

Comparative Accuracy of Altman Z-Score, Springate S-Score, and Grover G-Score in Predicting Financial Distress: Evidence from Indonesia's Textile Subindustry Under Multi-Shock Conditions, 2021–2025

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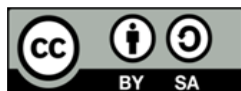
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ABSTRACT

Indonesia's textile and garment industry faced mounting pressure during the 2021–2025 period as the sector confronted several overlapping challenges, including Rupiah depreciation, the implementation of Permendag 8/2024, and stricter ESG-related requirements in international apparel markets. This study examines the ability of the Altman Z-Score, Springate S-Score, and Grover G-Score models to predict financial distress among 8 textile issuers (as the research sample) listed on the Indonesia Stock Exchange (IDX), using 40 firm-year observations from 2021 to 2025. Data were collected from audited annual reports available on the IDX website. Actual distress conditions were identified based on negative equity, trading suspensions related to financial problems, and PKPU or bankruptcy status. The predictive performance of the three models was then evaluated using a confusion matrix approach. The results show that the Altman Z-Score achieved the highest level of accuracy (92.50%), outperforming both the Springate S-Score (77.50%) and the Grover G-Score (75.00%). While the Springate model tended to over-classify healthy firms as distressed, and Grover misclassified several heavily distressed firms as safe, the

Altman model provided a more precise assessment. Additional findings also indicate that several issuers experienced worsening financial conditions after the implementation of Permendag 8/2024, reflected in declining sales performance, weaker liquidity, shrinking margins, and lower Z-Scores. Overall, the findings suggest that market-based indicators remain relatively useful during periods of broad industry disruption, whereas models relying heavily on accounting ratios tend to classify too many firms as financially distressed.

Keywords:

Altman Z-Score, financial distress, Permendag 8/2024, Springate S-Score, textile subindustry

1. INTRODUCTION

Indonesia's textile and garment industry has long been one of the country's important labor-intensive sectors. Besides contributing to manufacturing activity, the industry also absorbs a significant number of workers across Indonesia. However, conditions in the sector deteriorated sharply during 2024 and 2025. The Confederation of Indonesian Workers Union (KSPN) reported that 79,045 workers were laid off during 2024, while cumulative layoffs reached 126,160 workers by October 2025. Around 79 percent of those layoffs came from textile, garment, and footwear companies (Media Indonesia, 2025). The pressure facing the industry became increasingly visible after PT Sri Rejeki Isman Tbk (Sritex), previously recognized as one of Indonesia's largest integrated textile producers, ceased operations on 1 March 2025 following bankruptcy proceedings that affected more than 10,000 workers. These developments suggest that the difficulties experienced by the textile sector were not merely temporary business disruptions.

Several pressures emerged at nearly the same time and weakened the financial condition of textile issuers. One major challenge came from the continued depreciation of the Rupiah, which increased the cost of imported raw materials widely used in textile production. At the same time, the implementation of Permendag No. 8/2024 relaxed import restrictions and intensified competition from low-priced imported apparel products in the domestic market. The industry also faced growing pressure from international markets that increasingly emphasized sustainability standards and ESG-related compliance. Many

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Indonesian textile firms, however, still faced limitations in adapting to these changes. As these pressures accumulated, concerns regarding corporate solvency and financial distress became more difficult to ignore. Understanding the financial condition of listed textile firms during this period is therefore important, especially in assessing whether the sector was entering a deeper stage of financial distress under these overlapping economic and regulatory pressures.

One of the major pressures originated from the continued weakening of the Rupiah. After remaining relatively stable at around Rp14,663 per USD in May 2023, the exchange rate depreciated consistently throughout 2024 and 2025, eventually surpassing Rp17,000 per USD in early 2025.



Figure 1. USD/IDR Exchange Rate Fluctuation, 2021–2025

Source: Yahoo Finance, processed

This depreciation reflected more than short-term market fluctuation; it represented a structural shift that exposed the vulnerability of textile firms to imported input costs. In early 2024, raw and auxiliary materials accounted for approximately 72.81 percent of Indonesia's total imports, while textile manufacturers were among the industries most dependent on imported cotton, polyester staple fibre, and synthetic filament materials (Yogatama, 2024). As the Rupiah weakened, firms were forced to spend significantly more in Rupiah terms to purchase the same quantity of imported inputs, resulting in rising production costs and declining gross margins. The Indonesian Textile Association (API) also emphasized that exchange-rate stability is more critical for textile firms than tariff policy because most raw material expenditures are denominated in U.S. dollars (Primantoro, 2023). However, these increasing costs could not easily be transferred to consumers due to weakened domestic purchasing power following the pandemic period. Raising selling prices would instead risk intensifying the decline in demand amid growing import competition. Consequently, textile issuers faced deteriorating operating cash flow and weakening short-term liquidity, conditions commonly associated with the early stages of financial distress (Akyuwen et al., 2022).

A second source of pressure emerged from regulatory changes affecting the demand side of the market. On 17 May 2024, the Ministry of Trade introduced Regulation No. 8/2024 (Permendag 8/2024), representing the third amendment to Regulation No. 36/2023 concerning import policy. Officially, the regulation aimed to resolve congestion involving approximately 26,415 containers stranded at Tanjung Priok and Tanjung Perak ports following previous import restrictions (Coordinating Ministry for Economic Affairs of the Republic of Indonesia, 2024). In practice, however, the regulation significantly relaxed import requirements for eleven commodity groups, including garments, footwear, textiles, and downstream textile products. The previous requirement for technical recommendations from the Ministry of Industry was replaced with a less restrictive surveyor-report mechanism under the revised import policy framework (Ministry of Trade of the Republic of Indonesia, 2024). As a result, imported apparel products were able to enter the domestic market with considerably lighter supervision. According to the Indonesian Textile Association (API), approximately 20,000 containers of imported clothing products, predominantly originating from China, entered Indonesia following implementation of the regulation (Liputan6, 2024). The impact of this policy shift can also be observed through textile import values under HS Codes 61, 62, and 63. After declining from USD 965.8 million in 2021 to USD 670.0 million in 2024 due to tighter import controls, textile imports rebounded sharply to USD 820.5 million in 2025, representing a 22.5 percent increase compared with the previous year (Badan Pusat Statistik, 2025b).

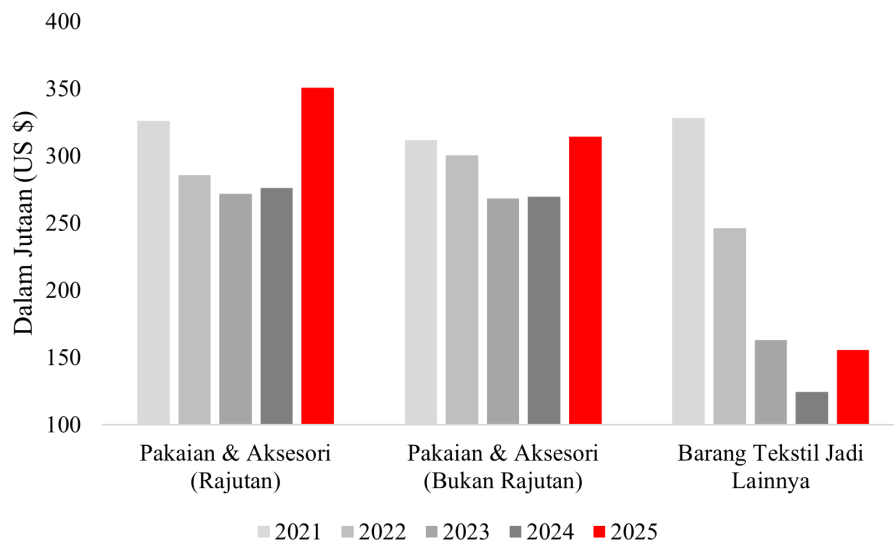


Figure 2. Indonesia's Textile Import Value, 2021–2025 (USD Million)

Source: BPS, processed

The Ministry of Industry later acknowledged that Permendag 8/2024 contributed significantly to the worsening condition of the textile industry (Puspita, 2024), indicating that the policy accelerated rather than alleviated industrial distress. Although the regulation was eventually revoked and replaced by Permendag 16/2025 on 30 June 2025, the financial damage experienced by listed textile issuers had already materialized in their deteriorating financial statements, which serve as the empirical basis for this study (Purnomo, 2025)

The third pressure, although less visible than currency depreciation and import liberalization, may have the longest-term consequences. While domestic textile firms struggled with rising costs and weakening demand, global apparel markets increasingly shifted toward sustainability-based standards. Indonesia's textile exports remain concentrated in the United States, Japan, and the European Union market, with exports to the United States alone reaching approximately USD 3.59 billion in 2023 (Badan Pusat Statistik, 2025a). Although the European Union represents a smaller share of Indonesia's export market than several major trading partners, the region has become one of the strictest jurisdictions in integrating ESG compliance into international trade requirements. Several regulations—including the Carbon Border Adjustment Mechanism (CBAM), Corporate Sustainability Due Diligence Directive (CSDDD), Corporate Sustainability Reporting Directive (CSRD), and EU Deforestation Regulation (EUDR)—have increased sustainability obligations for apparel exporters (Carbonfact, 2026). Under the CSDDD framework, both EU and non-EU apparel companies participating in European supply chains are required to integrate environmental and human-rights due diligence into their operations, thereby transferring compliance pressure directly to Indonesian textile manufacturers (Carbonfact, 2025)

In addition, the European Union's Carbon Border Adjustment Mechanism (CBAM) officially entered its compliance phase on 1 January 2026 and has outlined a future expansion pathway toward additional sectors and carbon-intensive products, potentially affecting upstream chemical and polymer industries that supply materials used in synthetic fibres such as polyester and nylon (International Carbon Action Partnership, 2026). Domestically, OJK Regulation No. 51/POJK.03/2017 has already required listed issuers to publish sustainability reports since 2017, while Indonesia's sustainability-reporting framework is expected to strengthen further through the implementation of Sustainability Disclosure Standards (SPK) aligned with the International Sustainability Standards Board (ISSB) roadmap beginning in 2026. Nevertheless, evidence suggests that ESG implementation among Indonesian issuers remains largely procedural rather than substantive. (Jimmy & Munandar, 2026), for example, found that private construction-sector issuers achieved an average GRI disclosure score of only 24 percent, indicating that sustainability reporting often functions as formal compliance rather than genuine ESG integration. For textile issuers, this limitation carries direct financial implications. Companies lacking reliable environmental and supply-chain disclosure face growing risks of losing access to premium export markets while simultaneously competing against cheaper imported products in the domestic market. This dual pressure further intensifies the financial distress already affecting the sector. Supporting this argument, (Prameswari & Fambudi, 2024) found that ESG disclosure significantly influences financial-distress

probability among Indonesian consumer cyclical firms, suggesting that ESG quality constitutes a material determinant of financial stability rather than merely a reputational issue.

From a theoretical perspective, these conditions can be explained through signaling theory (Spence, 1973; Ross, 1977). Indicators such as declining gross margins, weakening working capital, and increasing leverage provide negative signals regarding corporate viability, which are subsequently interpreted by bankruptcy-prediction models as indicators of financial distress (Brigham & Houston, 2019). Among the models most frequently used in empirical research are the Altman Z-Score, originally developed for publicly listed manufacturing firms in the United States (Altman, 1968), and the Springate S-Score, which was developed using Canadian firms and emphasizes short-term cash-flow conditions more strongly (Springate, 1978), and the Grover G-Score, which re-evaluates the Altman model to provide a highly reliable alternative for bankruptcy prediction (Grover, 2001). Previous studies in Indonesia, however, have produced inconsistent findings regarding the relative accuracy of these models. Hidayat et al., (2024) reported that the Springate model achieved higher predictive accuracy than Altman within the technology sector, while Wahyuni & Rubiyah, (2021) found the opposite result in plantation companies. Meanwhile, Rahayu et al., (2025) observed substantial differences in the number of distressed textile and garment firms identified by each model during 2019–2023. Despite these findings, limited research has examined the performance of these three models under the compounded shocks experienced during the 2021–2025 period, particularly those related to Rupiah depreciation, import liberalization through Permendag 8/2024, and increasing ESG compliance pressures from the European Union. Accordingly, this study aims to: (i) classify the financial distress conditions of eight textile issuers listed on the IDX during 2021–2025 using the Altman Z-Score, Springate S-Score, and Grover G-Score models; (ii) compare the predictive accuracy of these models against actual distress conditions using a confusion matrix approach; and (iii) interpret the findings in relation to trade-policy changes and ESG compliance pressures, thereby providing insights relevant to investors, management, regulators, and broader sustainability policy discussions. Based on the literature review and the multi-shock phenomena experienced by the textile industry, the hypothesis proposed in this study is as follows:

H1: There is a significant difference in the accuracy levels among the Altman Z-Score, Springate S-Score, and Grover G-Score models in predicting financial distress in textile and garment sub-sector companies under multi-shock conditions during the 2021–2025 period.

2. METHODS

Research Design

This study applies a quantitative approach using a descriptive-comparative research design. The quantitative approach was selected because the analysis relies on numerical data obtained from audited financial statements and financial ratios derived from those reports. The descriptive aspect is intended to classify the financial distress condition of each issuer during the observation period, whereas the comparative aspect evaluates which bankruptcy prediction model—Altman Z-Score or Springate S-Score or Grover G-Score—provides a more accurate representation of actual financial distress conditions within Indonesia's textile subindustry during the 2021–2025 observation period.

Population and Sample

The population of this study consists of all textile and garment companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2025 period, totaling fifteen issuers. The sampling technique employed was purposive sampling, which selects samples based on predetermined criteria rather than random selection (Sugiyono, 2019). Three criteria were applied in selecting the sample:

1. Textile and garment sub-sector companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2025 period.
2. Companies that consistently published audited annual financial statements throughout the observation period.
3. Companies that have complete variable data required for the calculation of the Altman Z-Score, Springate S-Score, and Grover G-Score models.

Based on these criteria, seven issuers were excluded due to delisting cases (SBAT and SRIL during 2024–2025) or incomplete consecutive disclosures (ACRO, CNTX, SPRE, SSTM, and UNIT). Consequently, eight issuers were selected as the final sample: PT Argo Pantes Tbk (ARGO), PT Trisula Textile Industries Tbk (BELL), PT Ever Shine Tex Tbk (ESTI), PT Indo-Rama Synthetics Tbk (INDR), PT Inocycle Technology Group Tbk (INOV), PT Asia Pacific Investama Tbk (MYTX), PT Asia Pacific Fibers Tbk (POLY), and PT Tifico Fiber Indonesia Tbk (TFCO). With five years of observation for each issuer, the study generated a total of 40 firm-year observations as the basis of analysis.

Data Sources and Collection

The study relies entirely on secondary data in the form of audited annual reports published by each issuer on the official IDX website (www.idx.co.id). Documentary technique was used to retrieve, download, and tabulate the relevant line items into spreadsheet form (Sugiyono, 2019). Cross-validation against each issuer's investor-relations page was performed to verify figures for issuers with unusual ratio movements, particularly POLY and ARGO whose negative equity positions produce mathematically extreme scores. Macro-level contextual data—Rupiah exchange rates and non-oil-and-gas import values—were collected from Yahoo Finance and the Indonesian Central Bureau of Statistics (BPS) respectively, as already introduced in Figures 1 and 2.

Variables and Analysis Techniques

The analysis proceeds in three stages.

First, the Altman Z-Score is computed for each issuer-year using the original 1968 formula for publicly listed manufacturers:

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$$

where X_1 is working capital to total assets, X_2 is retained earnings to total assets, X_3 is EBIT to total assets, X_4 is market value of equity to book value of total liabilities, and X_5 is sales to total assets (Altman, 1968). Classification follows the original cut-off scheme: $Z < 1.81$ indicates the distress zone, $1.81 \leq Z \leq 2.99$ indicates the grey zone, and $Z > 2.99$ indicates the safe zone.

Second, the Springate S-Score is computed using the four-variable discriminant function:

$$S = 1.03A + 3.07B + 0.66C + 0.40D$$

where A is working capital to total assets, B is EBIT to total assets, C is EBT to current liabilities, and D is sales to total assets (Springate, 1978). Springate applies a single cut-off: $S < 0.862$ indicates distress and $S \geq 0.862$ indicates a healthy condition.

Third, the Grover G-Score is computed using its re-evaluated discriminant function:

$$G = 1.650 X_{1-} + 3.404 X_{3-} - 0.016 ROA + 0.057$$

where X_1 is working capital to total assets, X_3 is EBIT to total assets, and ROA is net income to total assets (Grover, 2001). The Grover model applies the following cut-offs: $G \leq -0.02$ indicates the distress (bankrupt) zone, while $G \geq 0.01$ indicates a healthy (safe) condition.

Fourth, to evaluate which model more reliably reflects reality, predicted classifications are compared against actual distress status. Following the operationalization approach used in Indonesian distress studies (Almilia & Kristijadi, 2003), actual distress is identified hierarchically: an issuer-year is classified as actually distressed if it satisfies any of the following—(a) negative book equity in the audited balance sheet, (b) trading suspension imposed by the IDX during the year, or (c) PKPU or bankruptcy ruling by the Commercial Court. For consistency in the confusion-matrix evaluation, grey-zone classifications under Altman are treated as predicted distress throughout the 2021–2025 window. The confusion matrix maps four cells: true positives (TP, predicted distress and actually distressed), true negatives (TN, predicted healthy and actually healthy), false positives (FP, predicted distress but actually healthy), and false negatives (FN, predicted healthy but actually distressed). Accuracy is calculated as:

$$\text{Accuracy} = (TP + TN) / (TP + TN + FP + FN) \times 100\%$$

Beyond headline accuracy, the analysis tracks four supplementary indicators to contextualize results against the Permendag 8/2024 shock (issued 17 May 2024): year-on-year sales growth, gross-margin contraction, current-ratio movement, and the directional shift in Z-, S-, and G-scores between the pre-policy window (2022–2023) and the post-policy window (2024–2025). These indicators provide empirical traction for interpreting whether observed distress patterns coincide with—or merely follow—the trade-policy and ESG-compliance signals identified in the Introduction. The model with the highest confusion-matrix accuracy is then designated as the more reliable early-warning instrument for the textile subindustry under the conditions of this period.

3. RESULTS AND DISCUSSIONS

Results

Applying the Altman Z-Score formula to 40 firm-year observations produces the classification reported in Table 1. POLY records the most extreme trajectory, with Z falling from -16.29 in 2021 to -52.07 in 2025, reflecting an unusually large negative working-capital position and a deeply negative retained-earnings ratio. ARGO follows a less severe but persistent distress path (-5.09 in 2021 to -0.77 in 2025), while MYTX remains in distress territory throughout the window (-0.96 to -1.49). ESTI, INDR, and INOV cluster around the distress threshold, with Z-scores between -1.10 and 2.24 across the five years. Only TFCO maintains a safe-zone classification across all five years (4.01 – 5.93), and BELL is the single issuer to migrate downward, beginning in the safe zone in 2021–2022 (3.67 – 3.86) before sliding into the grey zone

from 2023 onward (2.43–2.97). In aggregate, six of eight issuers (75 percent) are flagged as distressed under Altman in 2021, rising to seven of eight (87.5 percent) in each subsequent year of the window.

Table 1. Altman Z-Score Classification, 2021–2025

Tahun	ARGO	BELL	ESTI	INDR	INOV	MYTX	POLY	TFCO
2021	(5.09)	3.67	(0.71)	2.15	1.46	(0.96)	(16.29)	5.93
2022	(4.08)	3.86	(1.06)	2.24	0.98	(0.84)	(16.67)	5.25
2023	(1.40)	2.97	(1.10)	1.41	0.84	(1.53)	(19.23)	5.69
2024	(1.29)	2.43	(1.02)	1.68	0.78	(1.47)	(39.75)	5.72
2025	(0.77)	2.68	1.21	1.52	0.83	(1.49)	(52.07)	4.01

Source: Computed by author from IDX audited annual reports.

The Springate S-Score classification, shown in Table 2, produces a more aggressive distress pattern. The majority of the issuers fall below the 0.862 cut-off throughout the observation window. Among the eight issuers, only TFCO and BELL occasionally bypass the distress threshold. TFCO touches the safe zone only in 2021 ($S = 1.15$), and BELL only in 2023 ($S = 0.88$), while falling into distress in all other years. The remaining six issuers—ARGO, ESTI, INDR, INOV, MYTX, and POLY—register scores indicating sustained distress-zone classification. POLY records the most extreme trajectory, with S plunging from -3.50 in 2021 to -12.91 in 2025. The Springate model thus flags 37 of 40 firm-year observations (92.5 percent) as distressed across the five-year window.

Table 2. Springate S-Score Classification, 2022–2025

Tahun	ARGO	BELL	ESTI	INDR	INOV	MYTX	POLY	TFCO
2021	(1.49)	0.73	0.51	0.98	0.44	(0.16)	(3.50)	1.15
2022	(1.69)	0.74	0.41	0.82	0.14	(0.01)	(3.47)	0.65
2023	(0.31)	0.88	0.42	0.14	0.11	(0.48)	(4.57)	0.65
2024	(0.22)	0.80	0.49	0.37	0.26	(0.20)	(10.10)	0.63
2025	0.05	0.81	0.58	0.33	0.16	(0.21)	(12.91)	0.60

Source: Computed by author from IDX audited annual reports.

The Grover G-Score classification, shown in Table 3, produces a more lenient distress pattern compared to the other models. While it successfully identifies the severe and persistent distress of ARGO, MYTX, and POLY across all years, it completely classifies ESTI and TFCO in the safe zone for the entire 2021–2025 window. INDR and INOV are also frequently classified as safe before dropping into the bankrupt zone in specific years. BELL consistently passes as safe throughout the observation period. Consequently, the Grover model flags only 20 of 40 firm-year observations (50.0 percent) as distressed.

Table 2. Grover G-Score Classification, 2022–2025

Tahun	ARGO	BELL	ESTI	INDR	INOV	MYTX	POLY	TFCO
2021	-2.35	0.59	0.37	0.59	0.14	-0.46	-6.64	0.80
2022	-2.57	0.58	0.28	0.46	-0.26	-0.31	-6.75	0.51
2023	-0.44	0.67	0.30	-0.12	-0.26	-0.76	-8.00	0.55
2024	-0.35	0.55	0.37	0.03	-0.10	-0.55	-16.58	0.57
2025	-0.07	0.53	0.48	0.01	-0.22	-0.51	-20.57	0.60

Source: Computed by author from IDX audited annual reports.

To benchmark predictive accuracy against ground truth, actual distress status was determined for each firm-year using the criteria defined in the methods section, principally the audited 31 December balance-sheet position on book equity and sustained operational losses. Of the 40 firm-year observations, thirty (75.0 percent) qualify as actually distressed: ARGO, ESTI, INDR, INOV, MYTX, and POLY across the five-year window, reflecting heavy operational pressure and negative equity cases. The remaining 10 firm-year observations (TFCO and BELL across five years) maintain better fundamental stability and are classified as actually healthy. Comparing predicted classifications against this ground truth produces the confusion matrices reported in Table 4, with the visual comparison provided in Figure 3.

Table 4. Confusion Matrix: Altman Z-Score vs Springate S-Score vs Grover G-Score, 2022–2025

Prediction vs Actual	Altman Z-Score	Springate S-Score	Grover G-Score
True Positive (TP)	30	29	20
True Negative (TN)	7	2	10
False Positive (FP)	3	8	0
False Negative (FN)	0	1	10

Total Accuracy	92.50%	77.50%	75.00%
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Source: Computed by author.

Three patterns stand out from the confusion matrix comparison. First, the Altman Z-Score correctly identifies all 30 distressed observations (TP = 30) and correctly classifies 7 healthy observations (TN = 7). Its only errors are 3 false positives stemming from BELL's grey-zone years, yielding the highest accuracy of 92.50 percent. Second, the Springate S-Score correctly predicts 29 distressed observations (TP = 29) but misclassifies 8 out of 10 healthy observations as distressed (FP = 8), producing a high Type I error rate and an accuracy of 77.50 percent. Third, the Grover G-Score correctly identifies all 10 healthy observations (TN = 10) but misses 10 actually distressed observations (FN = 10), producing a high Type II error rate and the lowest accuracy of 75.00 percent. Within the predefined criteria of this study, Altman therefore emerges as the most reliable predictive instrument for the textile subindustry during the 2021–2025 window.

4. DISCUSSION

The headline finding—the Altman Z-Score outperforming both the Springate S-Score and Grover G-Score in predictive accuracy (92.50 percent, 77.50 percent, and 75.00 percent, respectively)—warrants careful interpretation rather than immediate celebration of any single model. The gap between the models originates from how they treat structurally distressed versus temporarily distressed issuers. Altman achieves perfect sensitivity (TP = 30), meaning that every firm-year characterized by actual distress is correctly flagged, while also correctly retaining 7 of 10 actually healthy firm-years in the safe zone. Springate also shows high sensitivity (TP = 29) but suffers from massive Type I errors, incorrectly flagging 8 of 10 healthy observations as distressed. This asymmetry traces back to structural differences in the formulas. Altman's X4 variable—market value of equity divided by book value of total liabilities—captures the market's forward-looking assessment of structural solvency, a dimension absent in Springate's purely accounting-based specification. TFCO illustrates the consequence vividly: across the observation years, TFCO's market capitalization comfortably exceeds its book liabilities, pushing Altman's Z into the safe zone despite modest operating profitability. Springate, lacking any market-based variable, classifies these same firm-years as distressed because its formula is dominated by the ratio of EBIT to total assets, which understates TFCO's structural strength. Conversely, the Grover model suffers from the opposite problem (Type II error), misclassifying heavily distressed firms like ESTI and INDR as safe (FN = 10) due to its lenient cut-off and overreliance on certain asset-turnover metrics that mask deep equity deficits. The implication is consequential: under multi-shock conditions, models that ignore equity-market signals (Springate) systematically over-flag distress, while overly lenient re-evaluations (Grover) miss critical structural decay.

The framing of the textile crisis as a policy-driven shock is supported, rather than merely assumed, by four supplementary indicators tracked across the pre-Permendag (2021–2023) and post-Permendag (2024–2025) windows. The indicators are summarized visually in Figure 4. First, six of the eight issuers (75 percent) record a decline in their average Altman Z-Score from the pre- to the post-period, with the most extreme deterioration observed in POLY (Z = −17.40 to −45.91, a shift of −28.51 points). Second, five of the eight issuers (62 percent) register a contraction in their current ratio across the policy window, indicating tightening short-term liquidity as inventory turnover slowed under intensified import competition. Third, year-on-year sales movements diverge sharply by issuer profile: POLY's revenue collapses from USD 297.05 million in 2021–2023 average to USD 118.56 million in 2024–2025 average—a 60 percent decline—while MYTX's sales contract from Rp1.51 trillion to Rp1.14 trillion in the same window. By contrast, BELL and ARGO, both of which retain positive book equity throughout the post-Permendag period, manage modest revenue growth, suggesting that distressed and non-distressed issuers experienced fundamentally different demand-side trajectories under the same regulatory regime. Fourth, gross-margin compression is most severe in POLY (EBIT margin falling from −1.6 percent to −35.5 percent), confirming the dual-squeeze hypothesis identified in the Introduction: rising imported-input costs from Rupiah depreciation compounding with revenue erosion from low-cost garment imports. These indicators do not establish causation in a strict econometric sense, but they do establish a strong temporal correspondence between the policy event and accelerated deterioration in the structurally weakest issuers. The Ministry of Industry's own subsequent acknowledgement of Permendag 8/2024 as a principal driver of textile distress (Puspita, 2024) provides external corroboration of this empirical pattern.

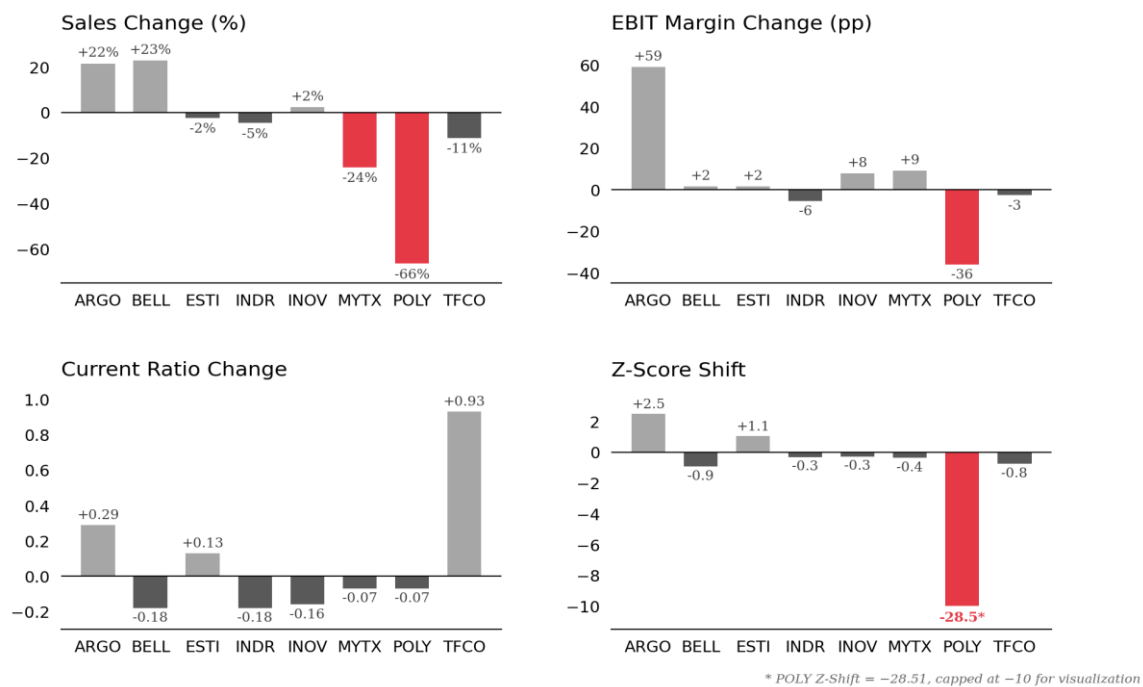


Figure 4. Pre vs Post Permendag 8/2024: Four Supplementary Indicators per Issuer
Source: Computed by author from IDX audited annual reports.

Beyond the immediate trade-policy mechanism, the results illuminate a deeper signaling problem that connects this study to the broader sustainability and public-policy agenda. Under signaling theory (Spence, 1973; Ross, 1977), financial-statement disclosures function as costly signals through which management communicates firm viability to investors and creditors. Yet the eight sampled issuers operate within an Indonesian disclosure ecosystem—governed by OJK Regulation No. 51/POJK.03/2017—where sustainability reporting has functioned as a compliance trigger rather than a substantive integration mechanism (Jimmy & Munandar, 2026). For globally connected textile producers, this disclosure asymmetry is no longer cost-free. The simultaneous tightening of EU sustainability requirements—CBAM, CSDDD, CSRD, and EUDR—means that issuers without verifiable environmental and supply-chain data emit, by omission, a negative signal to premium export markets even before any distress indicator surfaces in their balance sheets. Natasya Prameswari & Nurcahyo Fambudi, (2024) document this transmission empirically for Indonesian Consumer Cyclical issuers, showing that ESG disclosure exerts a statistically significant influence on financial-distress probability. The textile findings reported here are consistent with that channel: the issuers in deepest accounting distress (POLY, MYTX) are also those most exposed to the structural mismatch between domestic disclosure norms and global compliance frontiers. From a public-policy standpoint, this suggests that Permendag 8/2024 and the still-emerging ESG-integration regime should be evaluated not as separate streams of policy but as components of a single signaling environment in which Indonesian textile issuers are currently disadvantaged on both ends.

Situating these results within the prior empirical literature clarifies their contribution. Hidayat et al. (2024) reported Springate accuracy of 72.22 percent in Indonesia's technology sector during 2021–2023, exceeding Altman; Wahyuni & Rubiyah, (2021) reported the reverse ranking for the plantation sector during 2014–2018, with Altman reaching 94.66 percent against Springate's 81.33 percent; and Rahayu et al., (2025) documented divergent distress counts across the Altman, Springate, and Grover models for textile-garment issuers during 2019–2023. The present study sits closest to the Wahyuni–Rubiyah finding in both ranking and magnitude (Altman > Springate, with Altman exceeding 90 percent accuracy). The high accuracy of Altman (92.50 percent) compared to Springate (77.50 percent) and Grover (75.00 percent) in this study can be explained by the uniquely compounded shock of the 2021–2025 window—Rupiah depreciation, Permendag 8/2024, and emerging ESG compliance pressure. These shocks severely depressed internal accounting ratios across the entire sector, inflating false-positive rates for pure-accounting models like Springate. At the same time, the sample is dominated by structurally weak issuers (75.0 percent of firm-years register actual distress), which exposes the weakness of the Grover model in detecting profound equity erosion. The contribution of this study, therefore, is not to nominate a universal winner, but to demonstrate that under sector-wide, policy-amplified distress, market-based variables

(Altman's X4) retain meaningful discriminating power while pure-accounting specifications collapse into over-flagging (Springate) or under-detection (Grover). This nuance—that model choice should be conditional on the macro-financial regime—extends rather than overturns the prior literature.

5. CONCLUSION

This study assessed financial-distress risk in Indonesia's textile subindustry over the 2021–2025 multi-shock window using two classical prediction models. With respect to the first objective, the Altman Z-Score classifies the majority of sampled issuers in distress or grey-zone status throughout the observation period, with POLY, MYTX, and ARGO consistently in distress and only TFCO maintaining a safe-zone classification across all five years. Addressing the second objective, the Springate S-Score produces a more aggressive distress pattern, flagging 37 of 40 firm-year observations (92.5 percent) as distressed, while the Grover G-Score produces a highly lenient pattern, flagging only 20 of 40 firm-year observations (50.0 percent) as distressed. Regarding the third objective—comparative accuracy against actual distress status defined by negative book equity, IDX trading suspension, or consecutive net losses—the Altman Z-Score outperforms both the Springate S-Score and Grover G-Score with an accuracy of 92.50 percent against 77.50 percent and 75.00 percent, respectively. The performance gap derives entirely from Altman's balanced sensitivity and specificity (identifying all 30 actual distress cases while retaining 7 of 10 healthy firms in the safe zone), driven by its inclusion of the market-value-of-equity variable (X4) that captures structural solvency unavailable to Springate's and Grover's purely accounting-based specifications.

The findings contribute to three audiences. For management of textile issuers, the consistent classification of POLY and MYTX into both predicted and actual distress underscores the urgency of structural balance-sheet remediation rather than incremental cost adjustment; the cases of BELL and TFCO, which remain solvent despite operating under the same macroeconomic regime, indicate that disciplined capital structure and equity-market positioning can preserve viability through compound shocks. For investors and creditors, the documented over-flagging tendency of Springate and under-detection by Grover suggest that screening tools relying solely on accounting ratios may generate excessive false positives or false negatives in distress-saturated sectors; complementing them with market-based indicators—as Altman does through X4—reduces the risk of misclassifying structurally sound or severely distressed issuers. For policymakers, the empirical correspondence between Permendag 8/2024 and post-policy deterioration in sales, current ratio, and Altman Z-Score supports the Ministry of Industry's own acknowledgement that trade liberalization without accompanying ESG-integration and competitiveness measures can accelerate, rather than mitigate, sectoral distress.

Theoretically, the study extends the bankruptcy-prediction literature by demonstrating that model performance is conditional on the prevailing macro-financial regime. The high accuracy of Altman and the lower accuracy of Springate and Grover in this study indicate that distress-saturated conditions depress the discriminating power of models relying on accounting ratios alone. This boundary condition is consistent with signaling theory: where bad-news signals become sector-wide noise, only market-based variables retain meaningful informational value. Three limitations qualify these conclusions. First, the sample size of eight issuers, while exhaustive within the screening criteria, limits statistical generalization. Second, the actual-distress classification relies on strict criteria that may underestimate softer distress conditions such as prolonged liquidity strain. Third, the study does not directly measure ESG disclosure quality at the firm-year level, treating the ESG-compliance environment as a structural context rather than a measured variable.

Future research could productively address these limitations. Future researchers are advised to expand the sample scope to other labor-intensive manufacturing industries that are also vulnerable to import substitution policies, such as footwear, leather goods, and furniture, to test whether the documented patterns generalize beyond textiles. Incorporating alternative prediction models such as Zmijewski or Ohlson's logit specifications would test whether the Altman ranking holds against a broader instrument set. Furthermore, it is recommended to integrate macroeconomic variables (such as Rupiah exchange rate fluctuations) and ESG (Environmental, Social, and Governance) compliance metrics as moderating variables to examine their impact on the accuracy of financial distress prediction models. Constructing a firm-year ESG disclosure index aligned with POJK 51/2017 and the emerging SPK standards—possibly using GRI Standards as the scoring framework—would allow direct empirical testing of whether ESG-disclosure quality moderates the financial-distress probability that Natasya Prameswari & Nurcahyo Fambudi, (2024) document at the sector level. Such an integrated framework would directly serve the public-policy agenda articulated in the SNAV XIV theme of ESG integration in education, profession, and policy.

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