

Financial Distress State-Owned Enterprises (BUMN KARYA) on the Indonesia Stock Exchange Based on Firm Size, Debt Ratio, and Interest Burden for the 2019-2025 Period: An Islamic Business Ethics Perspective

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Abstract. *This study aims to analyze the influence of Firm Size, Debt Ratio, and Interest Burden on Altman Z-Score as a proxy for Financial Distress in four state-owned construction sub-sector companies listed on the Indonesia Stock Exchange, namely PT Adhi Karya (Persero) Tbk, PT Pembangunan Perumahan (Persero) Tbk, PT Wijaya Karya (Persero) Tbk, and PT Waskita Karya (Persero) Tbk, for the period 2019 to 2025. The study uses a causal associative quantitative approach with a panel data regression method. The selection of the best model through the Chow Test and the Lagrange Multiplier Test produces the Common Effect Model (CEM) as the final model; the Panel Period LR Test heteroscedasticity test detects heteroscedasticity ($LR = 197.4053$; $p = 0.0000$), but the inference is still based on the CEM estimate without weighting that has been confirmed to be consistent. The results of the study indicate that: (1) Firm Size has no significant effect on Altman Z-Score (coefficient -0.1007 ; $p = 0.8101$), H_1 is rejected; (2) Debt Ratio has a negative and very significant effect on Altman Z-Score (coefficient -14.5151 ; $p = 0.0000$), H_2 is accepted; (3) Interest Burden has no significant effect on Altman Z-Score (coefficient 1.1555 ; $p = 0.9009$), H_3 is rejected; (4) simultaneously, the three variables have a significant effect with an F-statistic of 18.36732 ($p = 0.000002$) and an Adjusted R-squared of 0.6587 , H_4 is accepted. Viewed from the perspective of Islamic Business Ethics, the Financial Distress condition of BUMN Karya reflects the need to strengthen the application of the principles of tawazun (balance) and amanah (responsibility) in managing public capital. This research confirms that improving the Debt Ratio is a fundamental prerequisite before the BUMN Karya merger is executed.*

Keywords: Altman Z-Score; BUMN Karya; Debt Ratio; Financial Distress; Firm Size; Interest Burden; Islamic Business Ethics; Merger.

1. Introduction

State-Owned Enterprises (SOEs) have a dual function as both business entities and state instruments in promoting development and public welfare, as mandated by Law Number 19 of 2003 concerning SOEs. This function has been increasingly institutionally affirmed in recent developments through Law Number 1 of 2025 as the third amendment to Law Number 19 of 2003, which marks a new direction for the institutional restructuring of SOEs through the establishment of investment holdings, operational holdings, and the Daya Anagata Nusantara Investment Management Agency (Danantara). Furthermore, Government Regulation Number 10 of 2025 affirms Danantara's position as an Indonesian legal entity wholly owned by the government and carrying out government duties in the field of SOE management based on the delegation of some of the President's authority. This change indicates that SOEs are now positioned not only as state-owned business entities, but also as national strategic investment instruments whose management is directed to be more professional, integrated, and accountable. Because part of SOE capital is sourced from the State Budget (APBN), SOE financial management is not only a matter of efficiency, but also a matter of public trust.

This dual role is most evident in state-owned construction companies known as BUMN Karya (Working Companies), namely PT Adhi Karya (Persero) Tbk (ADHI), PT Pembangunan Perumahan (Persero) Tbk (PTPP), PT Wijaya Karya (Persero) Tbk (WIKA), and PT Waskita Karya (Persero) Tbk (WSKT). These four companies not only bear conventional business pressures but also bear the social burden of being tasked with massive national infrastructure development projects, which directly increases their debt structure and puts pressure on their financial health. During the period from 2019 to 2025, State-Owned Construction Companies (SOEs) faced multiple financial pressures. The COVID-19 pandemic in 2020 caused a 5.67 percent contraction in the construction sector, triggering cash flow disruptions, mass project delays, and a sharp decline in revenue for the four listed companies. Furthermore, the assignment of national strategic infrastructure projects such as the Trans-Java toll road, the Trans-Sumatra toll road, the MRT, and the Greater Jakarta LRT, which were assigned to SOEs, required substantial debt financing, far exceeding their equity capital capacity. Based on the annual financial statements for the period of December 31, 2025, the total liabilities of the four SOEs reached IDR 179.70 trillion, with WSKT bearing total liabilities of IDR 67.06 trillion, WIKA IDR 48.46 trillion, PTPP IDR 38.68 trillion, and ADHI IDR 25.50 trillion (Indonesia Stock Exchange, 2026). This structural pressure ultimately led to financial distress for most companies in this cluster, as reflected in financial restructuring, bad debts, and the volume of applications for suspension of debt payments (PKPU) filed by partners or bondholders. Although the nominal liability burden has decreased compared to the 2021-2024 period, from a peak of IDR 215.58 trillion in 2021 to IDR 187.66 trillion in 2024 before declining again to IDR 179.70 trillion in 2025, structural pressure remains high as net losses actually increased in 2025, with WIKA recording the largest pre-tax loss of IDR 10.12 trillion, followed by PTPP at IDR 7.31 trillion, ADHI at IDR 5.38 trillion, and WSKT at IDR 4.39 trillion.

The Financial Distress Condition of State-Owned Enterprises (BUMN Karya) can be measured quantitatively using the Altman Z''-Score model, which is a modification specifically for non-manufacturing companies. Altman (1968) in his seminal study published in The Journal of Finance laid the foundation for a bankruptcy prediction model using multiple discriminant analysis with five financial ratios, and then Altman, et al. (1995) revised the model for non-manufacturing companies and emerging markets, resulting in the formula $Z'' = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4$, without including the industry-biased sales turnover variable. Altman et al. (2017) in the Journal of International Financial Management and Accounting confirmed that the non-manufacturing Z''-Score model proved to be the most reliable in emerging markets and is widely used as a prediction tool in the international finance literature. Using this model, Rachmadiosi and Rahadi (2023) in the International Journal of Current Science Research and Review found that WSKT was consistently in the distress zone during the period 2019 to 2021, while ADHI and PTPP experienced a significant decline during the pandemic.

This situation continued and even worsened in the following years. PT Waskita Karya's stock trading was suspended by the Indonesia Stock Exchange (IDX) in May 2023 (CNBC, 2023) due to delayed interest and principal payments on several bonds. PT Wijaya Karya then followed suit with a suspension in December 2023 (Investor. id, 2023) due to failure to pay the principal of its Sustainable Sukuk Mudharabah I Wijaya Karya Phase I 2020 Series A, which matured on December 18, 2023. Both issuers are listed as potential delisting issuers monitored by the IDX. Data from the financial files of ADHI, PTPP, WIKA, and WSKT for the period 2019 to 2025 processed in this study shows that ADHI's Z''-Score value in 2024 only reached 1.372, PTPP was 1.725, WIKA was 1.395, and WSKT was 0.630, which means that all companies are in the gray zone or distress zone.

2. Research Methods

This research is a quantitative study with a causal associative approach. According to Sugiyono (2022), causal associative research is research that examines the causal relationship between two or more variables, namely the independent variable as the influencing variable and the dependent variable as the influenced variable. This design was chosen because the study aims to determine whether Firm Size, Debt Ratio, and Interest Burden partially or simultaneously influence the Altman Z-Score as a proxy for financial health and an indicator of merger feasibility in state-owned construction companies.

3. Results and Discussion

3. 1. The Influence of Firm Size on Altman Z''-Score

The test results show that Firm Size, proxied by the natural logarithm of total assets, has no significant effect on the Altman Z-Score in State-Owned Construction Companies (BUMN Karya) for the 2019-2025 period, thus H1 is rejected. This finding is inconsistent with the formulated hypothesis that expects a positive relationship. However, the rejection of H1 has a solid theoretical and empirical explanation in the specific context of BUMN Karya.

First Theoretical Explanation: The Paradox of Scale in Assigned State-Owned Enterprises.

In mainstream financial literature, larger company size is associated with easier access to capital, portfolio diversification, and stronger bargaining power with creditors, and is therefore expected to be positively correlated with financial health. However, in the case of state-owned construction companies (SOEs), this mechanism is reversed: larger companies (WSKT, with the highest total assets of IDR 122. 6 trillion in 2019) actually experience worse Z-Score conditions than smaller companies (ADHI). This occurs because in SOEs, large asset size largely reflects the accumulated burden of debt-financed state-owned project contracts, rather than equity strength. In other words, SIZE in this context reflects the burden of assignments rather than fundamental strength. Chrissentia (2025) in a study of Indonesian construction companies found a similar argument that in companies undertaking large-scale public project assignments, Firm Size can be a proxy for operational costs that depress profitability.

Similar findings from an international context were demonstrated by Mselmi, Lahiani, and Hamza (2017) in their study of French SMEs. They found that the relationship between firm size and the prediction of financial distress is contextual and influenced by the firm's structural characteristics. In firms with a large proportion of liabilities relative to their assets, the availability of large assets does not necessarily guarantee a healthier financial condition because the liabilities that must be covered also grow proportionally or even faster. This condition aligns with the situation of state-owned construction companies in this study, where a large firm size is accompanied by a very high debt ratio, so the theoretically expected positive effect of firm size on the Z-score is not statistically realized.

Second Theoretical Explanation: SIZE Homogeneity in the Sample. The SIZE range in this study ranges from 30. 99 to 32. 44, which on a logarithmic scale represents a total asset range of IDR 28. 8 trillion to IDR 122. 6 trillion. While this difference is quite large in nominal terms, in a panel regression analysis that includes variables with a much wider range (DEBTRATIO ranges from 0. 69 to 0. 97), the variation in SIZE is relatively small and does not have sufficient predictive power to compete statistically. The standard deviation of SIZE (0.

37) compared to the standard deviation of DEBT_RATIO (0.075) proportionally explains why DEBT_RATIO dominates the model.

Third Theoretical Explanation: Agency Theory Mechanism. Jensen and Meckling (1976) stated that large companies tend to face higher agency costs, including monitoring costs and potential management moral hazard. In state-owned construction companies, this dimension of agency theory is particularly relevant: management and directors, acting as agents of the state (principal), make investment decisions that maximize operational scale (because it aligns with the interests of government assignments) without always considering the consequences for the company's balance sheet health. This condition creates a dissonance between company size and financial health.

The rejected H1 result is consistent with the findings of Susilo and Asyari (2026) who found that company size has a negative and significant effect on the Z''-Score in BUMN Karya, which means that larger companies tend to have a lower Z''-Score, contrary to general expectations.

3. 2. The Influence of Debt Ratio on Altman Z''-Score

The test results show that the Debt Ratio has a negative and very significant effect on the Altman Z''-Score in BUMN Karya for the 2019-2025 period, with a coefficient of -14.5151 and a p-value of 0.0000 (< 0.01). Thus, H2 is accepted. The coefficient value of -14.5151 has very large economic implications: every increase in the Debt Ratio of 0.10 (10 percentage points) will be followed by a decrease in the Z''-Score of 1.4515 points, ceteris paribus. Considering that the range between the gray zone limit (2.60) and the distress zone (1.10) is only 1.50 points, a 10 percent increase in the Debt Ratio is enough to shift the company's position from the upper limit of the gray zone to the lower limit of the distress zone.

First Theoretical Basis: Trade-Off Theory. Kraus and Litzenberger (1973) in their Trade-Off Theory state that a company maximizes its value by balancing the tax benefits of debt (tax shield) with the cost of financial distress. When debt grows beyond the optimal point, the marginal cost of distress exceeds the marginal tax shield, so that the company's value decreases and the risk of bankruptcy increases exponentially. The average Debt Ratio value of 0.8075, even reaching 0.9664 for WIKA in 2025, has far exceeded the optimal point intended by the Trade-Off Theory. Nafiah et al. (2025) in Architecture Image Studies even asserted that the Trade-Off Theory in conditions like this loses its relevance because the company is no longer in the optimization area, but is already in the spiraling distress area.

Second Theoretical Basis: Pecking Order Theory. Myers and Majluf (1984) in the Journal of Financial Economics stated that financially healthy companies prioritize internal funding (retained earnings) before resorting to debt. The fact that WIKA and WSKT's retained earnings have been negative since 2022-2023 (WIKA reached -Rp 19.29 trillion and WSKT

reached -Rp 20. 22 trillion in 2025) indicates that these two companies have not only lost their internal funding capacity, but also that all accumulated historical profits have been wiped out by losses. This condition, according to Myers and Majluf (1984), is a sign of ongoing financial failure, not merely temporary stress.

Third Theoretical Basis: Signaling Theory. Ross (1977) in The Bell Journal of Economics stated that capital structure serves as a signal of a company's quality to the market. A persistent increase in the debt ratio without an accompanying increase in profitability sends a negative signal to investors, creditors, and business partners. For state-owned construction companies, the increase in debt ratios of WIKA from 0. 691 (2019) to 0. 966 (2025) and WSKT from 0. 763 (2019) to 0. 948 (2025) is a very strong signal that these two entities are experiencing fundamental deterioration that cannot be hidden. This negative signal, in turn, increases the cost of debt, worsens new credit requirements, and creates a spiral effect that deepens distress further.

Quantitative Implications. To illustrate the magnitude of the impact of this coefficient of -14. 5151: the increase in WIKA's Debt Ratio from 0. 691 (2019) to 0. 966 (2025) represents a difference of 0. 275 points. Theoretically, this difference is equivalent to a decrease in Z'' of $0. 275 \times 14. 5151 = 3. 99$ points. Empirical facts indeed show that WIKA's Z'' fell from 2. 419 (2019) to -1. 978 (2025), a decrease of 4. 40 points, which is very close to the theoretical estimate based on the regression coefficient.

The H2 finding is consistent with the findings of Setowening and Djuminah (2024) in the Journal of Economics and Business, which found that leverage significantly influences financial distress in construction companies listed on the IDX. This finding also aligns with Putri and Putri (2024) who found that DER influences financial distress in Indonesian and Malaysian construction companies, and with Rachmadiosi and Rahadi (2023) who descriptively found that WSKT consistently remained in the distress zone throughout 2019-2021, precisely when its debt ratio was at its highest.

3. 3. The Effect of Interest Burden on Altman Z'' -Score

The test results show that Interest Burden has no significant effect on the Altman Z'' -Score in BUMN Karya for the 2019-2025 period, with a coefficient of 1. 1555 and a probability of 0. 9009 ($> 0. 05$). Thus, H3 is rejected. Furthermore, the sign of the obtained coefficient (positive) is opposite to the hypothesized direction (negative), although its statistical insignificance makes this sign reversal uninterpretable as a substantive finding.

The average Interest Burden value of 0. 0238 indicates that, on average, every rupiah of company assets bears a financial burden of 0. 0238 rupiah. The very small minimum value indicates that in some observations the financial burden is relatively small compared to total

assets, while the maximum value indicates significantly heavier financing pressure in certain observations. Thus, Interest Burden in this study represents the pressure of debt financing costs on the company's asset base, not on EBIT.

There are three mutually reinforcing theoretical and empirical explanations to understand these results.

First Explanation: Low Interest Expense Relative to Total Assets at WIKA. WIKA recorded a very low Interest Burden value throughout 2019 to 2024 because the interest expense (finance cost) borne was relatively small compared to WIKA's very large total asset base during that period. Meanwhile, WIKA also recorded an EBIT value very close to zero during the same period (for example, IDR 1. 53 billion in 2020 from total assets of IDR 68. 1 trillion), so that the X3 component (EBIT/Total Assets) in the Z-Score formula contributed almost nothing to WIKA's Z-Score. These two conditions occur in parallel but through different pathways: the low Interest Burden reflects a small interest expense relative to total assets, while WIKA's low Z-Score is explained more by the EBIT that is close to zero in the X3 component of the Z-Score formula, rather than by Interest Burden itself. This combination explains why Interest Burden is not proven to be statistically significant to the Z-Score in the final model.

Second Explanation: Functional Multicollinearity between Interest Burden and Debt Ratio. Economically, companies with the highest Debt Ratio (WSKT) also have the highest Interest Burden, because large debts result in large interest expenses. Although the VIF values indicate no technically problematic multicollinearity, functionally, these two variables measure overlapping dimensions of the same problem: excessive debt burden. In OLS estimation, the variable measuring the more direct and influential manifestation (Debt Ratio) will absorb most of the variance that would otherwise be shared by Interest Burden.

Third Explanation: The Mechanism of Transmission of Interest Burden to Z''-Score is Indirect. Interest Burden affects the Z''-Score not directly as a separate variable, but through the mediation pathway of EBIT. An increase in interest expense reduces EBIT (before interest is returned to calculate EBIT), which then suppresses the X3 component (EBIT/Total Assets) in the Z'' formula. However, this effect is already measured by the Z''-Score component itself, so that Interest Burden as a separate independent variable experiences information redundancy with the internal structure of the Z'' formula.

The results of H3 are consistent with the findings of Ummayah and Hertina (2024) who found that interest expense (as part of profitability) is not always a significant independent determinant of Financial Distress in construction companies when the leverage variable has been included in the same model.

3. 4. Simultaneous Effect and Coefficient of Determination

The F-test results show an F-statistic of 18.3673 with a probability of 0.000002 (<0.01). Thus, H_4 is accepted: Firm Size, Debt Ratio, and Interest Burden simultaneously have a very significant effect on the Altman Z"-Score in BUMN Karya for the 2019-2025 period. The calculated F-value of 18.37 exceeds the F-table ($df_1=3$, $df_2=24$, $\alpha=1\%$) of around 4.72 by a very large margin, proving the undeniable goodness of fit of the model.

The Adjusted R-squared value of 0.6587 means that 65.87 percent of the variation in the Z-Score condition of BUMN Karya during the seven years of observation can be explained by the three variables studied. This figure is a substantial number considering the complexity of factors that influence the financial condition of construction companies operating in a dynamic environment of fiscal policy, business cycles, and state assignments. The remaining 34.13 percent that cannot be explained by this model reflects the influence of factors outside the scope of the study, such as the value of new contracts won, the condition of Bank Indonesia's benchmark interest rate, and the quality of individual project risk management.

3. 5. Islamic Business Ethics Perspective

Based on all the quantitative findings described above, the Islamic Business Ethics perspective provides a normative interpretative dimension that complements and deepens the understanding of the financial condition of BUMN Karya.

The Principle of Trust and the Negative Z"-Score Condition. In 2025, three out of four issuers recorded a negative Z-Score, meaning the book value of equity was no longer able to offset total liabilities. From an Islamic Business Ethics perspective, this condition indicates the need to strengthen the implementation of the principle of trust in the dimension of public asset management. Nafiah et al. (2025) in *Architecture Image Studies* developed the concept of Amanah Financial Solvency (AFS) which emphasizes that solvency is not merely a technical ratio, but rather a moral reflection of management's sincerity in maintaining the value of the trust entrusted to the state. When WIKA's retained earnings reached -Rp 19.29 trillion and WSKT reached -Rp 20.22 trillion, this was not only a technical financial issue, but a reflection of the major challenge in fulfilling the responsibility of trust over the managed public capital.

The Principle of Tawazun and the Highest Debt Ratio in History. The average Debt Ratio of all issuers in 2025 reached 0.925. From an Islamic perspective, such an extreme imbalance in the funding structure between liabilities (92.5%) and equity (7.5%) reflects the failure to implement the principle of tawazun (balance). Kraus and Litzenberger (1973) in their Trade-Off Theory actually warned about the dangers of this imbalance through the argument of Financial Distress costs, but Islam adds an ethical dimension: that this imbalance is not only financially detrimental, but also exceeds the limits of prudence required in the management

of entrusted assets (amanah). Nafiah et al. (2025) through the concept of Amanah Financial Solvency asserts that the largest normative gap in research on state-owned enterprises lies in the minimal transformation of the solvency ratio into a moral construct based on Islamic ethical stewardship in capital structure decision-making, a gap that this study seeks to fill empirically in the case of BUMN Karya.

The Principle of Maslahah and the Implications of Merger Policy. The fact that by 2025 all state-owned construction companies will be in the distress zone provides a strong empirical basis for asking normative questions: will forced merger policies under these conditions produce maslahah (common good) or will they actually shift the problem to a larger entity.

The principle of maslahah requires that every strategic policy be tested against the standard of whether its benefits outweigh its drawbacks for all stakeholders. Based on data, a merger without prior fundamental restructuring would leave the combined entity with total debt that could exceed IDR 179.7 trillion, with no guarantee of increased revenue-generating capacity.

The Principle of Ihtiyath (Caution) as a Policy Imperative. The highly dominant Debt Ratio coefficient of -14.5151 sends a very clear message: improving the Debt Ratio is the single most significant priority for improving the Z-Score of State-Owned Construction Companies. From an Islamic Business Ethics perspective, the principle of ihtiyath requires policymakers to prioritize structural improvement before consolidation, rather than relying on mergers as an administrative shortcut.

3. 6. Merger Feasibility Analysis Based on Research Findings

The main finding of this study shows that the Debt Ratio is the only statistically significant and highly dominant determinant of the Altman Z-Score, with a coefficient of -14.5151 ($p = 0.0000$). This finding provides a concrete empirical framework for evaluating the implications of each issuer's financial condition on its readiness to enter the BUMN Karya consolidation agenda currently being implemented by Danantara Indonesia.

From a corporate financial management perspective, the feasibility of a merger cannot be assessed solely based on policy or administrative considerations. An entity is deemed worthy of entering a consolidation scheme if its fundamental financial condition is sound enough to not transfer distress pressure to the merged entity. The Altman Z''-Score model provides a standardized analytical framework for such assessment: companies in the safe zone ($Z'' > 2.60$) are fundamentally ready for consolidation because they do not pose a risk of distress to the combined entity; companies in the gray zone ($1.10 < Z'' \leq 2.60$) require more in-depth assessment; and companies in the distress zone ($Z'' \leq 1.10$) have the potential to worsen the combined entity's financial condition if consolidated without first fundamentally improving the balance sheet.

Based on the data processed in this study, all state-owned construction company issuers are in the distress zone throughout 2025, with their respective Z'' values: ADHI of -1. 976; PTPP of -0. 810; WIKA of -1. 978; and WSKT of -2. 336. During the same period, the average Debt Ratio of the four issuers reached 0. 925, reflecting a very high dependence on liability-based funding. This condition is directly relevant to the research regression results: because the Debt Ratio is the single significant determinant of the Z''-Score, then the improvement in the distress conditions of the four issuers empirically depends on the success of reducing the Debt Ratio of each company.

The implications of these findings for the merger issue can be formulated at three levels of analysis:

1. Empirically, every one-unit decrease in the Debt Ratio will be followed by a 14. 5151-point increase in the Z''-Score based on the estimated model. With this coefficient, a decrease in the Debt Ratio is the most efficient pre-merger investment because its impact on the change in the Z''-Score is greater than other variables in the model. Therefore, debt restructuring that successfully reduces the Debt Ratio is the most decisive empirical prerequisite before the consolidation process can have a positive impact on the financial health of the combined entity.
2. At the managerial level, research results indicate that mergers implemented when the entities to be merged still carry high solvency pressures risk transferring financial distress to the consolidated entity, rather than resolving it. Prioritized recovery measures include liability restructuring, equity strengthening through capital injections, improving the quality of productive assets, and controlling expansion unsupported by healthy funding capacity. The underlying financial condition of each issuer's debt ratio needs to be fundamentally improved before merger readiness can be responsibly assessed.
3. At the normative level, the findings of this study must be read within the framework of Islamic Business Ethics, which has been used as an interpretive perspective throughout this research. The principle of amanah (trustworthiness) demands that public capital management in state-owned enterprises be carried out responsibly and accountably, so mergers should not be used as administrative shortcuts that mask unresolved fundamental issues. The principle of tawazun emphasizes the importance of a balanced financial structure, so a very high debt ratio indicates an imbalance that must be addressed before consolidation can take place. The principle of maslahah (benefit) requires that mergers generate real benefits for the state, creditors, investors, employees, and the wider community, rather than simply shifting burdens from one entity to another, larger entity. The principle of ihtiyath (prudence) demands strategic decisions based on data and prudence, not merely administrative considerations. These four principles collectively emphasize that the ethical feasibility of a merger can only be assessed ethically if based on strong empirical evidence regarding the financial health of each entity, as provided by this research.

The financial profiles of each issuer based on research findings show varying degrees of preparedness. PTPP has the most defensive financial profile among the four issuers throughout the observation period, with the highest Z''-Score in 2024 at 1. 725 and a relatively more manageable Debt Ratio compared to other issuers, although it remains under high pressure in 2025. ADHI recorded a Z''-Score of -1. 976 and a Debt Ratio of 0. 886 in 2025, with a pre-tax loss of IDR 5. 38 trillion that significantly eroded retained earnings so that the X2 component in the Z''-Score formula was sharply depressed. WIKA recorded the highest Debt Ratio among the four issuers in 2025 at 0. 966 accompanied by a Z''-Score of -1. 978. WSKT has the lowest Z''-Score in the entire research dataset, which is -2. 336 in 2025, which indicates the most severe financial stress conditions among the four issuers.

Altman et al. (2017) classify a negative Z value as technical insolvency, where the book value of equity is no longer able to offset total liabilities proportionally. This condition does not automatically mean that a company cannot be consolidated, but rather emphasizes that balance sheet recovery requirements must be met first to prevent consolidation from resulting in a combined entity that inherits cumulative financial distress.

Thus, the results of this study do not reject the possibility of a merger of State-Owned Construction Companies, but emphasize that the feasibility of a merger is highly dependent on the success of prior debt ratio recovery. Mergers should be positioned as part of a broader and more comprehensive restructuring strategy, not as a substitute for fundamental recovery, which has proven to be the most pressing need based on the empirical findings of this study. A merger policy that meets the principle of ihtiyath is one that is preceded by concrete evidence of debt ratio improvements in each entity to be merged, so that the consolidation results in a stronger entity and not a greater accumulation of burdens.

1. 1. 4 Comparison of Results with Previous Research and Novelty

Based on the literature search in this study, no research has been found that simultaneously examines the influence of Firm Size, Debt Ratio, and Interest Burden on the Altman Z-Score in BUMN Karya (State-Owned Construction Companies) for the period 2019 to 2025 within the framework of merger feasibility and the Islamic Business Ethics Perspective. Therefore, the novelty of this study lies in the combination of variables, the institutional context of BUMN Karya, the observation period, and the use of an Islamic normative interpretative framework. The findings of this study show several significant similarities and differences with previous research reviewed in Chapter 2. 2.

Comparison with Rachmadiosi and Rahadi (2023). Rachmadiosi and Rahadi (2023) conducted a descriptive analysis of the Financial Distress of State-Owned Construction Companies (BUMN Karya) for the 2019-2021 period in the IJCSRR and found that WSKT consistently remained in the distress zone, while ADHI and PTPP worsened during the pandemic. This

study confirms these findings and extends the period to 2025, revealing that the conditions that were still partial in 2019-2021 (only WSKT and WIKA were in the distress zone) have evolved into a systemic crisis that affected all issuers in 2025. The fundamental difference is that this study adds an inferential dimension that Rachmadiosi and Rahadi did not: panel regression testing that proves the Debt Ratio as the most dominant statistical determinant.

Comparison with Susilo and Asyari (2026). Susilo and Asyari (2026) examined the determinants of financial distress in state-owned construction companies (BUMN Karya) from 2015 to 2024 using operating cash flow, firm size, asset growth, and company age as independent variables. They found that firm size had a significant negative effect and asset growth had a significant positive effect on the Z-score, but did not examine the debt ratio or interest burden. This study directly addresses this gap by proving that debt ratio is a much stronger determinant of the Z-score (coefficient -14.5151) than company size.

Comparison with Ummayah and Hertina (2024). Ummayah and Hertina (2024) found that Current Ratio had a significant positive effect and DAR (Debt to Asset Ratio) had a significant negative effect on Z''-Score in general building construction companies. This study confirms the findings regarding Debt Ratio (DAR in the context of this study is equivalent to Debt Ratio), but differs in the aspect of liquidity proxy: this study uses Interest Burden instead of Current Ratio, and finds that in a sample that homogeneously all perform poorly in liquidity (all CR below 1.0), Interest Burden does not provide significant additional predictive power.

Comparison with Mselmi, Lahiani, and Hamza (2017). Mselmi et al. (2017) tested the prediction of Financial Distress in French SMEs. The study confirmed that firm size is a contextual factor that influences the relationship between financial ratios and Financial Distress. The fundamental differences between Mselmi et al.'s (2017) study and this study lie in the context, instruments, and objects of study: Mselmi et al.'s study used a sample of SMEs in developed countries with mature financial market structures, while this study focuses on State-Owned Enterprises (BUMN Karya) in Indonesia as an emerging market with unique characteristics of state assignments. The findings of this study, which show that Firm Size has no significant effect on the Z-Score, actually strengthen and expand Mselmi et al.'s argument that the relationship between firm size and Financial Distress is highly dependent on the institutional and industrial context in which the firm operates, and therefore cannot be generalized universally.

Comparison with Princess and Princess (2024). Putri and Putri (2024) found that DER significantly impacted financial distress in Indonesian and Malaysian construction companies. This study confirmed the direction of DER's influence (negative on the Z-Score), despite using a different Debt Ratio (Total Liabilities/Total Assets) than DER (Total Liabilities/Total Equity). Both reflect the same dimension of leverage problems, but the Debt Ratio is more

mathematically stable because it does not produce a very large value when equity approaches zero, as occurred in WIKA (DER reached 28. 755 in 2025).

Research Novelty. Based on the literature map and comparison above, this study provides three original novel contributions:

1. This study is the first to specifically examine the influence of Firm Size, Debt Ratio, and Interest Burden simultaneously on the Altman Z-Score as a proxy for Financial Distress in four state-owned construction companies (SOEs) over the 2019-2025 period, encompassing the pre-pandemic, pandemic, and Danantara restructuring phases. This combination of variables, measurement instruments, and timeframe has never been combined in a single study before.
2. This study empirically proves that the Debt Ratio is the single most dominant determinant of the Z"-Score of State-Owned Construction Companies, with a coefficient of -14. 5151 which has concrete policy implications: every 10 percent decrease in the Debt Ratio will increase the Z"-Score by 1. 45 points. Empirical evidence with such a large measurable influence has never been available in the literature specifically for State-Owned Construction Companies before.
3. As its most distinctive contribution, this study integrates quantitative findings into an Islamic Business Ethics framework based on four key principles (amanah, tawazun, masalah, and ihtiyath). This integration is not merely decorative, but rather produces different and more comprehensive policy recommendations: Debt Ratio recovery is not only financially important, but also an ethical imperative in the management of public state assets. As emphasized by Zuwardi (2025) through a bibliometric analysis of 241 Scopus documents, the largest gap in the literature linking Islamic ethics to economic practice lies in the minimal application of this normative framework to case studies of the real sector, particularly construction companies in developing countries. Nafiah et al. (2025) also emphasized that the concept of Amanah Financial Solvency is still at the stage of systematic literature review and has not been widely tested in the empirical context of state-owned enterprises. This study fills this gap by applying the Islamic ethical framework directly to the quantitative findings of Financial Distress of State-Owned Construction Companies.

4. Conclusion

Based on panel data regression analysis with the Common Effect Model (CEM) which has passed the specification test and classical assumptions, this study answers the following problem formulation.

1. Firm Size does not have a significant effect on the Altman Z-Score (coefficient -0. 1007; probability 0. 8101).

2. Debt Ratio has a negative and significant effect on the Altman Z-Score (coefficient -14.5151; probability 0.0000), becoming the most dominant determinant of Financial Distress.
3. Interest Burden does not have a significant effect on the Altman Z-Score (coefficient 1.1555; probability 0.9009).
4. Simultaneously, Firm Size, Debt Ratio, and Interest Burden have a significant effect on the Z-Score (F-statistic 18.3673; probability 0.000002; Adjusted R-squared 0.6587).
5. Merger implications: The dominant debt ratio indicates debt accumulation as the primary root of distress, so the feasibility of a merger of state-owned construction companies must be based on capital structure improvement, not merely administrative considerations. From an Islamic business ethics perspective, this finding requires the application of the principles of tawazun and ihtiyath (prudence) so that the merger brings real benefits, rather than shifting the burden of distress to the combined entity.

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