THE PREDICTION OF FINANCIAL DISTRESS IN PROPERTY COMPANIES IN SOUTHEAST ASIAN: INDONESIA, SINGAPORE, AND MALAYSIA

Muhammad Abdul Ghoni*[1] (iD)
Asep Maksum[2]
Abdul Qadir Jaelani[3]
Noor'ain Mohamad Yunus[4] (iD)
[1, 2, 3] Faculty of Economics and Business, Universitas Al Azhar, Indonesia
[4] Faculty of Business and Management, Universiti Teknologi MARA, Puncak Alam Campus, Malaysia
Email: abdul.ghoni@uai.ac.id[1]; lanijaelani81@gmail.com[2]; asep_maksum@uai.ac.id[3]; noorainyunus@uitm.edu.my[4]

ABSTRACT

Introduction: This study aims to assess and evaluate the financial distress state of a sample including 204 data points from 35 enterprises in Southeast Asia, specifically Indonesia, Malaysia, and Singapore.

Methods: This study analyzes the effects of Covid-19 on these enterprises, specifically concentrating on the likelihood of financial hardship as assessed by Edward Altman's Z-score model.

Results: Evidence indicates that property businesses listed on the Indonesia, Malaysia, and Singapore Stock Exchanges had greater financial difficulties during the Covid-19 period compared to the post-Covid period, aligning with observations at the ASEA Landmark level. The projected likelihood of default for publicly traded enterprises rose significantly during the Covid pandemic.

Conclusion and suggestion: The data reveal that the Z-score's efficacy in predicting bankruptcy markedly declined during the financial crisis. The data indicate that Covid-19 is causing financial pain to enterprises in Southeast Asia.

INTRODUCTION

The impact of financial difficulty on business reputation is a critical matter that has garnered much attention in recent years. The financial situations of companies have significant ramifications for several stakeholders, including management, government, and investors, serving as an early warning signal that allows for proactive measures to be taken before real bankruptcy. Financial distress is often triggered by liquidity pressures,

declining asset values, and the inability to meet financial obligations. The impact of financial distress is costly for not only shareholders and debtholders, but also for consumers, suppliers, and employees (Lian, 2024). Hence, issues in the financial condition of companies, especially in property companies, often serve as a significant indicator of concern for investors, regulators, and other stakeholders, prompting additional examination into the potential impact of audit business risk (Astami et al., 2024).

Financial distress in companies is a condition in which a company is dealing with its financial obligations. This may happen due to several factors, including inadequate management, a downturn in the business or economy, or excessive indebtedness (Al Ali et al., 2024). Financial difficulty can significantly impact the reputation of real estate firms. Real estate companies encounter considerable hurdles, including capital demands, huge funding requirements, extended occupancy periods, and slowest capital recovery; many of these raise their risks (Chai et al., 2024). When a corporation faces financial challenges, investors can decide not to engage with a company that shows financial instability, which could affect future growth. Investors necessitate a thorough comprehension of the financials of an investment opportunity to assess the company's future sustainability (Wu et al., 2022).

Figure 1. Non-Performing Loan (NPL) and Total NPL ratio of property sectors in ASEAN+plus-3 economies (Hongkong,China, Korea, Japan)
Source: ASEAN+3 Financial Stability Report 2024

There are several ASEAN property companies facing financial difficulties and default risks, due to rising debt, especially in light of regional economic issues. Singapore has substantial developer debt, but other ASEAN nations have profitability, liquidity, and financing issues. These vulnerabilities are worsened by tighter financial circumstances,

excess inventory, and waning buyer confidence (Chui et al., 2018). Since 2021, there has been a significant increase in property-related non-performing loan (NPL) percentages in ASEAN+ Plus-3 economies (China; Hong Kong, China; Japan; and Korea). While overall non-performing loan percentages remain constant, apprehensions exist regarding banks' credit risks stemming from their exposure to the real estate sector.

In 2023, the Corporate Real Estate Sentiment Index of the Asia-Pacific saw increases from the year 2022-2023. Economic growth decreased, and revenues from property companies fell. The growth dynamics indicate an enhancement in sentiment over three consecutive quarters, despite remaining in negative territory.
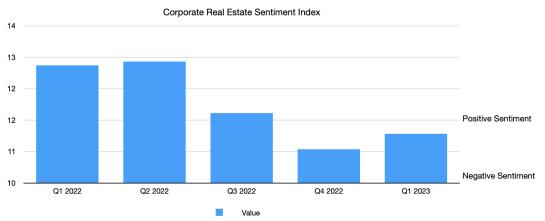

Figure 2. Global Corporate Real Estate Sentiment Index
Source: Knight Frank | CRESA Research: 2023

The expansion of employee numbers and capital expenditure (CAPEX) is heavily influenced by the macroeconomic climate. The firms in financial distress attract fewer and lower-quality applicants. This implies that employees recognize financial trouble and act to safeguard their careers. Therefore, it is plausible that employees consider the firm's financial health, and firms should reduce financial leverage to attract and retain talent (Han et al., 2024). In light of the ongoing economic instability, firms are employing a cautious strategy toward property developers, as evidenced by the figures below.

Growth Dynamic	Value	QoQ Movement
Global Economic Growth	2,52	↓
Company Revenue Growth	3,17	↓
Company Headcount Growth	2,80	↑
Company Capital Expenditure Growth	3,06	↑

Figure 3. Condition of the property companies
Source: Knight Frank | CRESA Research: 2023

Corporations encountering financial difficulties may have lasting reputational harm, negatively impacting shareholder and investor relations. Some research studies demonstrate substantial undercover intervention of financial distress of company by investors in corporate decision-making (Balyuk & Fedyk, 2023). The stabilization of inflation within the central bank's target range has facilitated economic development in several nations. Moreover, increased geopolitical tensions may obstruct global commerce once more. Severe climate change may also impede growth momentum in the sub region. This may be the source of financial hardship for real estate firms in Asia (Allen et al., 2024).

For some consideration, property prices in Jakarta are declining due to rising interest rates and concerns about economic growth. Consequently, the erosion of purchasing power among the majority and the uncertain economic climate negatively affect property companies' ability to expand and remain resilient in the face of economic challenges. In Malaysia, some residential developments are designed to meet community needs; however, investors and property buyers are proceeding with caution, assessing market conditions to maximize profits. In Singapore, investors are also exercising caution after reaching historic price peaks in light of downgraded economic forecasts. This situation has created an opportunity for local high-net-worth individuals in the essential housing market, which is linked to diminished foreign buyer activity. As a result, there is a growing emphasis on sustainable and affordable housing solutions that cater to the evolving preferences of residents. Developers are increasingly focusing on creating properties that not only promise profitability but also enhance the quality of life for their occupants, ensuring long-term viability in a fluctuating market (Frank, 2024).

Therefore, evaluating a company's financial health is essential for investment and corporate decision-making. The study of financial distress is growing as an important issue for stakeholders such as investors, creditors, and regulators, as it serves as an early warning mechanism to alleviate the detrimental impacts of financial challenges on firm stability and growth. Several financial distress models have been constructed and evaluated over the years, each featuring distinct predictors, sample data, and classification methodologies. Investors and financial specialists consistently assess the Altman Z-score model across Southeast Asia, notably in Indonesia, Malaysia, and Singapore, employing it as a foundation for their judgments.

There is a research paper on financial distress aimed at the expanding awareness of how cognitive biases affect business financial decisions, especially in financially distressed companies (Ahemed et al., 2025). Some studies conducted by the ASEAN+3 Macroeconomic Research Office (AMRO) (2024) found financial difficulty in the property sector of the ASEAN area, particularly among developers, is becoming alarming, especially with the proliferation of junk-rated bonds and the imminent risk of defaults. Factors such

as unsold residential properties, escalating borrowing expenses stemming from global trade ambiguities, and the possibility of a decline in the financial performance of property developers are driving this trend. However, the gaps and novelty between this study and previous studies are that this study used financial ratios to predict financial distress in the property industry. Classical empirical techniques for predicting defaults in the property industry utilize financial indicators derived from balance sheets to categorize defaulting and non-defaulting enterprises and to assign a likelihood of default to companies over a specified time frame (Modina et al., 2023); however, this study has observed raised levels of financial distress in developing countries in Southeast Asia. This was not addressed by Andini and Falianty (2022) who discovered that the increase in bad loans within the retail property industry had significantly contributed to multiple financial crises. The originality and novelty of this study serves as a tool for managers and regulators to identify property companies susceptible to financial instability, facilitating prompt intervention with the financial ratio under uncertainty era.

LITERATURE REVIEW

Due to the significance of forecasting financial distress, it has garnered considerable interest from researchers since the 1960s. Various scholars have developed a predictive model for the financial difficulties of companies using financial ratio, such as current ratios, asset turnover, and other financial indicators (Shi & Li, 2024; Zhao et al., 2022). In the real estate and property industry, Yi (2012) conducted research on predicting financial distress and the implementation of the Altman Z-score. One of the most often utilized risk early warning models in this field is the Z-score model. Financial distress circumstances refer to firms that are unable to run their operations effectively and cannot compete with other companies. The development of financial crises leads investors and creditors to exercise caution in their investment and lending decisions regarding these companies (Kristanti & Pancawitri, 2024). These situations arise from unstable or disordered financial management within a company. This economic challenge commences with escalating liquidity difficulties, subsequently leading to an overall loss on assets and a failure to fulfil diverse financial commitments (Alcalde et al., 2022).

Introduced by Altman (1968), the Altman Z-score is a financial instrument used for predicting the probability of a company's financial difficulties and a number of studies conducted over the past 50 years have examined the efficacy of the Altman score in forecasting company bankruptcy (Alves & Meneses, 2024). The Altman Z-score model serves as a measure of company performance (Ranta & Ylinen, 2024) which includes five financial measures (Choi et al., 2024); This study will investigate various ratios, including profitability, liquidity, solvency, and cash flow (Hanafi et al., 2021a), since, evaluating

profitability, liquidity, and leverage ratios can assist in identifying organizations that are having difficulty fulfilling their financial responsibilities.

All these variables are significant positive relationships to meet financial obligations of the property companies, A decline in profitability, liquidity, and leverage ratios will increase the probability of financial distress. Previous research (Wijaya et al., 2024; Saraswati et al., 2024; Manaf et al., 2021; Yuniarwati & Yusianto, 2023) demonstrated a corporation having good profitability, liquidity, and leverage ratios signifies that it is not experiencing financial difficulties. As all financial ratio of the company indicates that a strong capacity for profit generation, liquidity, solvency, and cash flow will assist a corporation in mitigating its financial distress risk (Hanafi et al., 2021b). However, there are existing studies on the Prediction Financial Distress Prediction Models in Property and Real Estate which have used the Altman Z-score in the Indonesia Market, such as Desiyanti et al. (2019), Andriani and Sihombing (2021) and Yuniarwati and Yusianto (2023). However, the accuracy of the Z-score model applied on the South East Asia property industry has not been explored.

Finally, as far as we are aware, no prior research has evaluated the Altman Z-score model's ability to forecast financial distress and property performance in the real estate sector. Considering the challenging circumstances faced by the property industry in Southeast Asia during the Covid-19 pandemic, along with the significance of this research issue, the current study constitutes a valuable addition to the literature. Furthermore, we apply the revised Altman model (1983) to the property industry in Southeast Asia that experienced bankruptcy during the 2018–2023 timeframe.

RESEARCH METHODS

Altman's Z-score models are employed to evaluate the financial distress of property and real estate companies that are listed on the Indonesia Stock Exchange (IDX), Malaysia's listed stock exchange (Bursa Malaysia), and Singapore SGX Stocks by cycling. Samples were of 204 observations from 35 public industries listed in the stock exchange in Southeast Asia, with a particular emphasis on Singapore, Malaysia, and Indonesia, for the period from 2018 to 2023 from the annual reportsobtained from the stock exchange of Indonesia (www.idx.co.id) the Malaysia stock Exchange (www.bursamalaysia.com) and singapore Stock Exchange (www.sgx.com). Due to the company's possession of accurate accounting data in Singapore, Malaysia, and Indonesia for Z-score computation, it is essential to have information encompassing at least the three years preceding the bankruptcy filing to facilitate a thorough analysis of fluctuations in Z-score values. This historical data will allow for a more reliable assessment of financial stability and help identify trends that may indicate potential risks. Additionally, understanding these

variations can assist in making informed decisions regarding future investments and operational strategies.

The Altman Z-score methodology incorporates five financial metrics, each with specific weights, to derive a solitary Z score number (Mercadier & Strobel, 2024). Based on previous literature (Gaos & Mudjiyanti, 2021; Simbolon, 2022) the formula of the Altman Z-score is presented as below :

$$Z" - Score = 6,56Z\_1 + 3,26Z\_2 + 6,72Z\_3 + 1,05Z\_4 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{(1)}$$

$Z" - Score$ = Bankruptcy
Z_1 = Working capital / Total assets
Z_2 = Retained earnings / Total assets
Z_3 = Earnings before interest and tax (EBIT) / Total assets
Z_4 = Book value of equity / Book value of total debt

It shows that the company's financial condition can lead to bankruptcy, so action must be taken to prevent bad things from happening (Distress zone). In this case it is considered a grey area because financial conditions have a chance of facing bankruptcy problems (grey zone). The financial condition in this position can be said to be good and safe from financial problems (Safe zone). Values of the Altman Z-score exceeding 3 indicate that a firm maintains a robust financial standing (Bellucci et al., 2023). An AltmanZ-score of 2.6 or higher indicates a safe financial position (Rauf, 2023).

RESULT AND ANALYSIS

The Z-score analysis of financial distress is conducted in Indonesian property enterprises. The calculations conducted using the Altman model on Indonesian property businesses yielded the following results:

Table 1. Altman Z Score results of property companies in Indonesia

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
1	APLN	PT. Agung Podomoro Land Tbk.	2018	0.1	0.6	0.2	0.2	1.1	*Distress zone*
			2019	0.7	0.6	0.2	0.2	1.8	*Grey zone*
			2020	1.2	0.5	0.2	0.2	2.1	*Grey zone*
			2021	1.0	0.5	0.1	0.2	1.7	*Grey zone*
			2022	1.3	0.7	0.7	0.2	2.9	*Safe zone*
			2023	0.6	0.8	0.4	0.2	2.1	*Grey zone*
2	ASRI	PT. Alam Sutera Realty Tbk.	2018	-0.2	1.1	0.5	0.6	1.9	*Grey zone*
			2019	0.2	1.2	0.5	0.4	2.3	*Grey zone*
			2020	-0.3	1.0	-0.1	0.4	1.1	*Distress zone*
			2021	-0.2	1.0	0.3	0.3	1.4	*Grey zone*
			2022	0.0	1.2	0.6	0.3	2.0	*Grey zone*

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
			2023	-0.2	1.3	0.5	0.3	1.8	*Grey zone*
3	BIPP	PT. Bhuwanatala Indah Permai Tbk.	2018	1.0	-0.9	-0.1	0.5	0.5	*Distress zone*
			2019	1.1	-0.8	0.2	0.3	0.7	*Distress zone*
			2020	1.9	-0.8	0.5	0.3	1.9	*Grey zone*
			2021	1.0	-0.8	0.3	0.3	0.7	*Distress zone*
			2022	1.1	-0.9	0.3	0.3	0.8	*Distress zone*
			2023	0.9	-0.9	0.2	0.3	0.4	*Distress zone*
4	BKDP	PT. Bukit Darmo Property Tbk.	2018	-0.9	-1.2	-0.3	1.5	-1.0	*Distress zone*
			2019	-0.4	-1.3	-0.2	1.5	-0.4	*Distress zone*
			2020	-0.7	-1.5	-0.3	1.3	-1.1	*Distress zone*
			2021	-0.2	-1.6	-0.3	2.1	0.0	*Distress zone*
			2022	-0.5	-1.8	-0.3	2.0	-0.6	*Distress zone*
			2023	-0.9	-2.0	-0.3	1.1	-2.0	*Distress zone*
5	BKSL	PT. Sentul City Tbk.	2018	0.6	0.5	0.2	1.1	2.4	*Grey zone*
			2019	0.5	0.5	0.1	0.7	1.9	*Grey zone*
			2020	0.5	0.1	-0.1	0.4	0.9	*Distress zone*
			2021	1.2	0.1	0.2	0.7	2.2	*Grey zone*
			2022	0.9	0.1	0.1	0.6	1.6	*Grey zone*
			2023	0.2	0.1	0.2	1.9	2.4	*Grey zone*
6	CSIS	PT. Cahayasakti Investindo Sukses Tbk.	2018	-1.7	-0.2	-0.4	2.3	0.0	*Distress zone*
			2019	-2.6	-0.2	-0.1	0.4	-2.4	*Distress zone*
			2020	2.4	-0.1	0.2	0.3	2.8	*Safe zone*
			2021	2.6	-0.1	0.3	0.9	3.7	*Safe zone*
			2022	2.5	0.0	0.4	0.4	3.2	*Safe zone*
			2023	2.6	0.0	0.1	0.3	3.0	*Safe zone*
7	DILD	PT. Intiland Development Tbk.	2018	0.0	0.4	0.2	0.4	1.1	*Distress zone*
			2019	0.3	0.5	0.4	0.4	1.5	*Grey zone*
			2020	0.1	0.2	0.3	0.2	0.9	*Distress zone*
			2021	0.1	0.2	0.3	0.2	0.7	*Distress zone*
			2022	0.1	0.2	0.4	0.2	0.9	*Distress zone*
			2023	0.3	0.3	0.6	0.3	1.4	*Grey zone*
8	ELTY	PT. Bakrieland Development Tbk.	2018	1.2	0.3	1.3	0.6	3.4	*Safe zone*
			2019	0.9	-0.1	-0.4	0.6	1.0	*Distress zone*
			2020	0.1	0.0	-0.1	0.7	0.7	*Distress zone*
			2021	0.0	0.0	-0.1	0.6	0.6	*Distress zone*
			2022	0.4	-0.1	-0.5	0.9	0.7	*Distress zone*
			2023	0.3	-0.5	-0.8	0.9	-0.1	*Distress zone*
9	MDLN	PT. Modernland Realty Tbk.	2018	0.8	1.0	0.2	0.4	2.4	*Grey zone*
			2019	-0.1	1.0	0.4	0.3	1.6	*Grey zone*
			2020	-3.1	0.4	-0.5	0.1	-3.1	*Distress zone*
			2021	0.0	0.4	0.2	0.1	0.7	*Distress zone*
			2022	-0.3	0.5	0.2	0.1	0.5	*Distress zone*
			2023	-0.2	0.4	0.1	0.1	0.4	*Distress zone*
10	RBMS		2018	1.1	0.0	0.2	1.0	2.3	*Grey zone*
			2019	0.7	-0.1	0.0	0.9	1.5	*Grey zone*

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
		PT. Ristia Bintang Mahkotasejati Tbk.	**2020**	0.5	-0.3	-0.3	0.7	0.6	*Distress zone*
			2021	0.5	-0.4	-0.1	1.1	1.1	*Distress zone*
			2022	0.4	-0.6	-0.2	0.7	0.2	*Distress zone*
			2023	0.8	-0.7	-0.1	0.7	0.7	*Distress zone*

The table above shows that, in 2018, five real estate companies in Indonesia experienced a decrease within the Distress Zone category: PT. Agung Podomoro Land Tbk, PT. Bhuwanatala Indah Permai Tbk, PT. Bukit Darmo Property Tbk, PT. Cahayasakti Investindo Sukses Tbk, and PT. Intiland Development Tbk. In 2020, the Covid-19 pandemic significantly affected the property sector, leading to eight property companies in Indonesia entering a distress zone. These companies included PT Alam Sutera Realty Tbk, PT Bukit Darmo Property Tbk, PT Sentul City Tbk, PT Intiland Development Tbk, PT Bakrieland Development Tbk, PT Modernland Realty Tbk, PT Ristia Bintang Mahkotasejati Tbk, and PT Bhuwanatala Indah Permai Tbk.

As of 2021, six property companies in Indonesia remain classified within the Distress Zone category: PT Bhuwanatala Indah Permai Tbk, PT Bukit Darmo Property Tbk, PT Intiland Development Tbk, PT Bakrieland Development Tbk, PT Modernland Realty Tbk, and PT Ristia Bintang Mahkotasejati Tbk. In 2022, six property businesses in Indonesia remained classified inside the Distress Zone category, namely PT Bhuwanatala Indah Permai Tbk, PT Bukit Darmo Property Tbk, PT Intiland Development Tbk, PT Bakrieland Development Tbk, PT Modernland Realty Tbk, and PT Ristia Bintang Mahkotasejati Tbk.

In 2023, the recession resulted in five property businesses in Indonesia remaining classified inside the Distress Zone category: PT Bhuwanatala Indah Permai Tbk, PT Bukit Darmo Property Tbk, PT Bakrieland Development Tbk, PT Modernland Realty Tbk, and PT Ristia Bintang Mahkotasejati Tbk. The Z-score analysis of financial distress was conducted in Malaysian property enterprises. The calculations based on the Altman model applied to property businesses in Malaysia gave the following results.

Table 2. Altman Z Score results of property companies in Malaysia

No	Code	Company	Period	Z1	Z2	Z3	Z4	*Z'SCORE*	Category
1	BERTAM (9814)	BERTAM ALLIANCE BERHAD	**2018**	3.0	-0.3	-0.1	2.9	5.5	*Safe zone*
			2019	-1.1	-0.8	-0.6	4.0	1.5	*Grey zone*
			2020	-1.4	-1.9	-1.8	3.3	-1.8	*Distress zone*
			2021	-1.4	-2.0	-0.2	3.4	-0.2	*Distress zone*
			2022	-0.7	-1.6	0.0	5.3	3.0	*Safe zone*
			2023	-0.7	-1.6	0.0	4.7	2.5	*Safe zone*
2	ECOWLD (8206)	ECO WORLD DEVELOPMENT GROUP BERHAD	**2018**	0.1	0.2	0.1	0.7	1.1	*Distress zone*
			2019	0.0	0.2	0.2	0.8	1.2	*Grey zone*
			2020	-0.4	0.3	0.2	0.9	0.9	*Distress zone*

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
			2021	-0.3	0.3	0.2	1.0	1.2	Grey zone
			2022	0.2	0.4	0.2	1.1	1.9	Grey zone
			2023	0.9	0.4	0.3	1.2	2.8	Safe zone
3	ENCORP (6076)	ENCORP BERHAD	2018	0.1	0.0	0.3	0.3	0.7	Distress zone
			2019	-0.2	-0.1	0.3	0.3	0.3	Distress zone
			2020	0.9	-0.1	0.3	0.5	1.6	Grey zone
			2021	1.0	-0.2	0.4	0.5	1.8	Grey zone
			2022	1.0	-0.2	0.3	0.6	1,7	Grey zone
			2023	0.9	-0.3	0.3	0.6	1.6	Grey zone
4	ENRA (8613)	ENRA GROUP BERHAD	2018	-2.3	0.1	0.0	1.4	-0.8	Distress zone
			2019	1.8	-0.3	-0.5	0.9	1.8	Grey zone
			2020	1.4	-0.3	0.2	0.8	2.1	Grey zone
			2021	0.8	-0.4	-0.1	1.0	1.2	Grey zone
			2022	2.4	-0.6	0.3	1.6	3.7	Safe zone
			2023	2.0	-1.3	-1.7	1.4	0.3	Distress zone
5	GOB (1147)	GLOBAL ORIENTAL BERHAD	2018	2.4	0.1	-0.3	0.5	2.8	Safe zone
			2019	1.8	-0.2	-0.4	0.4	1.6	Grey zone
			2020	1.7	-0.2	-0.2	0.4	1.7	Grey zone
			2021	0.8	-0.3	0.1	0.3	1.0	Distress zone
			2022	0.3	-0.2	0.2	0.4	0.6	Distress zone
			2023	-0.6	-0.2	0.3	0.4	-0.1	Distress zone
6	IVORY (5175)	IVORY PROPERTIES GROUP BERHAD	2018	2.3	0.9	0.3	1.6	5.1	Safe zone
			2019	3.4	0.9	0.2	1.6	6.0	Safe zone
			2020	3.4	0.8	0.2	1.2	5.5	Safe zone
			2021	-0.5	0.4	-0.7	0.8	-0.1	Distress zone
			2022	-0.6	0.0	-0.7	0.5	-0.7	Distress zone
			2023	-1.9	-0.8	-1.5	0.3	-4.0	Distress zone
7	MAGNA (7617)	MAGNA PRIMA BERHAD	2018	0.7	1.4	-0.1	1.5	3.5	Safe zone
			2019	-1.2	1.4	-0.1	1.4	1.5	Grey zone
			2020	-1.0	0.9	-1.1	0.9	-0.2	Distress zone
			2021	-0.8	1.0	0.2	1.3	1.6	Grey zone
			2022	-0.2	1.4	0.7	2.8	4.7	Safe zone
			2023	-3.7	1.1	-2.2	0.2	-4.6	Distress zone
8	PLB (7055)	PLB ENGINEERING BERHAD	2018	0.4	0.2	0.1	0.4	1.1	Distress zone
			2019	1.4	0.2	0.3	0.4	2.3	Grey zone
			2020	0.7	0.1	0.1	0.3	1.3	Grey zone
			2021	0.1	0.1	0.3	0.3	0.8	Distress zone
			2022	1.2	0.1	0.5	0.3	2.1	Grey zone
			2023	-0.5	-0.2	0.0	0.2	-0.4	Distress zone
9	SAPRES (4596)	SAPURA RESOURCES BERHAD	2018	2.0	2.1	0.2	15.9	20.2	Safe zone
			2019	1.8	2.1	-0.1	13.2	16.9	Safe zone
			2020	0.9	1.9	-0.3	6.4	8.8	Safe zone
			2021	0.3	1.7	-0.2	4.2	5.9	Safe zone
			2022	-0.3	0.0	-2.4	0.3	-2.5	Distress zone
			2023	-0.6	0.3	0.9	0.4	1.0	Distress zone

No	Code	Company	Period	Z1	Z2	Z3	Z4	*Z'SCORE*	Category
10	TALAMT (2259)	TALAM TRANSFORM BERHAD	2018	0.0	-1.9	0.0	0.7	-1.1	*Distress zone*
			2019	-1.0	-2.2	0.0	0.8	-2.5	*Distress zone*
			2020	-2.2	-2.3	0.3	0.9	-3.4	*Distress zone*
			2021	0.2	-2.7	-0.1	0.7	-1.9	*Distress zone*
			2022	-0.5	-2.7	0.2	0.7	-2.3	*Distress zone*
			2023	0.0	-3.0	0.0	0.7	-2.2	*Distress zone*
11	TROP (5401)	TROPICANA CORPORATION BERHAD	2018	1.3	0.2	0.3	0.9	2.8	*Safe zone*
			2019	-0.3	0.1	0.3	1.1	1.2	*Grey zone*
			2020	0.3	0.1	0.2	1.0	1.7	*Grey zone*
			2021	0.3	0.1	0.1	1.0	1.5	*Grey zone*
			2022	0.0	0.1	-0.2	0.9	0.9	*Distress zone*
			2023	1.4	0.1	0.1	1.0	2.6	*Grey zone*
12	YONGTAI (7066)	YONG TAI BERHAD	2018	1.1	0.1	0.2	1.2	2.5	*Grey zone*
			2019	0.0	-0.2	-0.5	1..0	0.3	*Distress zone*
			2020	0.3	-0.3	-0.2	1.1	0.8	*Distress zone*
			2021	0.7	-0.3	0.0	1.3	1.6	*Grey zone*
			2022	0.2	-1.8	-2.9	0.6	-3.9	*Distress zone*
			2023	0.1	-2.2	0.0	0.6	-1.5	*Distress zone*

According to Table 4, in 2018, five property businesses in Malaysia fell inside the Distress Zone category: Eco World Development Group Berhad, Encorp Berhad, Enra Group Berhad, PLB Engineering Berhad, and Talam Transform Berhad. In 2019, the number of property businesses in Malaysia classified inside the Distress Zone category diminished to three, namely Encorp Berhad, Talam Transform Berhad, and Yong Tai Berhad.

In 2020, the Covid-19 pandemic significantly affected the property sector, leading five Malaysian property companies—Bertam Alliance Berhad, Eco World Development Group Berhad, Magna Prima Berhad, Talam Transform Berhad, and Yong Tai Berhad—to enter the Distress Zone. As of 2021, five property businesses in Malaysia remain classified under the Distress Zone category: Bertam Alliance Berhad, Global Oriental Berhad, Ivory Properties Group Berhad, PLB Engineering Berhad, and Talam Transform Berhad.

As of 2022, six property businesses in Malaysia remain classified under the Distress Zone category, namely Global Oriental Berhad, Ivory Properties Group Berhad, Sapura Resources Berhad, Talam Transform Berhad, Tropicana Corporation Berhad, and Yong Tai Berhad. In 2023, the recession resulted in eight property companies in Malaysia remaining classified in the Distress Zone category, including Enra Group Berhad, Global Oriental Berhad, Ivory Properties Group Berhad, Magna Prima Berhad, PLB Engineering Berhad, Sapura Resources Berhad, Talam Transform Berhad, and Yong Tai Berhad. A financial distress study (Z-score) was conducted on property enterprises in Singapore. The Altman model, when applied to property businesses in Singapore, resulted in the following calculation outcomes.

Table 3. Altman Z Score results of property companies in Singapore

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
1	(SGX: 40V)	ALSET INTERNATIONAL LIMITED	2018	3.6	-3.4	-0.7	1.3	0.7	*Distress Zone*
			2019	3.4	-5.7	-1.4	1.2	-2.5	*Distress Zone*
			2020	5.4	-0.9	-0.8	5.0	8.7	*Safe Zone*
			2021	3.7	-1.7	-2.2	4.2	4.0	*Safe Zone*
			2022	4.6	-3.6	-2.3	3.0	1.8	Grey Zone
			2023	4.2	-4.6	-0.3	7.3	6.6	*Safe Zone*
2	(SGX: 5RA)	ASIA-PACIFIC STRATEGIC INV LTD	2018	3.7	-6.3	-0.5	6.4	3.3	*Safe Zone*
			2019	2.8	-6.5	-0.7	13.6	9.2	*Safe Zone*
			2020	1.6	-6.6	-0.7	4.2	-1.6	*Distress Zone*
			2021	0.2	-7.0	-0.5	2.7	-4.5	*Distress Zone*
			2022	-0.8	-10.5	-0.5	1.6	-10.2	*Distress Zone*
			2023	-0.8	-15.7	-1.2	1.6	-16.1	*Distress Zone*
3	(SGX: 42S)	ASTAKA HOLDINGS LIMITED	2018	1.8	-0.1	0.2	0.4	2.2	Grey Zone
			2019	1.2	-0.7	-1.1	0.2	-0.4	*Distress Zone*
			2020	1.2	-1.0	-0.1	0.2	0.3	*Distress Zone*
			2021	1.0	-1.2	-0.1	0.2	-0.1	*Distress Zone*
			2022	1.3	-1.3	0.2	0.3	0.4	*Distress Zone*
			2023	2.0	-2.0	0.0	0.5	0.5	*Distress Zone*
4	(SGX: 1D5)	CAPITAL WORLD LIMITED.	2018	-0.7	0.7	0.7	0.6	1.3	Grey Zone
			2019	1.8	3.0	-1.6	2.2	5.4	*Safe Zone*
			2020	2.4	-0.5	-4.3	2.0	-0.4	*Distress Zone*
			2021	-1.6	-2.1	-3.4	-0.2	-7.3	*Distress Zone*
			2022	1.9	-1.7	1.0	1.7	2.9	*Safe Zone*
			2023	1.7	-1.1	-0.4	1.5	1.6	Grey Zone
5	(SGX: BHD)	CHINA MINING INTERNATIONAL LTD	2018	2.0	-8.6	0.2	4.9	-1.4	*Distress Zone*
			2019	1.5	-11.2	-1.2	3.7	-7.2	*Distress Zone*
			2020	1.2	-14.1	-1.0	3.4	-10.5	*Distress Zone*
			2021	0.0	-4.5	0.6	1.5	-2.4	*Distress Zone*
			2022	-0.2	-4.6	-0.1	1.6	-3.2	*Distress Zone*
			2023	-0.8	-8.8	-2.9	1.3	-11.2	*Distress Zone*
6	(SGX: BCD)	CHINA YUANBANG PROP HLDGS LTD	2018	0.9	0.0	0.0	0.2	1.2	Grey Zone
			2019	1.0	0.1	0.4	0.4	1.8	Grey Zone
			2020	1.8	0.2	0.3	0.5	2.7	*Safe Zone*
			2021	1.3	0.2	0.2	0.6	2.3	Grey Zone
			2022	1.1	0.1	-0.2	0.5	1.4	Grey Zone
			2023	0.8	-0.2	-0.3	0.3	0.6	*Distress Zone*

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
7	(SGX: 1C0)	EMERGING TOWNS & CITIES SING LTD	2018	2.6	0.2	0.4	0.6	3.7	*Safe Zone*
			2019	1.4	0.2	0.6	0.8	3.1	*Safe Zone*
			2020	1.2	0.2	0.4	0.8	2.6	*Safe Zone*
			2021	0.9	0.1	0.5	0.6	2.1	*Safe Zone*
			2022	-0.2	-0.2	1.3	0.4	1.3	Grey Zone
			2023	-0.6	-0.5	0.5	0.3	-0.4	*Distress Zone*
8	(SGX: PH0)	HATTEN LAND LIMITED	2018	1.9	0.4	0.2	0.3	2.8	*Safe Zone*
			2019	1.1	0.4	0.5	0.3	2.4	Grey Zone
			2020	-0.2	-0.1	-0.9	0.1	-1.0	*Distress Zone*
			2021	0.2	-0.5	-0.6	0.0	-0.9	*Distress Zone*
			2022	0.4	-0.4	0.1	0.1	0.2	*Distress Zone*
			2023	-0.9	-0.6	0.0	0.1	-1.3	*Distress Zone*
9	(SGX: F86)	MYP LTD.	2018	-2.1	0.2	0.1	0.5	-1.4	*Distress Zone*
			2019	-0.8	0.2	-0.1	0.6	-0.1	*Distress Zone*
			2020	-0.3	0.2	-0.1	0.7	0.5	*Distress Zone*
			2021	-2.7	-0.1	-0.5	0.7	-2.6	*Distress Zone*
			2022	0.3	-0.1	0.1	0.8	1.2	Grey Zone
			2023	0.4	-0.1	0.1	0.8	1.2	Grey Zone
10	(SGX: 1H2)	OLIVE TREE ESTATES LIMITED	2018	2.0	1.8	0.0	0.8	4.7	*Safe Zone*
			2019	1.1	1.7	-0.2	0.7	3.2	*Safe Zone*
			2020	-0.8	1.6	-0.4	0.6	0.9	*Distress Zone*
			2021	-0.3	1.4	-0.2	0.4	1.3	Grey Zone
			2022	1.2	-7.1	-0.4	0.9	-5.4	*Distress Zone*
			2023	0.8	-8.2	-0.2	1.0	-6.6	*Distress Zone*
11	(SGX: 5UX)	OXLEY HOLDINGS LIMITED	2018	1.9	0.5	0.4	0.3	3.1	*Safe Zone*
			2019	1.4	0.5	0.3	0.3	2.5	Grey Zone
			2020	1.0	0.4	-0.1	0.3	1.5	Grey Zone
			2021	1.9	0.4	0.3	0.4	3.0	*Safe Zone*
			2022	0.0	0.4	0.2	0.4	1.1	*Distress Zone*
			2023	1.4	0.4	0.1	0.5	2.3	Grey Zone
12	(SGX: T24)	TUAN SING HOLDINGS LIMITED	2018	-0.9	0.7	0.4	0.6	0.9	*Distress Zone*
			2019	0.5	0.7	0.2	0.6	2.1	Grey Zone
			2020	0.9	0.7	0.2	0.6	2.5	Grey Zone
			2021	0.2	0.9	0.3	0.9	2.3	Grey Zone
			2022	0.3	0.9	0.1	0.9	2.3	Grey Zone
			2023	-0.2	0.9	0.2	0.9	1.9	Grey Zone
13	(SGX: 5DM)	YING LI INTL REAL ESTATE LTD	2018	0.7	0.3	0.0	0.7	1.7	Grey Zone
			2019	0.0	0.0	-0.4	0.7	0.2	*Distress Zone*

No	Code	Company	Period	Z1	Z2	Z3	Z4	Z'SCORE	Category
			2020	0.4	-0.2	0.0	0.6	0.8	*Distress Zone*
			2021	-0.1	-0.4	-0.2	0.5	-0.3	*Distress Zone*
			2022	0.2	-0.5	-0.3	0.5	0.0	*Distress Zone*
			2023	-1.0	-0.5	0.2	0.5	-0.8	*Distress Zone*

According to the above data, in 2018, four property businesses in Singapore fell inside the crisis zone category: ALSET INTERNATIONAL LIMITED (SGX: 40V), CHINA MINING INTERNATIONAL LTD (SGX: BHD), MYP LTD (SGX: F86), and TUAN SING HOLDINGS LIMITED (SGX: T24). In 2019, the number of property companies in Singapore classified within the distress zone category diminished to five, namely Alset International Limited (SGX: 40V), Astaka Holdings Limited (SGX: 42S), China Mining International Ltd (SGX: BHD), Myp Ltd (SGX: F86), And Ying Li Intl Real Estate Ltd (SGX: 5DM).

In 2020, the Covid-19 pandemic significantly affected the property sector, leading to eight property companies in Singapore entering a distress zone. These companies include Asia-Pacific Strategic Inv Ltd (SGX: 5RA), Astaka Holdings Limited (SGX: 42S), Capital World Limited (SGX: 1D5), China Mining International Ltd (SGX: BHD), Hatten Land Limited (SGX: PH0), MYP LTD (SGX: F86), Olive Tree Estates Limited (SGX: 1H2), And Ying Li Intl Real Estate Ltd (SGX: 5DM). As of 2021, seven property companies in Singapore remain classified within the Distress Zone category: Asia-Pacific Strategic Investments Ltd (SGX: 5RA), Astaka Holdings LimiteD (SGX: 42S), Capital World Limited (SGX: 1D5), China Mining International Ltd (SGX: BHD), Hatten Land Limited (SGX: PH0), MYP LTD (SGX: F86), and Ying Li International Real Estate Ltd (SGX: 5DM).

As of 2022, seven real estate companies in Singapore remain classified within the Distress Zone category, namely Asia-Pacific Strategic Investments Ltd (SGX: 5RA), Astaka Holdings Limited (SGX: 42S), China Mining International Ltd (SGX: BHD), Hatten Land Limited (SGX: PH0), Olive Tree Estates Limited (SGX: 1H2), Oxley Holdings Limited (SGX: 5UX), and Ying Li International Real Estate Ltd (SGX: 5DM). In 2023, the recession resulted in eight property companies in Singapore remaining classified within the Distress Zone category, including Asia-Pacific Strategic Investments Ltd (SGX: 5RA), Astaka Holdings Limited (SGX: 42S), China Mining International Ltd (SGX: BHD), China Yuan bang Property Holdings Ltd (SGX: BCD), Emerging Towns & Cities Singapore Ltd (SGX: 1C0), Hatten Land Limited (SGX: PH0), Olive Tree Estates Limited (SGX: 1H2), and Ying Li International Real Estate Ltd (SGX: 5DM).

The results of this study are consistent with the research conducted by Saraswati et al. (2024), However, there are some novel discoveries that indicate that not all property companies encountered financial difficulties during the Covid-19 pandemic, such as

Emerging Towns & Cities Sing Ltd, PT. and Agung Podomoro Land Tbk. The results show a strong and meaningful link between how well businesses perform and their financial health in the property industry, based on the financial ratio from the Altman Z-score method. During periods of uncertainty, such as the Covid-19 epidemic, the financial stability of the property industry experiences difficulties, thereby impacting the property market in Southeast Asia. This situation underscores the importance of maintaining a strong financial indicator, as companies with better financial health are more likely to withstand economic shocks and emerge resilient. As a result, investors and stakeholders in the property market must prioritize sound financial practices to navigate future challenges effectively. Based on the results obtained, we assert that it is imperative for property companies such as Emerging Towns & Cities Sing Ltd. and PT. Agung Podomoro Land Tbk. to establish an early-warning system for identifying and monitoring potential financial distress risks to respond proactively to the Covid-19 crisis. This system should incorporate advanced analytics and real-time data tracking to provide timely insights into market trends and financial indicators. By doing so, these companies can not only mitigate risks but also capitalize on emerging opportunities in the evolving landscape of the real estate market.

CONCLUSION

This study uses Z-score analysis. Analysis of the firm data indicates that the majority of property and real estate enterprises have had adverse effects due to the Covid-19 epidemic in Southeast Asia. In 2020, the Covid-19 epidemic significantly affected the property sector, leading to eight property businesses in Singapore entering the Distress Zone. In 2020, the Covid-19 pandemic significantly affected the property sector, leading five Malaysian property companies—Bertam Alliance Berhad, Eco World Development Group Berhad, Magna Prima Berhad, Talam Transform Berhad, and Yong Tai Berhad—to enter a distress zone. Eight property companies in Indonesia are currently in the distress zone, including PT Alam Sutera Realty Tbk, PT Bukit Darmo Property Tbk, PT Sentul City Tbk, PT Intiland Development Tbk, PT Bakrieland Development Tbk, PT Modernland Realty Tbk, PT Ristia Bintang Mahkotasejati Tbk, and PT Bhuwanatala Indah Permai Tbk.

The findings have substantial implications for policymakers, investors, and enterprises, despite these limitations. The results indicate that firms should take financial distress exposure into account when making financial decisions. The results suggest that financial distress exposure is a risk factor that investors should take into account when evaluating firms. The results indicate that financial distress policies have substantial implications for market bankruptcy for policymakers.

This study covers just 35 property sector companies listed on the Indonesian Stock Exchange (www.idx.co.id), Malaysian Stock Exchange (www.bursamalaysia.com), and Singapore Stock Exchange (www.sgx.com) during a 5-year period from 2018 to 2023. This

study exclusively uses a bankruptcy prediction model, specifically the Altman Z-score. To enhance our research, we can employ the Springate S-Score and Zmijewski X-Score methodologies, broaden the scope of countries, and analyze the implications of the current tariff conflict between the United States and China, along with volatile global circumstances. This comprehensive approach may yield significant insights on the impact of diverse economic factors on the financial stability of enterprises in various geographies. Furthermore, integrating a varied array of models may improve the precision of bankruptcy forecasts and provide a more thorough insight into the property sector's robustness amid changing market conditions.

REFERENCES

Ahemed, A. M., Iqbal, U., & Atif, M. M. (2025). Asymmetric cost behavior and financial distress. *Economics Letters*, *247*. https://doi.org/10.1016/j.econlet.2024.112121

Al Ali, A. I., S, S. R., & Khedr, A. M. (2024). Enhancing financial distress prediction through integrated Chinese Whisper clustering and federated learning. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(3). https://doi.org/10.1016/j.joitmc.2024.100344

Alcalde, R., de Armiño, C. A., & García, S. (2022). Analysis of the Economic Sustainability of the Supply Chain Sector by Applying the Altman Z-Score Predictor. *Sustainability (Switzerland)*, *14*(2). https://doi.org/10.3390/su14020851

Allen, E., Doung, P., Iyengar, K., Khounthalyvong, P., Leuangkhamsing, S., Lynn, E. C., Magtibay-Ramos, N., Mangahas, J., Nguyen, D., Sandagdorj, B., Tian, S., Thomas, M., & Lin, M. (2024). *Southeast Asia (Asian Development Outlook – September 2024)*.

Alves, C. F., & Meneses, L. L. (2024). ESG scores and debt costs: Exploring indebtedness, agency costs, and financial system impact. *International Review of Financial Analysis*, *94*. https://doi.org/10.1016/j.irfa.2024.103240

Andini, S. A., & Falianty, T. A. (2022). Property Price, Capital Inflows, and Financial System Stability in Asean-5 Economies: a Simultaneous Analysis. *Journal of Indonesian Economy and Business*, *37*(1), 15–38. https://doi.org/10.22146/jieb.v37i1.1406

Andriani, F., & Sihombing, P. (2021). Comparative Analysis of Bankruption Prediction Models in Property and Real Estate Sector Companies Listed on the IDX 2017-2019. *European Journal of Business and Management Research*, *6*(1), 170–173. https://doi.org/10.24018/ejbmr.2021.6.1.730

ASEAN+3 Macroeconomic Research Office (AMRO). (2024). *Vulnerabilities and Potential Spillovers Stemming from Property Developer Financing*.

Astami, E., Pramono, A. J., Rusmin, R., Cahaya, F. R., & Soobaroyen, T. (2024). Do family ownership and supervisory board characteristics influence audit report lag? A view from a two-tier board context. *Journal of International Accounting, Auditing and Taxation*, *56*. https://doi.org/10.1016/j.intaccudtax.2024.100638

Balyuk, T., & Fedyk, A. (2023). Divesting under Pressure: U.S. firms' exit in response to Russia's war against Ukraine. *Journal of Comparative Economics*, *51*(4), 1253–1273. https://doi.org/10.1016/j.jce.2023.08.001

Bellucci, A., Pennacchio, L., & Zazzaro, A. (2023). Debt financing of SMEs: The certification role of R&D Subsidies. *International Review of Financial Analysis*, *90*. https://doi.org/10.1016/j.irfa.2023.102903

Chai, Y., Gan, Y., & Wang, Y. (2024). *Logistic Model-based Prediction of Financial Distress of Listed Chinese Real Estate Companies*. https://doi.org/10.2991/978-94-6463-268-2_17

Choi, S. Y., Ryu, D., & You, W. (2024). ESG activities and financial stability: The case of Korean financial firms. *Borsa Istanbul Review*, *24*(5), 945–951. https://doi.org/10.1016/j.bir.2024.05.007

Chui, M., Illes, A., & Upper, C. (2018). Mortgages, developers and property prices. *BIS Quarterly Review*, *Mar 2018*(March), 97–111.

Desiyanti, O., Soedarmo, W., Chandra, K., & Kusnadi, K. (2019). The Effect Of Financial Ratios To Financial Distress Using Altman Z-Score Method In Real Estate Companies Listed In Indonesia Stock Exchange Period 2014 - 2018. *Business and Entrepreneurial Review*, *19*(2), 119–136. https://doi.org/10.25105/ber.v19i2.5699

Frank, K. (2024). *Asia-Pacific Tomorrow*.

Gaos, R.R., & Mudjiyanti, R. (2021). Pengaruh Corporate Governance Dan Firm Size Terhadap Financial Distress. *Kompartemen: Jurnal Ilmiah Akuntansi, 19(1), 13–24.* https://doi.org/10.30595/kompartemen.v19i1.11218

Han, H. D., Gupta, K., & Krishnamurti, C. (2024). Are labor laws and employee welfare complements in determining leverage ratios? *Pacific Basin Finance Journal*, *88*. https://doi.org/10.1016/j.pacfin.2024.102545

Hanafi, A. H. A., Md-Rus, R., & Taufil Mohd, K. N. (2021a). Predicting Financial Distress In Malaysia And Its Effect On Stock Returns. *International Journal of Banking and Finance*, *16*. https://doi.org/10.32890/ijbf2021.16.2.4

Hanafi, A. H. A., Md-Rus, R., & Taufil Mohd, K. N. (2021b). Predicting Financial Distress In Malaysia And Its Effect On Stock Returns. *International Journal of Banking and Finance*, *16*. https://doi.org/10.32890/ijbf2021.16.2.4

Kristanti, F. T., & Pancawitri, S. (2024). Some Factors Affecting Financial Distress In Telecommunication Companies In Southeast Asia. *Business: Theory and Practice*, *25*(1), 190–199. https://doi.org/10.3846/btp.2024.20018

Lian, Y. (2024). Financial distress, bank branching deregulation, and customer-supplier relationships. *Journal of Corporate Finance*, *88*. https://doi.org/10.1016/j.jcorpfin.2024.102646

Manaf, S.M.A., Amzah, N.F.H., & Salleh. W.A. (2021). An Investigation of Factors Affecting Financial Distress: Analysis Among PN17 Companies in Bursa Malaysia. *Insight Journal*, *8*. https://doi.org/10.24191/ij.v8i0.100

Mercadier, M., & Strobel, F. (2024). Bank insolvency risk, Z-score measures and unimodal returns: A refinement. *The Quarterly Review of Economics and Finance*, 101919. https://doi.org/10.1016/j.qref.2024.101919

Modina, M., Pietrovito, F., Gallucci, C., & Formisano, V. (2023). Predicting SMEs' default risk: Evidence from bank-firm relationship data. *Quarterly Review of Economics and Finance*, *89*, 254–268. https://doi.org/10.1016/j.qref.2023.04.008

Ranta, M., & Ylinen, M. (2024). Employee benefits and company performance: Evidence from a high-dimensional machine learning model. *Management Accounting Research*, *64*. https://doi.org/10.1016/j.mar.2023.100876

Rauf, A. (2023). Bank stability and the price of loan commitments. *Journal of Financial Intermediation*, *54*. https://doi.org/10.1016/j.jfi.2023.101027

Saraswati, R. A., Ratnawati, A., & Irawan, T. (2024). Determinants of Financial Distress in Property and Real Estate Companies Listed on The Indonesian Stock Exchange. *Desember*, *2*(2), 80–92. https://doi.org/10.29244/jekp.13.2.2024.80-92

Shi, Y., & Li, X. (2024). Bankruptcy prediction for the European aviation industry: An application of the Altman model. *Managerial and Decision Economics*, *45*(1), 477–491. https://doi.org/10.1002/mde.4018

Simbolon, R. (2022). Pengaruh Kualitas Audit Dan Kondisi Keuangan Perusahaan Terhadap Opini Audit Going Concern Pada Perusahaan Pertambangan Sub Sektor Batu Bara Yang Terdaftar Di Bursa Efek Indonesia Tahun 2018-2020. *Jurnal Pembangunan Ekonomi dan Keuangan Daerah*,*23*(1).

Wijaya, F. Desta, Lasmana, A., & Melani, M.M. (2024). The Effect of Liquidity, Profitability, Leverage and Activity on Financial Distress. *Jurnal Ilmiah Manajemen Kesatuan*, *12*(4), 1377–1388. https://doi.org/10.37641/jimkes.v12i4.2550

Yi, W. (2012). Z-score Model on Financial Crisis Early-Warning of Listed Real Estate Companies in China: a Financial Engineering Perspective. *Systems Engineering Procedia*, *3*, 153–157. https://doi.org/10.1016/j.sepro.2011.11.021

Yuniarwati, Y., & Yusianto, Y. (2023). Development Of Property And Real Estate Companies: Z-Score Method Approach. *International Journal of Application on Economics and Business (IJAEB)*, *1*(2), 2987–1972. https://doi.org/10.24912/ijaeb.v1.i2.618-626

Zhao, S., Xu, K., Wang, Z., Liang, C., Lu, W., & Chen, B. (2022). Financial distress prediction by combining sentiment tone features. *Economic Modelling*, *106*. https://doi.org/10.1016/j.econmod.2021.105709