewski model employs Net Profit in a similar manner, comparing it to total assets. The Grover model, conversely, utilizes EBIT and Net Profit to assess the correlation with total assets. The transportation subsector's optimal choice between Net Profit and alternative earnings, such as EBIT, EBT, and RE, will be determined. The transportation subsector's unique characteristics, particularly the substantial influence of interest expense due to the prevalence of debt financing for asset acquisitions, will be considered. The high cost of interest will have a direct impact on the amount of tax liability. Consequently, the utilization of net profit will facilitate the assessment of the company's capacity to generate profits subsequent to the settlement of debt interest and tax obligations. While EBIT is indicative of a company's operating profit, it does not necessarily reflect its capacity to meet financial obligations. Furthermore, EBT, which reflects a company's profit after interest expenses, does not necessarily indicate its ability to pay taxes. The tax burden metric, which is often used to assess a company's liquidity, is not applicable in this study. Meanwhile, RE, which is an accumulation of a long period of time during the company's existence, cannot reflect its current condition. In instances where RE is high yet Net Profit is negative, the company remains susceptible to financial distress. In this financial distress analysis, Net Profit is utilized, and the Grover and Zmijewski models are employed due to their superior accuracy. The

Grover model demonstrates superior accuracy, particularly in contexts involving the transportation subsector, characterized by substantial fixed assets that are contingent on profitability. The Grover model's incorporation of WCTA (working capital turnover ratio) underscores its capacity to assess the resilience of working capital in the transportation subsector, a crucial factor in financial risk assessment.

The mean accuracy value in this study indicates that Zmijewski and Grover exhibit equivalent accuracy, with a mean value of 76%. These two models have a commonality in their utilization of the ROA ratio in the calculation of the profitability ratio. The transportation subsector is a capital-intensive sector, implying that assets and debt have a substantial impact on ROA. When the debt is elevated (high DAR), the ROA is diminished due to the reduction in profit resulting from increased interest costs associated with the debt. ROA plays a pivotal role in the transportation subsector, given its substantial asset base.

A notable strength of the Grover model lies in its capacity to discern financial variables that are particularly pertinent to profitability and operational efficiency. This is of particular relevance to the transportation subsector, which is inherently subject to challenges such as fluctuating operating costs, high capital intensity, and reliance on macroeconomic demand. Moreover, Grover's model is developed using more contemporary empirical data, rendering it more adaptable to the evolving dynamics of the global economy, including the repercussions of globalization and technological advancements. These characteristics render Grover's model more sensitive to the actual financial condition of companies in volatile industries such as the transportation subsector, which has been severely impacted by the global economic repercussions of the pandemic. Meanwhile, the Zmijewski model boasts significant advantages in analyzing financial distress in the transportation subsector. Its focus on leverage, profitability, and liquidity renders it suitable for the characteristics of this industry, which tends to have high debt, large assets, and revenue volatility due to external factors such as fuel prices and regulatory policies. Consequently, the Zmijewski model emerges as a valuable instrument for companies, investors, and regulators in evaluating the financial stability of transportation enterprises and in formulating risk mitigation strategies prior to the occurrence of bankruptcy.

CONCLUSION

The findings of this study indicate that the Altman model exhibits an average accuracy of 26% in predicting financial distress, while the Springate model demonstrates an accuracy of 46%. The Zimijewski and Grover models, on the other hand, exhibit an accuracy of 76% each. These results are derived from the mean accuracy calculated using the DAR and Net Profit indicators from the research sample. Of the four financial distress prediction models examined, the models that demonstrated the highest level of accuracy were the zmijewski and grover models, with an average accuracy value of 76%. It was observed that zmijewski exhibited superior performance when utilizing DAR indicators, while grover demonstrated superiority when employing Net Profit indicators.

The highest degree of accuracy with the DAR value indicator was obtained in the zmijewski model, at 83%. However, the predictions were incorrect for PT AirAsia Indonesia Tbk and PT Steady Safe Tbk. The zmijewski model resulted in non-

financial distress, while the DAR indicated financial distress with a DAR value of more than 1. In calculating accuracy using net profit, the grover model obtained the highest accuracy, at 72%. However, the non-financial distress grover model identified 10 instances of incorrect predictions, including PT Indomobil Multi Jasa Tbk (2021), PT Eka Sari Lorena Transport Tbk (2023), and PT Express Transindo Utama Tbk (2022 & 2023), which exhibited negative net profit conditions. Conversely, under conditions of positive net profit, the grover model produces financial distress, as evidenced by the cases of PT Jaya Trishindo Tbk (2023), PT Indomobil Multi Jasa Tbk (2022), PT Steady Safe Tbk (2021-2023), and PT Transkon Jaya Tbk (2023).

The findings suggest that the Zmijewski and Grover model can serve as a primary instrument for companies, investors, and regulators in the early detection of financial distress. Company management can utilize this model to assess financial conditions and implement more suitable preventive measures, such as improving liquidity, and improving operational efficiency and controlling interest expenses in order to increase profitability. Investors can employ this model as a valuable resource to evaluate a company's financial performance before making decisions, thereby minimizing potential losses. Regulators can leverage this model to analyze the financial stability of the transportation subsector, contributing to the maintenance of economic stability.

It is recommended that future research be conducted to ascertain the validity of this model in other sectors. In addition, the incorporation of non-financial variables, such as risk management and regulatory compliance, is necessary to enhance the accuracy of prediction results. Given the varied financial conditions and characteristics inherent to each sector, it is not feasible to generalize Zmijewski and Grover's model to all sectors. It is expected to further emphasize the importance of choosing the right prediction model to provide reliable results in mitigating the risk of financial distress.

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