Beyond Bankruptcy Prediction: A Longitudinal Analysis of Financial Health Signals in Indonesia's Listed Food and Beverage Companies, 2021-2025

Feby Nasywa Rahman, M. Irsan Nasution, Rahima Br Purba

Abstract

This study examines the financial-health classifications and longitudinal movements of the Modified Altman Z″-Score among five selected food and beverage companies listed on the Indonesia Stock Exchange (IDX) during 2021-2025. Using a descriptive quantitative design, the study analyzes secondary data from annual financial statements and calculates the Z″-Score from four ratios: working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, and book value of equity to total liabilities. The findings reported in the study indicate that all five companies remained above the healthy-category threshold throughout the observation period. However, their score trajectories differed: INDF and ICBP recorded increases, MYOR and GOOD showed fluctuations, and ROTI experienced an overall decline while remaining in the healthy category. These results illustrate that a stable classification may coexist with changes in an accounting-based financial-health indicator. Viewed through signaling theory, changes in the score can serve as prompts for further examination of a company's financial condition, rather than as definitive evidence of actual bankruptcy or future performance. The study contributes a company-level longitudinal perspective extending the observation period through 2025. Its findings should be interpreted within the limits of the selected sample and the use of a single model.

Keywords: financial distress; financial health; Modified Altman Z″-Score; food and beverage companies; Indonesia Stock Exchange; signaling theory.

Feby Nasywa Rahman[1]
Postgraduate Program, Master of Accounting, Universitas Pembangunan Panca Budi, Medan, Indonesia
e-mail: : febynasywarahman@gmail.com

M. Irsan Nasution[2], Rahima Br Purba[3]
e-mail: irsan@dosen.pancabudi.ac.id[1], rahima@dosen.pancabudi.ac.id[2]
3rd International Conference Epicentrum of Economic Global Framework (ICEEGLOF)
Theme: Cross-Sector and Cross-Disciplinary Strategies for Achieving the SDGS
https://proceeding.pancabudi.ac.id/index.php/ICEEGLOF

Introduction

The ability of a company to maintain financial health is essential for business continuity because deterioration in liquidity, profitability, retained earnings, and solvency can develop into financial distress and, in severe cases, business failure. Bankruptcy prediction has therefore become an important analytical area for management, investors, creditors, and other stakeholders. The literature has evolved from accounting-ratio and discriminant-analysis models toward statistical and machine-learning approaches, but accounting-based models remain useful because they are relatively transparent and can be calculated from publicly available financial statements [1]-[4].

The food subsector is relevant for financial-distress analysis because companies face fluctuations in raw-material prices, changes in consumer demand, operating-cost pressures, and competitive dynamics. These factors can affect working capital, profitability, and capital structure, which are represented in accounting-based distress models. Related Indonesian research has also examined liquidity, profitability, leverage, and governance-related characteristics in relation to risk-management disclosure among listed food and beverage companies [5]. Indonesian evidence confirms the relevance of Altman's modified model for food and beverage companies. Hamzah and Annisa, for example, applied Altman's Z"-Score to Indonesian food and beverage firms and identified healthy, grey-area, and distress classifications [6].

Previous Indonesian studies have also examined financial distress using financial ratios and alternative prediction models. Amaliasari and Rahmi examined food and beverage companies over 2015-2020 using Altman Z-Score [7], while Anisa et al. examined financial-ratio effects on distress before and during COVID-19 [8]. Bukhori et al. investigated financial distress in Indonesian manufacturing companies [9]. Studies in adjacent Indonesian settings also examine how financial ratios relate to market and performance outcomes. For example, EPS, ROA, current ratio, and price-to-book value have been examined in relation to stock prices among LQ45-listed firms [10], while financial ratios and corporate governance have been studied in relation to financial performance in Himbara banks [11]. Although these studies address different outcomes and samples, they provide broader context for the relevance of accounting ratios in financial analysis. The existing food and beverage distress studies establish an important empirical foundation but leave room for a longer post-pandemic observation window.

Comparative research demonstrates that model choice matters. Reza et al. compared Altman, Springate, Zmijewski, and Grover models for food and beverage companies and found differences in classifications [12]. A recent study by Laili and Burhanudin compared the same four models for Indonesian food and beverage companies over 2020-2024 [13]. Therefore, the novelty of the present study is not the first application of bankruptcy prediction to the Indonesian food sector. Instead, the study extends the longitudinal observation through 2025 and interprets financial-distress movements during the post-pandemic recovery period.

The research gap is thus temporal and contextual. Earlier studies provide evidence for pre-pandemic, pandemic, and earlier post-pandemic periods, while a 2021-2025 longitudinal assessment can extend the evidence through a more complete recovery window. The study also adopts signaling theory: financial statements and the ratios derived from them are observable signals that can reduce information asymmetry and help stakeholders assess financial risk [14], [15].

This study aims to assess the financial-health classifications and longitudinal movements of the Modified Altman Z″-Score among food and beverage companies listed on the IDX during 2021-2025. The research questions are: (1) What financial-health categories are indicated by

the Modified Altman Z″-Score? (2) How do company-level scores change during 2021-2025? and (3) What do these score trajectories imply for longitudinal financial-health monitoring?

Literature Review

2.1 Financial Distress and Bankruptcy Risk

Financial distress refers to deterioration in a firm's financial condition that increases difficulty in meeting obligations and maintaining normal operations. It should not be treated as synonymous with legal bankruptcy. Prediction models provide early-warning classifications of financial risk; they do not establish that a firm will certainly enter legal bankruptcy.

2.2 Bankruptcy Prediction and the Altman Model

Altman established the accounting-based discriminant-analysis approach that became one of the most influential bankruptcy-prediction frameworks [1]. Subsequent research extended the model for different firm types and international settings [3]. Machine-learning studies further demonstrate that bankruptcy prediction has developed beyond classical ratio models [2], [4]. For the Indonesian food and beverage context, Hamzah and Annisa specifically applied the modified Z"-Score and demonstrated its usefulness as a distress-screening instrument [6].

2.3 Operational Definition of the Modified Altman Z″-Score

The financial-health indicator is calculated using the Modified Altman Z″-Score model specified in this study:

$$Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$$

Where X_1 = working capital / total assets, with working capital defined as current assets minus current liabilities; X_2 = retained earnings / total assets; X_3 = earnings before interest and taxes (EBIT) / total assets; and X_4 = book value of equity / total liabilities [6].

Each component is calculated using the financial information reported for the relevant company and year. The four ratios are then multiplied by their respective coefficients and summed to obtain one Z″-Score for each company-year observation. The calculations must use consistent units and accounting definitions across the sampled companies and observation period.

For classification, this study applies the thresholds specified in the research framework: a Z″-Score below 1.10 indicates financial distress; a score from 1.10 to 2.60, inclusive, indicates the grey area; and a score above 2.60 indicates the healthy or non-distress category. These categories represent model-based financial-risk classifications and should not be interpreted as confirmation of actual bankruptcy or as a guarantee of future financial stability.

2.4 Signaling Theory as the Grand Theory

Signaling theory provides the theoretical foundation for interpreting accounting information as an observable representation of a firm's financial condition. Spence [14] introduced signaling theory in the context of information asymmetry, while Ross [15] explained how corporate financial structure can convey information to external parties. In the corporate financial-reporting context, differences in the information available to management and external stakeholders create a need for credible financial indicators. Annual financial statements provide publicly accessible information that investors, creditors, and other stakeholders can use to assess a firm's financial position and evaluate potential financial risks.

In this study, the Modified Altman Z″-Score serves as an accounting-based indicator that integrates four financial components: working capital to total assets, retained earnings to total assets, earnings before interest and taxes to total assets, and book value of equity to total liabilities. These components represent different dimensions of financial condition, including short-term financial flexibility, accumulated earnings, operating profitability, and the equity buffer relative to liabilities. By combining these indicators into a single score, the model

provides a structured basis for examining differences in financial-health classifications and changes in financial-condition signals across companies and years.

The signaling perspective also helps explain why longitudinal analysis is relevant. An increase in a firm's Z″-Score may indicate a strengthening of its overall accounting-based financial-health indicator, whereas a decline may signal a weakening that warrants further examination. Such movements can provide useful information for investors, creditors, and management, even when a firm's classification remains unchanged. Nevertheless, the Z″-Score should be interpreted as a screening and early-warning indicator rather than definitive evidence of actual bankruptcy or proof of a firm's future financial performance. Accordingly, this study uses signaling theory to interpret the financial-health classifications and score movements observed among selected Indonesian food-sector companies during 2021-2025, without assuming that changes in the score establish causal relationships or guarantee particular future outcomes.

2.5 Previous Studies and Research Positioning

Table 1. Previous studies and research positioning.

Study	Context / Period	Research Approach	Research Gap or Relevance to the Current Study
Hamzah & Annisa [6]	Indonesian food and beverage companies; 2018-2019	Altman Z″-Score	Provides direct sector-specific evidence on the application of the modified Altman model. The current study extends the observation period through 2025.
Amaliasari & Rahmi [7]	Indonesian food and beverage companies; 2015-2020	Altman Z-Score	Provides evidence from an earlier observation period. The current study extends the longitudinal assessment to 2021-2025.
Anisa et al. [8]	Indonesian food and beverage companies; before and during COVID-19	Financial-ratio analysis	Examines financial distress in relation to the pandemic period. The current study focuses on financial-health classifications and score movements during 2021-2025.
Reza et al. [12]	Indonesian food and beverage companies; 2017-2019	Comparison of Altman, Springate, Zmijewski, and Grover models	Demonstrates the relevance of alternative bankruptcy-prediction models. The current study focuses on longitudinal analysis using the Modified Altman Z″-Score rather than model comparison.
Laili & Burhanudin [13]	Indonesian food and beverage companies; 2020-2024	Comparison of Altman, Springate, Zmijewski, and Grover models	Provides a recent benchmark covering 2020-2024. The current study extends the observation window through 2025 and examines company-level score trajectories.
Current study	Five selected food-sector companies listed on the Indonesia Stock Exchange; 2021-2025	Descriptive quantitative analysis using the Modified Altman Z″-Score	Extends the longitudinal observation through 2025 and interprets differences in financial-health classifications and score movements in relation to accounting-based financial signals and signaling theory.

Source: Authors' synthesis of previous studies [6]-[8], [12], and [13].

2.6 Research Gap and Novelty

Previous studies have examined financial distress among Indonesian food and beverage companies using Altman Z-Score variants, financial ratios, and alternative bankruptcy-prediction models. These studies provide an important empirical foundation for assessing corporate financial risk. However, the evidence summarized in Table 1 indicates an opportunity to extend the observation period and further examine the evolution of financial-health indicators across consecutive years. In particular, the present study extends the observation window through 2025, complementing previous research covering earlier periods, including the 2020-2024 period examined in recent comparative-model research.

The research gap addressed in this study is therefore primarily temporal and analytical. By examining company-year observations over 2021-2025, this study assesses not only the financial-health classifications produced by the Modified Altman Z″-Score but also the direction and consistency of score movements across the observation period. This distinction is

important because companies may retain the same categorical classification while exhibiting different financial-health trajectories. Examining these movements provides a more nuanced description of financial conditions than relying exclusively on a single-year classification.

The novelty of this study lies in its longitudinal, industry-specific assessment of five selected food-sector companies listed on the Indonesia Stock Exchange over the 2021-2025 period, using the Modified Altman Z″-Score as an accounting-based financial-risk indicator. The analysis further interprets changes in the scores in relation to working capital, retained earnings, operating profitability, and the equity-to-liabilities ratio within the framework of signaling theory. Accordingly, the study does not claim to introduce a new bankruptcy-prediction model or to establish the first application of Altman-based analysis to the Indonesian food sector. Instead, it contributes an extended period of empirical observation and a company-level interpretation of financial-health signals during the post-pandemic period.

Research Methodology

3.1 Research Design

This study employs a descriptive quantitative design to assess the financial-health classifications and longitudinal movements of the Modified Altman Z″-Score among selected food-sector companies listed on the Indonesia Stock Exchange (IDX) during 2021-2025. The unit of analysis is the company-year observation, allowing the financial-health indicators of each sampled company to be examined over five consecutive years. The analysis focuses on calculating and classifying the Z″-Score, comparing score movements across companies and years, and interpreting the results in relation to the underlying accounting components. The study is descriptive rather than causal; therefore, it does not seek to establish causal relationships or to validate bankruptcy predictions against actual bankruptcy events.

3.2 Population and Sample

The study population comprises companies classified within the relevant food subsector on the Indonesia Stock Exchange during the 2021-2025 observation period. Purposive sampling is used to select companies that meet the predefined eligibility criteria: (1) being listed on the IDX throughout the observation period; (2) having accessible annual financial statements for each year from 2021 to 2025; and (3) providing the financial information required to calculate all four components of the Modified Altman Z″-Score for every company-year observation.

The sample reported in Table 2 comprises five companies observed over five years, yielding 25 company-year observations. The company identities and annual financial-statement inputs must be reconciled with official IDX records, company reports, and the calculation worksheet before submission. The population count remains unconfirmed in the current manuscript and is therefore marked for verification in Table 2.

3.3 Data Sources and Collection

This study uses secondary data obtained from the annual financial statements of the sampled companies for the 2021-2025 period. The statements are retrieved from the Indonesia Stock Exchange and/or the respective companies' official investor-relations websites. Data collection follows a structured documentation procedure in which the financial figures required for the Modified Altman Z″-Score are recorded for each company-year observation.

The required data include current assets, current liabilities, total assets, retained earnings, earnings before interest and taxes (EBIT), the book value of equity, and total liabilities. The extracted figures are checked against the corresponding annual financial statements to ensure consistency in company identity, reporting year, units of measurement, and account definitions. Any missing or inconsistent information must be resolved by consulting the original financial statements before the Z″-Score is calculated. The final dataset should retain a traceable record of the source document and the reported financial figures used in each calculation.

3.4 Data Analysis

The data analysis is conducted in five stages. First, the financial information extracted from the annual financial statements is checked for completeness and consistency across companies and years. Second, the four financial ratios required by the Modified Altman Z″-Score are calculated for each company-year observation. Third, the ratios are multiplied by the model coefficients and summed to obtain the Z″-Score for each observation. Fourth, each score is classified according to the specified financial-distress, grey-area, and healthy-category thresholds. Fifth, the resulting scores and classifications are compared across companies and years to identify longitudinal patterns, differences in score levels, and changes in financial-health indicators.

The analysis reports annual category frequencies, company-level score trajectories, and changes in the composite Z″-Score over time. The four underlying ratios define the model, but specific explanations attributing score movements to individual ratios are not made unless the company-year ratio calculations have been verified against the original financial statements. The results are presented through descriptive tables and concise narrative interpretation.

3.5 Research Questions

Because the design is descriptive rather than causal, formal hypotheses are not required. The study is guided by three research questions: RQ1: What financial-health categories are indicated by the Modified Altman Z″-Score? RQ2: How do company-level scores change during 2021-2025? RQ3: What do these score trajectories imply for longitudinal financial-health monitoring?

Table 2. Sample-selection criteria and final sample.

Criteria	Quantity	Remarks
Companies in the food and beverage subsector in the population	Needs verification	Confirm the number of eligible food and beverage companies using the official IDX classification and the study's eligibility criteria.
Consistently listed during 2021-2025	5 companies	INDF, ICBP, MYOR, GOOD, ROTI
Complete annual financial statements	5 companies	Annual financial statements for all five years
Sufficient data to calculate the Z″-Score	5 companies	Required financial-statement components available
Final sample	5 companies	1. INDF - PT Indofood Sukses Makmur Tbk; 2. ICBP - PT Indofood CBP Sukses Makmur Tbk; 3. MYOR - PT Mayora Indah Tbk; 4. GOOD - PT Garudafood Putra Putri Jaya Tbk; 5. ROTI - PT Nippon Indosari Corpindo Tbk
Total company-year observations	25 company-year observations	5 companies × 5 years

Source: Authors' compilation based on Indonesia Stock Exchange records and company annual reports (2021-2025).

Note: Ratio-specific explanations of score movements require verified company-year ratio calculations; the present results therefore interpret the reported composite Z″-Scores without attributing changes to individual ratios.

Results

4.1 Financial-Distress Classification

The Modified Altman Z″-Score results presented in Table 3 indicate that the five sampled companies were classified as financially healthy throughout the 2021-2025 observation period. Based on the classification thresholds adopted in this study, all reported company-year Z″-Scores exceeded 2.60. However, the uniformly healthy classification does not imply that the companies exhibited identical financial conditions or that their financial risk remained unchanged over time. The scores reveal different trajectories across companies, including sustained increases, fluctuations, and an overall decline in one company's score. Therefore, the

longitudinal analysis considers both the resulting financial-health classifications and the movements in Z″-Scores that may signal changes in the underlying financial condition.

Table 3. Modified Altman Z''-Score and financial-distress classification by company and year.

Company	2021 Z''	Cat.	2022 Z''	Cat.	2023 Z''	Cat.	2024 Z''	Cat.	2025 Z''	Cat.
INDF	2.81	Healthy	3.50	Healthy	3.74	Healthy	4.21	Healthy	4.42	Healthy
ICBP	3.17	Healthy	3.86	Healthy	4.20	Healthy	4.75	Healthy	5.05	Healthy
MYOR	6.20	Healthy	6.76	Healthy	8.05	Healthy	6.89	Healthy	7.38	Healthy
GOOD	3.14	Healthy	3.57	Healthy	4.15	Healthy	3.38	Healthy	3.42	Healthy
ROTI	5.49	Healthy	5.38	Healthy	4.46	Healthy	4.57	Healthy	3.74	Healthy

Source: Authors' calculations based on companies' annual financial statements (2021-2025).

4.2 Five-Year Trends in Financial Health

The five-year analysis reveals different financial-health trajectories despite the uniformly healthy classifications. INDF increased from 2.81 in 2021 to 4.42 in 2025, and ICBP increased from 3.17 to 5.05. MYOR rose from 6.20 to a peak of 8.05 in 2023, declined in 2024, and recovered to 7.38 in 2025. GOOD increased overall from 3.14 to 3.42, although its score peaked in 2023 before declining and recovering slightly. ROTI declined overall from 5.49 to 3.74, with a temporary increase in 2024. All five companies nevertheless remained above the study's healthy threshold of 2.60.

These results show that an unchanged categorical classification can coexist with increases, fluctuations, or declines in the composite financial-health indicator. A falling score within the healthy category warrants monitoring, but the composite score alone does not identify which financial ratio caused the movement or establish that bankruptcy will occur.

Table 4. Net change in reported Modified Altman Z″-Scores, 2021-2025.

Company	2021 Z″-Score	2025 Z″-Score	Net change
INDF	2.81	4.42	+1.61
ICBP	3.17	5.05	+1.88
MYOR	6.20	7.38	+1.18
GOOD	3.14	3.42	+0.28
ROTI	5.49	3.74	−1.75

Source: Authors' calculations based on the reported Z″-Scores in Table 3. Net change is calculated as the 2025 score minus the 2021 score.

Table 5. Distribution of financial-distress categories by year.

Year	Healthy / Non-distress	Grey area	Financial distress	Total
2021	5	0	0	5
2022	5	0	0	5
2023	5	0	0	5
2024	5	0	0	5
2025	5	0	0	5

Source: Authors' calculations based on the Modified Altman Z″-Score results presented in Table 3.

Table 5 summarizes the annual distribution of financial-health classifications. Based on the reported results, all five sampled companies remained in the healthy category in each year from 2021 to 2025, with no observations classified as grey area or financial distress. This finding suggests that the sampled companies maintained Z″-Scores above the adopted healthy-classification threshold throughout the observation period. However, the absence of grey-area and distress classifications should be interpreted within the scope of the selected sample and the prediction model employed. It does not establish that the entire Indonesian food subsector was free from financial distress, nor does it rule out financial vulnerabilities within individual companies. The differences in score trajectories reported in Table 3 therefore remain relevant for assessing changes in financial-health signals, even when the categorical classifications are unchanged.

4.3 Interpretation and Discussion of Financial-Health Signals

From a signaling-theory perspective, the Modified Altman Z″-Score summarizes accounting information that stakeholders may use to screen a firm's financial condition. All five sampled companies remained above the healthy-category threshold, but their score trajectories differed. An increasing score indicates improvement in the composite indicator, whereas a declining score warrants closer examination. Neither movement, by itself, establishes actual bankruptcy, future performance, or the specific financial ratio responsible for the change.

The 2021-2025 period spans the post-pandemic recovery, during which input costs, consumer demand, operating expenses, and financing conditions may affect corporate financial ratios. These contextual factors provide reasons to monitor financial statements over time, but this descriptive study does not establish that any one factor caused the observed score movements. The findings apply to the selected companies and should be considered alongside cash flows, debt maturities, profitability, operating conditions, and other company-specific information.

4.4 Comparison With Previous Studies

This study extends previous research on Indonesian food and beverage companies by examining company-level Z″-Scores over 2021-2025. Hamzah and Annisa [6] applied the Modified Altman Z″-Score to Indonesian food and beverage firms, while Amaliasari and Rahmi [7] and Anisa et al. [8] examined earlier periods. The present study complements that evidence by extending the observation window through 2025 and documenting differences in score trajectories.

Reza et al. [12] and Laili and Burhanudin [13] compared multiple bankruptcy-prediction models, highlighting that model choice can affect classifications. The present study does not test model superiority; its contribution is a longitudinal description using one model. Because the sample contains five selected companies and no actual bankruptcy outcomes are tested, the findings should not be generalized to the entire Indonesian food and beverage sector or interpreted as evidence of predictive accuracy.

4.5 Theoretical Implication

This study applies signaling theory as an interpretive framework for understanding how accounting-based indicators communicate information about corporate financial conditions. Financial statements provide observable information that external stakeholders can use to assess a firm's liquidity, accumulated earnings, operating profitability, and capital structure. The Modified Altman Z″-Score integrates these dimensions into a single indicator, enabling comparisons of financial-health classifications and score movements across companies and years.

The reported results illustrate the distinction between categorical financial-health classifications and changes in the underlying indicator. Although all five sampled companies remained in the healthy category throughout 2021-2025, their Z″-Score trajectories were not identical. From a signaling perspective, this variation suggests that a common classification does not necessarily convey the same degree or direction of change in the accounting-based financial-health indicator. Longitudinal score movements may therefore provide additional information for interpreting financial statements beyond a single-year classification.

The theoretical contribution is interpretive rather than causal. The study demonstrates how signaling theory can be used to frame the interpretation of changes in an accounting-based financial-risk indicator, but it does not directly test information asymmetry, stakeholder responses, or the effect of financial signals on investment and lending decisions. Future research could examine whether changes in Z″-Scores are associated with observable market responses, financing conditions, or subsequent financial difficulties [14], [15].

4.6 Practical Implication

The findings have practical implications for corporate management, investors, and creditors. For management, the Z″-Score can serve as an initial screening indicator for monitoring financial condition over time. A decline in the score, even when the company remains in the healthy category, should prompt further examination of working capital, retained earnings, operating profitability, and the relationship between equity and total liabilities. The purpose of this review is to identify which financial components require attention rather than to treat the score as a definitive diagnosis of financial distress.

For investors and creditors, the Modified Altman Z″-Score can complement the analysis of annual financial statements by providing a consistent basis for comparing financial-health indicators across companies and years. However, the score should not be used as the sole basis for investment, credit, or lending decisions. It should be considered alongside cash-flow information, debt maturity profiles, profitability trends, business risks, industry conditions, and other relevant financial and non-financial information. Related studies linking financial ratios with stock-price or financial-performance outcomes further illustrate why ratio-based indicators should be interpreted in context rather than in isolation [10], [11].

For financial analysts and other stakeholders, longitudinal monitoring can help distinguish a persistently strong indicator from a declining or fluctuating trajectory. In the present sample, the continued healthy classification of all five companies coexisted with differences in their score movements. This reinforces the practical value of examining both the classification and the underlying trend. Nevertheless, the results apply to the selected companies and observation period and should not be interpreted as evidence that the entire Indonesian food sector was free from financial distress.

Conclusion

This study assessed the financial-health classifications and longitudinal movements of the Modified Altman Z″-Score among five selected food-sector companies listed on the Indonesia Stock Exchange (IDX) during 2021-2025. Based on the results reported in the manuscript, all five companies remained in the healthy category throughout the observation period, although their Z″-Score trajectories varied. These findings indicate that a stable categorical classification can coexist with increases, fluctuations, or declines in the underlying accounting-based financial-health indicator.

The main contribution of this study lies in extending the observation period through 2025 and providing a longitudinal, industry-specific perspective on financial-health indicators during the post-pandemic period. Rather than claiming to be the first study to apply bankruptcy-prediction models to Indonesia's food sector, this research complements previous studies that have applied Altman-based models and compared alternative prediction approaches, including evidence covering 2020-2024 [6], [12], [13]. By interpreting company-level Z″-Score movements through the lens of signaling theory, the study highlights the importance of examining changes in financial-health indicators alongside their categorical classifications.

Practically, the Modified Altman Z″-Score can serve as a preliminary screening tool for monitoring corporate financial conditions. A sustained decline in the score, even when a company remains in the healthy category, should prompt further examination of working capital, retained earnings, operating profitability, and the relationship between equity and total liabilities. However, the score should be interpreted alongside other relevant financial and operational information rather than treated as definitive evidence of impending bankruptcy. The study is descriptive in nature and does not establish causal relationships or assess predictive accuracy against actual bankruptcy events.

The findings are subject to limitations concerning the selected sample, the observation period, and the use of a single bankruptcy-prediction model. The reported Z″-Scores and classifications should be verified against the original financial statements and the calculation workbook before publication; the population count in Table 2 also requires confirmation. Future research could expand the sample, compare the Modified Altman Z″-Score with alternative models such as Springate, Zmijewski, and Grover, or examine whether financial-health indicators are associated with subsequent financial difficulties and other observable corporate outcomes.

References

[1] E. I. Altman, "Financial ratios, discriminant analysis and the prediction of corporate bankruptcy," The Journal of Finance, vol. 23, no. 4, pp. 589–609, 1968, doi: 10.1111/j.1540-6261.1968.tb00843.x.

[2] T. M. Alam, K. Shaukat, M. Mushtaq, Y. Ali, M. Khushi, S. Luo, and A. Wahab, "Corporate bankruptcy prediction: An approach towards better corporate world," The Computer Journal, vol. 64, no. 11, pp. 1731–1746, 2021, doi: 10.1093/comjnl/bxaa056.

[3] E. I. Altman, M. Iwanicz-Drozdowska, E. K. Laitinen, and A. Suvas, "Financial distress prediction in an international context: A review and empirical analysis of Altman's Z-score model," Journal of International Financial Management & Accounting, vol. 28, no. 2, pp. 131–171, 2017, doi: 10.1111/jifm.12053.

[4] S. Shetty, M. Musa, and X. Brédart, "Bankruptcy prediction using machine learning techniques," Journal of Risk and Financial Management, vol. 15, no. 1, p. 35, 2022, doi: 10.3390/jrfm15010035.

[5] J. R. Hasibuan, R. Maisyarah, and M. I. Nasution, "Effect of management ownership, size of board of commissioners, auditor reputation, liquidity, profitability, leverage on risk management disclosure of food and beverage companies listed on the Indonesia Stock Exchange (IDX)," International Journal of Management, Economic and Accounting, vol. 2, no. 2, pp. 8–19, 2025, doi: 10.61306/ijmea.

[6] R. S. Hamzah and M. L. Annisa, "Altman's Z″-Scores for financial distress predictions among food and beverages industry in Indonesia," Owner: Riset dan Jurnal Akuntansi, vol. 6, no. 1, pp. 1056–1068, 2022, doi: 10.33395/owner.v6i1.696.

[7] T. A. Amaliasari and M. Rahmi, "Financial distress analysis using the Altman Z-Score method on food and beverage sub-sector companies listed on the Indonesian Stock Exchange for the period 2015–2020," in Proc. 3rd Int. Conf. Business, Accounting, and Economics (ICBAE 2022), 2022, doi: 10.4108/eai.10-8-2022.2320891.

[8] S. Anisa, S. Shafitranata, R. Azizah MT, and R. Octavia, "The effect of financial ratios on the financial distress of food and beverage companies in Indonesia before and during Covid-19," Nominal: Barometer Riset Akuntansi dan Manajemen, vol. 12, no. 2, pp. 166–176, 2023, doi: 10.21831/nominal.v12i2.58346.

[9] Bukhori, R. Kusumawati, and M. Meilani, "Prediction of financial distress in manufacturing companies: Evidence from Indonesia," Journal of Accounting and Investment, vol. 23, no. 3, pp. 588–605, 2022, doi: 10.18196/jai.v23i3.15217.

[10] R. J. P. Nainggolan, S. C. H. Manao, B. R. Sinuraya, N. U. Rahmi, and M. I. Nasution, "Pengaruh earning per share (EPS), return on asset (ROA), current ratio (CR), price book value (PBV) terhadap harga saham (studi kasus pada perusahaan yang terdaftar pada LQ45 di Bursa Efek Indonesia (BEI))," Akuntansi Prima, vol. 6, no. 2, 2024, doi: 10.34012/japri.v6i2.5655.

[11] Y. D. Afila, R. B. Purba, and M. I. Nasution, "The Effect of Financial Ratio on Financial Performance with Good Corporate Governance as a Moderating Variable in Himbara Banks," Journal of Research in Social Science and Humanities (JRSSH), vol. 6, no. 1, 2026, doi: 10.47679/jrssh.v6i1.632.

[12] M. J. Reza, G. Pagalung, and R. A. Damayanti, "Bankruptcy prediction with the Altman Z-Score, Springate, Zmijewski, and Grover models," Contemporary Journal on Business and Accounting, vol. 3, no. 2, pp. 118–135, 2023, doi: 10.58792/cjba.v3i02.40.
[13] S. A. Laili and Burhanudin, "Analysis comparative model of Altman Z-Score, Springate, Zmijewski and Grover in predicting bankruptcy in sub-sector companies food and beverages period 2020–2024," International Journal of Economics Accounting and Management, vol. 2, no. 6, pp. 389–406, 2026, doi: 10.60076/ijeam.v3i6.1962.
[14] M. Spence, "Job market signaling," The Quarterly Journal of Economics, vol. 87, no. 3, pp. 355–374, 1973, doi: 10.2307/1882010.
[15] S. A. Ross, "The determination of financial structure: The incentive-signalling approach," The Bell Journal of Economics, vol. 8, no. 1, pp. 23–40, 1977, doi: 10.2307/3003485.