JBS Nexus

JOHOR BUSINESS SCHOOL (JBS) NEXUS
e-ISSN: 3083-9130

Vol. 3 No. 1 (2026) 91-109
https://publisher.uthm.edu.my/ojs/index.php/jbsnexus

Beneish M-Score Analysis as a Detector of Financial Report Fraud in Building Construction Sub-Sector Companies Listed on the Indonesia Stock Exchange (IDX)

Selvia Erninda Rosalia[1]*, Yohan Bakhtiar[2], Ahmad Saifi Athoillah[1]

[1] *Diploma Program IV of Financial, Department of Accounting, State Polytechnic of Malang, Malang, Soekarno Hatta Street No.9 Jatimulyo Lowokwaru Malang City, Malang, 65141, INDONESIA*
[2] *Diploma Program III of Accounting, Department of Accounting, State Polytechnic of Malang, Malang, Soekarno Hatta Street No.9 Jatimulyo Lowokwaru Malang City, Malang, 65141, INDONESIA*

*Corresponding Author: saifiathoillah@polinema.ac.id
DOI: https://doi.org/10.30880/jbsnexus.2026.03.01.009

Article Info

Received: 20 March 2026
Accepted: 25 May 2026
Available online: 27 June 2026

Keywords

Beneish M-Score, fraud, financial statements

Abstract

Transparency in the construction sector which is vulnerable to manipulation due to performance pressure and large project risks as shown by PT Wijaya Karya (WIKA), highlighting the urgency to evaluate financial accountability in construction companies. This study aims to implement Beneish M-Score method to detect potential financial fraud in building construction sub-sector listed on Indonesia Stock Exchange during 2019-2024 and to identify the financial ratios that most influence the probability of fraud using binary logistic regression. This study used quantitative descriptive method with secondary data from the Indonesia Stock Exchange website. The population included all building construction sub-sectors listed on IDX during 2019-2024, with four samples; PT Wijaya Karya Tbk (WIKA), PT Waskita Karya Tbk (WSKT), PT Adhi Karya Tbk (ADHI) and PT PP Tbk (PTPP). The results of the study showed that manipulation indication of financial statement which was fluctuative when PT Wijaya Karya Tbk (WIKA) and and PT PP Tbk (PTPP) identified as manipulators several times, while PT Waskita Karya Tbk (WSKT) and PT Adhi Karya Tbk (ADHI) remained the most consistent non-manipulators. The Total Accruals to Total Assets (TATA) ratio proved significant in detecting fraud based on the binary logistic regression test. Manipulation might occur at any time depending on internal conditions and external pressures. Companies are needed to improve internal audits and implement strict reporting policies each period to prevent potential financial statement manipulation.

1. Background

Construction companies, particularly state-owned enterprises (SOEs) such as PT Wijaya Karya (Persero) Tbk, PT Waskita Karya (Persero) Tbk, PT Adhi Karya (Persero) Tbk, and PT Pembangunan Perumahan (Persero) Tbk, play a vital role in national infrastructure development through National Strategic Projects (PSN). Their involvement in major projects is expected to improve financial performance, but in reality, the increase in the number of

projects does not always translate directly to the growth in the company's net profit (Efendi et al., 2024). Several companies have experienced significant losses, debt defaults, and even credit rating downgrades. This phenomenon has raised concerns about the possibility of financial reporting manipulation to maintain the company's image in the eyes of the public and investors.

Financial reports are documents that show the current financial condition of a company or during a certain period (Kasmir, 2019). Financial reports are a means of accounting for company performance to stakeholders (Lestari et al., 2023). Accuracy and transparency in financial reporting are essential for objective decision-making. Inconsistent information in financial reports risks eroding investor confidence, damaging reputations, and worsening a company's financial condition, particularly in the high-risk construction sector.

Financial statement fraud is a serious threat because it can cause significant losses and damage a company's reputation. Pressure to demonstrate good performance often drives companies to manipulate financial data, known as financial statement fraud. Data from ACFE Global (2020) Reports indicate that financial statement fraud, despite its low frequency, results in the highest average losses compared to other types of fraud. Several cases of fraud, such as those at Enron, PT Garuda Indonesia, and alleged fraud by PT Wijaya Karya, confirm that financial statement fraud can occur both globally and nationally.

In mid-2023, news reports emerged of alleged financial report manipulation by state-owned companies PT Waskita Karya and Wijaya Karya. The Deputy Minister of State-Owned Enterprises (SOEs) revealed the alleged financial report manipulation by PT Wijaya Karya (Persero) Tbk (WIKA), raising questions about the company's integrity. While revenue in the first quarter of 2023 grew 37.34% to Rp 4.34 trillion, WIKA recorded a loss of Rp 521.25 billion, compared to a profit of Rp 1.32 billion in the same period the previous year (Binekasri, 2023).

Accurate detection methods based on historical data are needed to prevent or identify early indications of fraud. One known method for detecting potential financial reporting fraud is the Beneish M-Score. This method was developed by ProfessorBeneish (1999)with the aim of detecting financial report manipulation through analysis of financial indicators. Beneish M-Score uses eight financial ratios as its main components, namely: Days Sales in Receivables Index (DSRI), Gross Margin Index (GMI), Asset Quality Index (AQI), Sales Growth Index (SGI), Depreciation Index (DEPI), Selling, General, and Administrative Expenses Index (SGAI), Leverage Index (LVGI), Total Accruals to Total Assets (TATA).

Christiansen et al. (2024) shows that two state-owned construction companies, namely PT WSKT and PT WIKA, have Beneish M-Scores which indicate the potential for report manipulation. Adilla & Ferli (2021) found that of Beneish's eight ratios, only the Sales Growth Index (SGI) ratio had a significant effect on fraud in manufacturing companies in Indonesia. These mixed results suggest the need for further testing, particularly in the construction sector.

This study combines the Beneish M-Score method with SPSS for binary logistic regression testing. The Beneish M-Score financial indicators analysis tool uses eight financial ratios as the main components. Binary logistic regression is used in this study because the dependent variable in the form of an indication of financial statement fraud has only two possibilities. The Beneish M-Score financial indicators analysis tool uses eight financial ratios as the main components, namely; Days Sales in Receivables Index (DSRI), Gross Margin Index (GMI), Asset Quality Index (AQI), Sales Growth Index (SGI), Depreciation Index (DEPI), Selling, General, and Administrative Expenses Index (SGAI), Leverage Index (LVGI), Total Accruals to Total Assets (TATA). Binary logistic regression is used in this study because the dependent variable in the form of an indication of financial statement fraud has only two possibilities, namely being indicated to commit fraud or not. This method allows testing the relationship between the Beneish M-Score score as an independent variable with the probability of fraud. Based on the background information above, the researcher will conduct a study entitled "Analysis of the Beneish M-Score Method as a Detector of Financial Report Fraud in State-Owned Enterprises in the Building Construction Sub-Sector Listed on the Indonesia Stock Exchange (IDX) in 2019-2024".

2. Literature Review

2.1 Agency Theory

Agency Theory explains the relationship between principals (shareholders) and agents (management), in which principals delegate decision-making authority to agents to manage the company on their behalf. According to Jensen and Meckling (1976), the separation of ownership and control may create information asymmetry and conflicts of interest because managers often possess more information about the company than shareholders. Under certain circumstances, managers may act in their own interests rather than those of the owners, including manipulating financial information to achieve performance targets, maintain their reputation, or obtain personal benefits. Therefore, Agency Theory provides an important theoretical foundation for understanding the occurrence of financial reporting fraud and the relevance of fraud detection models such as the Beneish M-Score.

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

2.2 Financial Statements

According toKasmir (2019, p. 7)A financial statement is a document that shows a company's current financial condition or over a specific period. This document reflects the company's current condition, both on a specific date (for the balance sheet) and over a specific period (for the income statement). Financial statements are prepared periodically, such as quarterly or semiannually, for internal purposes.

Published financial reports play a crucial role in assessing a company's performance, as the information they provide can be analyzed to assess the company's viability for stakeholders. Every company positions the finance function as a key element in business direction planning, and its implementation must be optimized to ensure financial reports are accessible and utilized optimally by those who need them to support decision-making. Analyzing financial information requires a comprehensive review of every business activity, both by management and external parties with an interest in the company.

The Financial Statements subsection was added and expanded to explain the definition, purpose, and importance of financial statements as a source of information for stakeholders. The discussion highlights the role of financial statements in assessing corporate performance, supporting decision-making, and providing the basis for detecting potential financial reporting fraud. This addition strengthens the conceptual foundation of the study by linking financial reporting quality to fraud detection.

2.3 Financial Reporting Fraud

The Financial Reporting Fraud subsection was expanded by incorporating definitions and theoretical explanations from auditing and accounting literature. Fraud was defined as an intentional act involving deception to obtain an unfair advantage (IAPI, 2014), while financial statement fraud was explained as the deliberate manipulation of accounting information to misrepresent a company's actual financial condition (Kieso et al., 2018). This discussion provides a stronger theoretical foundation for understanding financial reporting fraud and supports the application of the Beneish M-Score model as a fraud detection mechanism.

2.4 Beneish M-Score

The Beneish M-Score is a model developed by Messod D. Beneish in 1999 to detect potential earnings manipulation in a company's financial statements. This model uses a number of financial ratios to evaluate whether there are indications of fraud or manipulation in the presentation of financial statements. The Beneish M-Score includes several variables related to aspects such as changes in receivables, profitability ratios, and company activities that can provide clues to attempts to manipulate financial statements. Through this score calculation, analysis can identify companies at high risk of engaging in earnings manipulation, making it useful for investors, auditors, and related parties in conducting further evaluations. The Beneish M-Score calculation formula is as follows:

$$M\text{-}Score = -4.48 + (0.920 \times DSRI) + (0.528 \times GMI) + (0.404 \times AQI) + (0.892 \times SGI) + (0.115 \times DEPI) - (0.172 \times SGAI) - (0.327 \times LVGI) + (4.697 \times TATA)$$

Source: Beneish (1999)

The M-Score interpretation categories are shown in Table 1.

Table 1 *Interpretation of M-Score Values*

M-Score Value	Information
M-Score value ≤ -2.22	The company shows no indication of fraud (non-manipulator)
M-Score value > -2.22	The company has the potential for fraud in financial reports (manipulator)

Source: Beneish (1999)

Table 1 was added showing M-Score value ≤ -2.22 = Non-Manipulator" and "M-Score value > -2.22 = Manipulator.

2.5 Beneish Ratio Index

*Beneish Ratio Index*is a series of financial ratios used to detect possible earnings manipulation in a company's financial statements. This model, known as the Beneish M-Score, combines various ratios to provide an indication of whether a company may be involved in financial statement manipulation. There are eight ratios used in the Beneish M-Score analysis model according to Beneish (1999):

1. *Days Sales in Receivable Index* (DSRI)
   This ratio is calculated using the formula:

$$DSRI = \frac{Receivables\ Account_t\ /\ Sales_t}{Receivables\ Account_{t-1}\ /\ Sales_{t-1}}$$

Source: Beneish (1999)

The DSRI value reflects the growth of a company's receivables from year to year. A high DSRI value indicates that accounts receivable are growing faster than sales, which could indicate that the company is increasing its fictitious receivables to boost revenue (Beneish, 1999).

2. *Gross Margin Index* (GMI)
   The GMI ratio measures a decline in gross margin. A decrease in gross profit margin from the previous year causes the GMI ratio to increase. An increase in the GMI reflects profitability pressures that can encourage management to manipulate performance.This ratio is calculated using the formula:

$$GMI = \frac{Gross\ Income_t/Sales_t}{Gross\ Income_{t-1}/Sales_{t-1}}$$

Source: Beneish (1999)

3. *Asset Quality Index* (AQI)
   The AQI ratio measures the proportion of non-productive assets to total assets. An increase in the AQI indicates an increase in non-current or non-productive assets, such as fixed assets, goodwill, or deferred charges. Management can utilize asset classification to cover losses or increase the value of total assets (Beneish, 1999). This ratio is calculated using the formula:

$$AQI = \frac{(1 - Current\ Assets + Fixed\ Assets)_t/Total\ Assets_t}{(1 - Current\ Assets + Fixed\ Assets)_{t-1}/Total\ Assets_{t-1}}$$

Source: Beneish (1999)

4. *Sales Growth Index* (SGI)
   The SGI ratio measures the difference between net sales for the current year and the previous year. Increasing company growth can be an indicator of earnings manipulation. The need for greater funding can encourage managers to manipulate revenue and sales to meet future targets and profits (Beneish, 1999). This ratio is calculated using the formula:

$$SGI = \frac{Sales_t}{Sales_{t-1}}$$

Source: Beneish (1999)

5. *Depreciation Index* (DEPI)
   The DEPI ratio reflects changes in the depreciation rate of fixed assets. A high DEPI value indicates a decreasing depreciation rate, which may indicate an attempt to increase profits by lowering depreciation expenses. This manipulation occurs through changes in the asset's economic life or depreciation method (Beneish, 1999). This ratio is calculated using the formula:

$$DEPI = \frac{Depretiation_{t-1}/(Depreciation_{t-1} + Fixed\ Assets_{t-1})}{Depretiation_t/(Depreciation_t + Fixed\ Assets_t)}$$

Source: Beneish (1999)

6. *Sales, General, and Administrative Expenses Index* (SGAI)
   The SGAI ratio reflects changes in the proportion of operating expenses to sales. An increase in this ratio indicates inefficiency or profitability pressures, which can lead to management manipulating earnings to conceal rising costs (Beneish, 1999). This ratio is calculated using the formula:

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

$$SGAI = \frac{(SGA\ Expense_t / Sales\ _t)}{(SGA\ Expense_{t-1} / Sales_{t-1})}$$

Source: Beneish (1999)

7. *Leverage Index* (LVGI)
   The LVGI ratio measures changes in the structure of debt to total assets. Increasing leverage indicates a higher debt burden. High leverage puts a company at risk of default, and managers may be motivated to manipulate financial statements to maintain the appearance of debt repayment capacity or maintain financial ratios (Beneish, 1999). This ratio is calculated using the formula:

$$LVGI = \frac{(Total\ Liabilities_t / Total\ Aset_t)}{(Total\ Liabilities_{t-1} / Total\ Aset_{t-1})}$$

Source: Beneish (1999)

8. *Total Accruals to Total Assets* (TATA)
   The TATA ratio reflects the proportion of accruals to total assets. High accruals indicate a high likelihood of accounting-based earnings manipulation. Management can inflate earnings by recording unrealized revenue or delaying the recognition of expenses (Beneish, 1999). This ratio is calculated using the formula:

$$TATA\ = \frac{(Earning\ After\ Tax_t - Cash\ Flows\ from\ Operating_t)}{Total\ Assets_t}$$

Source: Beneish (1999)

2.6 Hypotheses

Based on Agency Theory, the Beneish M-Score framework, and previous empirical studies, this research examines whether the eight Beneish ratio indicators significantly influence the probability of financial reporting fraud in state-owned building construction companies listed on the Indonesia Stock Exchange (IDX). Therefore, the following hypotheses are proposed:

1. **HA1:** Days Sales in Receivables Index (DSRI) has a significant effect on the probability of financial reporting fraud.
   H01: Days Sales in Receivables Index (DSRI) does not have a significant effect on the probability of financial reporting fraud.

2. **HA2:** Gross Margin Index (GMI) has a significant effect on the probability of financial reporting fraud.
   H02: Gross Margin Index (GMI) does not have a significant effect on the probability of financial reporting fraud.

3. **HA3:** Asset Quality Index (AQI) has a significant effect on the probability of financial reporting fraud.
   H03: Asset Quality Index (AQI) does not have a significant effect on the probability of financial reporting fraud.

4. **HA4:** Sales Growth Index (SGI) has a significant effect on the probability of financial reporting fraud.
   H04: Sales Growth Index (SGI) does not have a significant effect on the probability of financial reporting fraud.

5. **HA5:** Depreciation Index (DEPI) has a significant effect on the probability of financial reporting fraud.
   H05: Depreciation Index (DEPI) does not have a significant effect on the probability of financial reporting fraud.

6. **HA6:** Sales, General, and Administrative Expenses Index (SGAI) has a significant effect on the probability of financial reporting fraud.
   H06: Sales, General, and Administrative Expenses Index (SGAI) does not have a significant effect on the probability of financial reporting fraud.

7. **HA7:** Leverage Index (LVGI) has a significant effect on the probability of financial reporting fraud.
   H07: Leverage Index (LVGI) does not have a significant effect on the probability of financial reporting fraud.

8. **HA8:** Total Accruals to Total Assets (TATA) has a significant effect on the probability of financial reporting fraud.
   H08: Total Accruals to Total Assets (TATA) does not have a significant effect on the probability of financial reporting fraud.

9. **HA9:** DSRI, GMI, AQI, SGI, DEPI, SGAI, LVGI, and TATA simultaneously have a significant effect on the probability of financial reporting fraud.
   H09: DSRI, GMI, AQI, SGI, DEPI, SGAI, LVGI, and TATA simultaneously do not have a significant effect on the probability of financial reporting fraud.

2.7 Framework

Framework is a section that describes the logical flow or systematic relationship between the concepts, theories, and variables used in the research. The research framework is shown in Figure 1.

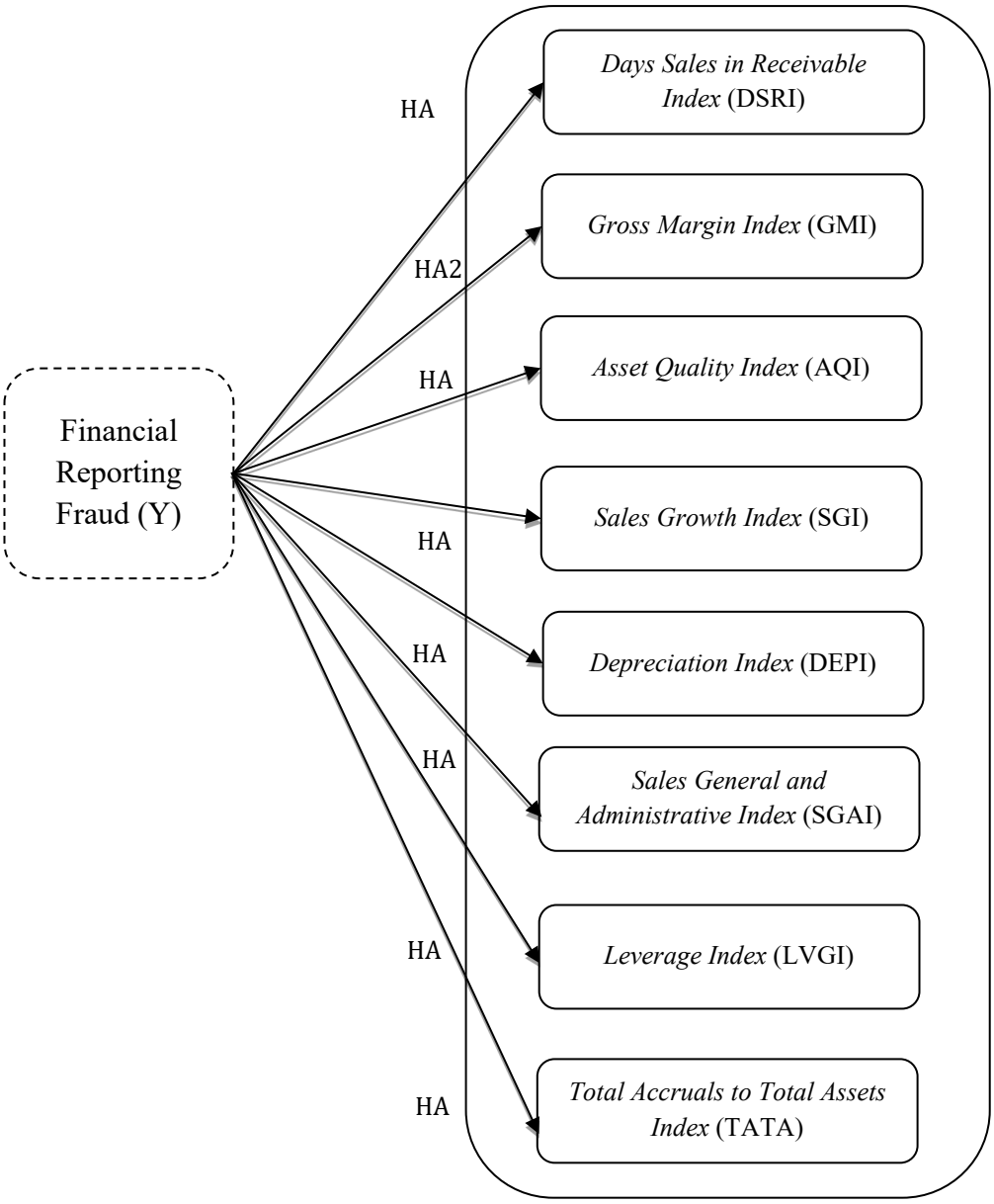

Fig. 1 *Framework of thought*

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

Figure 1 presents the conceptual framework of this study. Financial Reporting Fraud (Y) is defined as the dependent variable, while the eight Beneish ratio indicators—Days Sales in Receivables Index (DSRI), Gross Margin Index (GMI), Asset Quality Index (AQI), Sales Growth Index (SGI), Depreciation Index (DEPI), Sales, General and Administrative Expenses Index (SGAI), Leverage Index (LVGI), and Total Accruals to Total Assets (TATA)—serve as the independent variables. Based on Agency Theory and the Beneish M-Score framework (Beneish, 1999; Jensen & Meckling, 1976), each ratio is expected to influence the probability of financial reporting fraud. Accordingly, the proposed relationships are formulated into hypotheses (HA1–HA8) and empirically tested using binary logistic regression analysis.

3. Research Methods

The object of this research is the detection of financial statement fraud identified through the implementation of the Beneish M-Score method. This method is used to detect potential financial statement manipulation. The subjects of this research are state-owned companies in the building construction sub-sector listed on the Indonesia Stock Exchange (IDX) during the 2019-2024 period. This research uses quantitative research. The analysis used is binary logistic regression, and all data processing and analysis processes were conducted using IBM SPSS Statistics version 27. Logistic regression is used to test the effect of eight ratios financial statements that form the Beneish M-Score (DSRI, GMI, AQI, SGI, DEPI, SGAI, LVGI, and TATA) on the potential manipulation of financial statements of state-owned companies in the building construction sub-sector listed on the Indonesia Stock Exchange (IDX) for the 2019-2024 period. The data used are secondary data obtained from the annual financial statements of state-owned companies in the building construction sub-sector listed on the Indonesia Stock Exchange (IDX) for the 2019-2024 period. These financial statement data were downloaded from the official website of the Indonesia Stock Exchange (IDX). https://www.idx.co.id).

The population of this study consists of all building construction sub-sector companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2024 period, totaling 22 companies. Since not all companies met the requirements of this study, a purposive sampling technique was employed to select the most relevant observations. The sample selection was based on the following criteria: (1) companies classified as State-Owned Enterprises (SOEs) that have been transformed into publicly listed companies (Tbk); and (2) companies that consistently published complete and audited annual financial statements during the 2019–2024 period and made them publicly available through the official IDX website. These criteria were established to ensure data consistency, reliability, and comparability throughout the observation period. Based on the purposive sampling process, four companies satisfied all selection criteria and were included in the final sample, namely PT Wijaya Karya (Persero) Tbk (WIKA), PT PP (Persero) Tbk (PTPP), PT Adhi Karya (Persero) Tbk (ADHI), and PT Waskita Karya (Persero) Tbk (WSKT). Observations were conducted over six years (2019–2024), resulting in a total of 24 firm-year observations used in the analysis.

4. Results and Discussion

4.1 Beneish M-Score Calculation Analysis

The calculation results of each indicator, as well as the final M-Score value for each company will be presented in Appendix 1. Based on the calculation results of the Beneish M-Score for four state-owned companies in the building construction sub-sector listed on the Indonesia Stock Exchange (IDX), it was found that WIKA, WSKT, and ADHI were classified as companies that were consistently in the non-manipulator category during the 2019-2024 period. The Beneish M-Score value for the three companies was recorded at <-2.22. This situation indicates that the financial statements presented by the three companies were not indicated to contain systematic manipulation based on the M-Score method. PT PP (Persero) Tbk (PTPP) was the company most frequently categorized as a manipulator compared to other state-owned construction companies in this study. PTPP's Beneish M-Score was recorded at >-2.22 four times during the six-year study period: in 2019, 2020, 2021, and 2024.

4.1.1 Descriptive Statistical Test

The manuscript was revised by adding a Descriptive Statistical Analysis subsection that summarizes the characteristics of all research variables using minimum, maximum, mean, and standard deviation values. This addition helps explain the distribution, central tendency, and variability of the data prior to hypothesis testing and logistic regression analysis. This is shown in Table 2.

Table 2 *Descriptive statistical test results*

Beneish M-Score	N	*Minimum*	*Maximum*	*Mean*	*Standard Deviation*
	24	0	1	0.5	0.51075
DSRI	24	0.51	2.41	1,0618	0.40538
GMI	24	-1.27	1.7	0.8173	0.58796
AQI	24	0.13	1.59	0.937	0.47846
SGI	24	0.52	1.48	0.9352	0.23872
DEPI	24	0.49	1.18	0.9493	0.15873
SGAI	24	0.77	2.43	1,1806	0.37001
LVGI	24	0.83	1.12	1,0004	0.06818
TATA	24	-0.09	0.06	-0.0175	0.03929
Valid N (listwise)	24				

Source: Processed by Researchers (2025)

Based on the results of descriptive statistical analysis in Table 2 of 24 samples, the dependent variable Beneish M-Score (Y) shows a minimum value of 0 and a maximum of 1 with an average of 0.5000. This value indicates that as many as 50% of the sample companies are indicated to have committed financial statement fraud, while the rest are not indicated to have committed fraud based on the Beneish M-Score classification, namely a value > -2.22 indicates a manipulating company. The standard deviation of 0.51075 reflects a fairly moderate spread of data and indicates variations in the level of manipulation between companies.

The Gross Margin Index (GMI) variable shows an average value of 0.8173. A mean value of less than 1 indicates a general increase in gross margins among the sample companies, which contrasts with the characteristics of companies that manipulate financial statements. The standard deviation of 0.58796 indicates a relatively wide range of standard deviations, indicating differences in margin performance between companies.

The Asset Quality Index (AQI) variable has an average value of 0.8173 and a standard deviation of 0.47846. An average value close to 1 reflects the absence of a significant shift from current to non-current assets, although AQI values above 1 in some companies may indicate potential asset manipulation.

The Sales Growth Index (SGI) variable recorded an average of 0.9352 and a standard deviation of 0.23872. This value indicates that sales growth across companies is relatively stable, with low levels of variation, so the pressure on management to maintain sales growth is not considered too high.

The Depreciation Index (DEPI) variable has an average value of 0.9493 with a standard deviation of 0.15873. A mean value <1 indicates a tendency for increasing depreciation expense, reflecting conservative accounting practices. The low standard deviation indicates that depreciation policies across companies in the sample are relatively uniform and do not indicate a significant slowdown in depreciation.

The Sales, General and Administrative Expenses Index (SGAI) variable has a mean of 1.1806 and a standard deviation of 0.37001. The mean > standard deviation indicates considerable variation in the data. A mean value exceeding 1 indicates an increase in operating costs that is disproportionate to sales growth, which could be an early sign of profitability pressures and potential financial statement manipulation.

The Leverage Index (LVGI) variable shows an average of 1.0004 and a standard deviation of 0.06818. This value indicates no significant change in the debt-to-asset structure among companies in the sample and indicates a low level of variation in financing policies.

The Total Accruals to Total Assets (TATA) variable has an average value of -0.0175 with a standard deviation of 0.03929. The mean value is -0.0175. The standard deviation value is 0.03929, meaning the standard deviation is greater than the mean, so the data variation in this ratio is small.

4.1.2 Multicollinearity Test

A Multicollinearity Test subsection was added to evaluate the correlation among the independent variables. This analysis was conducted to ensure that the Beneish ratio indicators do not exhibit high intercorrelations that could bias the logistic regression estimates and affect the reliability of the model. This is shown in Table 3.

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

Table 3 *Multicollinearity test results*

Variables	*Tolerance*	VIF
DSRI	0.559	1,788
GMI	0.403	2,479
AQI	0.817	1,225
SGI	0.393	2,547
DEPI	0.491	2,038
SGAI	0.270	3,701
LVGI	0.631	1,584
TATA	0.685	1,460

Source: Processed by Researchers (2025)

Based on Table 3, the results of the multicollinearity test conducted on eight independent variables (X1-X8), it can be concluded that there are no symptoms of multicollinearity in the model. All variables show a VIF value < 10 or Tolerance > 0.10, which is in accordance with the safe limit according to the guidelines explained byGhozali (2021, p. 157). Each independent variable does not have a strong linear relationship with each other and is suitable for inclusion in a binary logistic regression model. This result ensures that the regression parameter estimates are stable and that the influence of each variable can be interpreted validly.

4.1.3 Binary Logistic Regression Test

Test Binary logistic regression is used to predict the probability of an event occurring with a categorical (nominal) dependent variable. Binary logistic regression is used when the dependent variable consists of two categories, namely 0 and 1.

Hosmer and Lemeshow's Goodness of Fit Test

A Hosmer–Lemeshow Goodness-of-Fit Test was added to evaluate the suitability of the logistic regression model and to ensure that the model adequately fits the observed data before interpreting the regression results.

Table 4 *Results of Hosmer and Lemeshow's Goodness of Fit Test*

Step	*Chi-square*	df	Sig.
1	13,812	8	0.087
2	5,171	8	0.739
3	7,212	8	0.514
4	0	6	1

Source: Processed by Researchers (2025)

Based on the results obtained in Table 4, the significance value (Sig.) at each step is 0.087 at Step 1, 0.739 at Step 2, 0.514 at Step 3, and 1.000 at Step 4. All significance values are > 0.05. According toGhozali (2021), if the significance value > 0.05, then the logistic regression model is considered to fit or match the data, because there is no significant difference between the values predicted by the model and the actual values in the data.

4.1.4 Fit Model

An Overall Model Fit subsection was added to evaluate the goodness of fit of the logistic regression model by comparing the initial and final -2 Log Likelihood values. This analysis was included to determine whether the addition of the independent variables improved the model's ability to explain the probability of financial reporting fraud. The testing process is carried out by comparing the initial value of -2 Log Likelihood with its final value. The hypothetical model is considered to fit the statistical data if the initial value of -2 Log Likelihood is higher than the final value, indicating a decrease in the value as an indication of improved model fit (Ghozali, 2021, p. 357).

Table 5 *Overall Model Fit Results*

Iteration	-2 Log Likelihood
-2 Initial Likelihood Logs (Block 0)	33,104
-2 Final Likelihood Logs (Block 1)	0,000

Source: Processed by Researchers (2025)

Based on the SPSS output in Table 5, it provides two -2 Log Likelihood (-2LL) values: one for the initial model (Block 0) that only includes constants, and another for the model after the addition of independent variables (Block 1). The -2 Log Likelihood (-2LL) value in the model decreased from 33.104 in Step 1 to 0.000 in Step 5. This decrease in the -2LL value indicates that the addition of independent variables to the model can improve the model's fit to the data. The smaller the -2LL value, the better the model is at predicting the dependent variable.

4.1.5 Nagelkerke R Square (R^2)

A Nagelkerke R Square analysis in Table 6 was added to evaluate the explanatory power of the logistic regression model. This analysis measures the proportion of variation in the dependent variable that can be explained by the independent variables and provides an indication of the model's predictive strength (Ghozali, 2021, p. 357).

Table 6 *Nagelkerke Results R Square (R^2)*

Step	-2 Log likelihood	Cox & Snell R Square	Negelkerke R Square
1	24,426	0.308	0.411
2	19,328	0.441	0.588
3	10,881	0.607	0.809
4	0,000	0.750	1,000

Source: Processed by Researchers (2025)

A Nagelkerke R Square value of 1 indicates that the logistic regression model is very powerful and perfect in explaining data variation, but in the context of a small sample (N = 24). Based on the increase in the Nagelkerke R Square value from 0.411 to 1, it can be concluded that each additional independent variable in the model makes a significant contribution in explaining the dependent variable, and the final model has very high explanatory power.

4.1.6 Classification Table

A Classification Table (Table 7) was added to evaluate the predictive accuracy of the binary logistic regression model. The analysis reports the model's ability to correctly classify firms into manipulator and non-manipulator categories and provides evidence of the model's classification performance.

Table 7 *Classification Table Results*

Observed			Beneish M-Score		Percentage Correct
			Non-Manipulator	Manipulator	
Step 1	Beneish M-Score	Non-Manipulator	9	3	75
		Manipulator	2	10	83.3
	Overall Percentage				79.2
Step 2	Beneish M-Score	Non-Manipulator	9	3	75
		Manipulator	1	11	91.7
	Overall Percentage				83.3
Step 3	Beneish M-Score	Non-Manipulator	11	1	91.7
		Manipulator	1	11	91.7
	Overall Percentage				91.7
Step 4	Beneish M-Score	Non-Manipulator	12	0	100
		Manipulator	0	12	100
	Overall Percentage				100

Source: Processed by Researchers (2025)

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

Based on the output shown in Table 7, the Step 1 model successfully predicted 11 of the 13 Non-Manipulator (NM) cases with a correct percentage of 75.0% for the Non-Manipulator (NM) category and 83.3% for the Manipulator (M) category, with an overall accuracy of 79.2%. The overall accuracy rate reached 79.2%, indicating that the initial model was quite effective in distinguishing between companies indicated and not indicated to have manipulated financial statements.

In Step 2, the classification accuracy for the Manipulator (M) category increased to 91.7% (11 of 12 companies correctly classified), while the Non-Manipulator (NM) category remained at 75.0% (9 of 12 companies). The overall accuracy increased to 83.3%, indicating that the model has become more robust in classifying companies suspected of manipulation.

In Step 3, the number of companies correctly classified in both categories increased to 11 from 12 (91.7%) for both Manipulators (M) and Non-Manipulators (NM). Overall accuracy also increased to 91.7%, indicating that the model not only became more accurate but also showed indications of balanced classification ability between the two categories.

In Step 4, the model successfully classified all 12 samples, both Manipulator (M) and Non-Manipulator, with a total accuracy of 100%. This indicates that the model has perfect classification capabilities at this stage.

4.1.7 Significance of Logistic Regression Coefficients

The significance of the logistic regression coefficient indicates the extent to which the independent variable statistically influences the probability of occurrence of the dependent variable.

Table 8 *Selection method results table (Stepwise)*

Indicators		Binary	Wald	Sig.	Exp(B)
Step 1	TATA	40,890	5,414	0.020	5.734E+17
	Constant	0.662	1,418	0.234	1,939
Step 2	DSRI	-5,154	3,374	0.066	0.006
	TATA	41,973	4,616	0.032	1.69268E+18
	Constant	6,512	4,056	0.044	673,356
Step 3	DSRI	13,515	2,631	0.105	740542,785
	DEPI	-15,826	2,429	0.119	0
	TATA	116,943	3,356	0.067	6.13E+50
	Constant	6,599	1,090	0.296	734,236
Step 4	DSRI	734,542	0	0.984	.
	GMI	248,913	0	0.982	1.26E+108
	SGAI	-579,360	0	0.985	0
	TATA	7156,166	0	0.983	.
	Constant	-137.41	0	0.987	0

Source: Processed by Researchers (2025)

A Logistic Regression Coefficients Table (Table 8) was added to present the estimated regression coefficients, significance levels, Wald statistics, and odds ratios [Exp(B)] for each Beneish ratio indicator. This addition enables a more comprehensive evaluation of the direction, magnitude, and statistical significance of the relationships between the independent variables and financial reporting fraud.

Based on Table 8, the binary logistic regression equation is obtained based on the regression output in Step 4 (because it includes all variables entered in the model):

$$Ln\frac{p}{1-p} = -137{,}41 + 734{,}542\ (DSRI) + 248{,}913\ (GMI) - 579{,}360\ (SGAI) + 7{,}156{,}166\ (TATA)$$

Source: Processed by Researchers (2025)

Based on the results of the stepwise selection method shown in Table 8, in Step 1 the variable entered is Total Accruals to Total Assets (TATA). The regression coefficient (B) value for TATA is 40.890 with a significance value (Sig.) of 0.020 ($p < 0.05$) which indicates that TATA has a significant effect on the possibility of financial statement fraud. The Wald value of 5.414 strengthens the statistical evidence of TATA's contribution in the initial model. The greater the TATA value, the greater the chance of financial statement fraud. The significance value of the constant is The significance value of the constant in Step 1 is 0.234 ($p > 0.05$) indicating that the constant is not significant in the initial model.

The Sales, General and Administrative Expenses Index (SGAI) variable was added to the model in Step 2. The SGAI significance value was 0.066 ($p > 0.05$), indicating that SGAI did not significantly influence financial

statement fraud. TATA remained a significant variable with a coefficient value increasing to 41.973 and a significance value of 0.032 ($p < 0.05$). The constant value of 6.512 with a significance value of 0.044 ($p < 0.05$) indicated that the constant began to have a significant influence in the model at this stage.

The Days Sales in Receivables Index (DSRI) variable was entered in Step 3. The DEPI coefficient value was 30.125 with a significance value of 0.095 ($p > 0.05$), indicating that the variable was not significant in predicting financial statement fraud. DSRI had a coefficient of 13.910 with a significance value of 0.107 ($p > 0.05$), still insignificant. TATA still maintained its moderate significance with a p-value of 0.086, although its contribution began to weaken compared to the previous step. The constant value at this stage had a significance of 0.084, which was still above the 0.05 threshold and meant it was insignificant.

The Gross Margin Index (GMI) variable is entered into Step 4. The analysis results show that none of the variables in the model have a significance <0.05. The p-value for DSRI is 0.984, GMI is 0.982, SGAI is 0.985, and TATA is 0.983, all >0.05, indicating that all variables in Step 4 do not have a significant effect on financial statement fraud. The constant value of -137.410 with a significance of 0.987 also indicates that the constant is not significant. Based on Table 8 according to the results of binary logistic regression testing using the stepwise method, it can be concluded that:

1) The effect of the DSRI ratio on the probability of financial statement fraud

Based on the results of the binary logistic regression test conducted in this study, the DSRI variable has a positive but insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value of 734.542 with a significance level of 0.984 indicates that changes in accounts receivable relative to sales are not sufficient to explain the tendency for profit manipulation.

The results of this study are in line with the findings expressed by Husein et al. (2023) stated that DSRI does not significantly influence the probability of financial reporting fraud in state-owned companies listed on the capital market. This finding indicates that increasing receivables is not always related to manipulation, but rather This could be a logical consequence of the credit sales system or the construction sector's business cycle. The DSRI ratio may be less sensitive in detecting the likelihood of financial reporting fraud in sectors with long-term projects and installment payments.

The results of this study are not in line with the findings put forward by Annisa & Ghozali (2020) which states that DSRI has a significant relationship and influences the probability of financial reporting fraud, a high DSRI ratio can be an early indicator of the unfairness of recording income in financial reports.

Based on the test results, it was found that the DSRI ratio was not significant to the probability of financial statement fraud. The DSRI variable has no significant effect on financial reporting fraud because the significance value is greater than 0.05. This finding is consistent with Husein et al. (2023), who also found that DSRI was not a significant predictor of financial statement fraud in Indonesian listed companies. The alternative hypothesis (HA1) stating that DSRI influences the probability of financial statement fraud was rejected. The null hypothesis (H01) stating that DSRI does not influence the probability of financial statement fraud was accepted.

2) The effect of the GMI ratio on the probability of financial reporting fraud

Based on the results of the binary logistic regression test conducted in this study, the GMI ratio has a positive but insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value is +248.913 with a significance level of 0.982 or 98.2%, far exceeding the 5% significance limit. This insignificant relationship reflects that the condition of declining profit margins in the building construction sub-sector is not necessarily caused by fraud, but can be influenced by operational factors such as rising material prices, project delays, or changes in payment schedules. Business patterns that rely on large-scale projects with long durations and installment payment systems also make margin fluctuations normal.

The results of this study are in line with the findings expressed bySuheni & Arif (2020)stated that GMI has no effect on the probability of financial reporting fraud. When a company experiences a decline in profits or profitability, its ability to conceal or manipulate financial data is limited, as the difference in profit decline from the previous year is immediately apparent and easily detected by those auditing the financial statements.

The results of this study are not in line with the findings put forward by Annisa & Ghozali (2020)which states that GMI has a positive and statistically significant effect on the probability of fraudulent reporting. Financial performance. A decrease in gross profit from sales compared to the previous year indicates that the company may be engaging in earnings management. These results indicate the potential for earnings management practices by the company.

Based on the test results, it was found that the GMI ratio was not significant on the probability of financial statement fraud. The alternative hypothesis (HA2) stating that GMI influences the probability of

financial statement fraud was rejected. The null hypothesis (H02) stating that GMI does not influence the probability of financial statement fraud was accepted.

3) The effect of the AQI ratio on the probability of financial reporting fraud

Based on the results of the binary logistic regression test conducted in this study, the AQI ratio has a negative and insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value of -9.121 with a significance level (Sig.) of 1.000 indicates that the AQI does not significantly influence the dependent variable. A significance value that far exceeds the threshold of 0.05 indicates the absence of a statistically significant relationship in this research model. An increase in the AQI does not always reflect an indication of manipulation, especially in companies in the building construction sub-sector. This ratio can increase due to the accumulation of long-term fixed assets such as heavy equipment, projects in progress, or prepayments, which are common characteristics of the construction industry. The addition of these assets is more reflective of operational needs than an indication of manipulative intent. Agency theory explains that management has the flexibility to prepare financial statements based on legitimate accounting policies to adjust to long-term project dynamics. An increase in the AQI in this context is more reflective of a project reporting strategy or business cycle, rather than an attempt at manipulation.

The results of this study are in line with the findings expressed by Husein et al. (2023) stated that AQI has no significant effect on the probability of financial reporting fraud. This insignificant AQI ratio is in line with the results of research conducted by Husein et al. (2023), the significance value of the AQI variable is 0.12 (> 0.05). This result indicates that AQI has no influence on the practice of financial statement manipulation. Managers tend not to target AQI manipulation because it is considered to be within reasonable limits. Asset accounts are material and easily detected if manipulated, so the possibility of manipulation of these items is small. A high AQI value reflects good asset quality, while a low AQI value indicates high credit risk or a decline in asset quality.

The results of this study are not in line with the findings put forward by Annisa & Ghozali (2020) which states that AQI has a significant effect on the probability of financial statement fraud. An increase in the percentage of intangible assets to total assets in a certain period (t) compared to the previous period (t-1) indicates the possibility of the company's involvement in earnings management.

Based on the test results, it was found that the AQI ratio was not significant on the probability of financial statement fraud. The alternative hypothesis (HA3) stating that AQI influences the probability of financial statement fraud was rejected. The null hypothesis (H03) stating that AQI does not influence the probability of financial statement fraud was accepted.

4) The effect of the SGI ratio on the probability of financial statement fraud

Based on the results of the binary logistic regression test conducted in this study, the SGI ratio has a positive but insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value of 161.474 with a significance level (Sig.) of 0.997 indicates that SGI does not significantly influence the dependent variable.

The results of this study are in line with the findings expressed by Suheni & Arif (2020)stated that SGI does not significantly influence the probability of financial statement fraud because, regardless of whether or not management feels pressure to grow sales, managers will certainly strive to provide the best for the company. High sales growth does not necessarily reflect managerial pressure to manipulate reports, especially when the increase stems from healthy operational performance and supportive market conditions. Companies with stable or even slowing growth still have the potential to manipulate, depending on profit pressures, internal target achievement, or certain managerial incentives. SGI cannot be used as a consistently strong or significant indicator in detecting financial statement manipulation. The influence of this variable is strongly influenced by differences in industry characteristics, implemented business strategies, and varying management motivations.

The results of this study are not in line with the findings put forward byAdilla & Ferli (2021)which states that SGI has a significant relationship and influence on the probability of financial reporting fraud. A company's desire to demonstrate increased revenue can drive changes in revenue figures in reports.

Based on the test results, it was found that the SGI ratio was not significant on the probability of financial statement fraud. This finding differs from Adilla and Ferli (2021), who reported that SGI significantly influenced the likelihood of fraud in manufacturing companies. The difference may be attributed to variations in industry characteristics and observation periods. The alternative hypothesis (HA4) stating that SGI influences the probability of financial statement fraud was rejected. The null hypothesis (H04) stating that SGI does not influence the probability of financial statement fraud was accepted.

5) The effect of the DEPI ratio on the probability of financial reporting fraud

Based on the results of the binary logistic regression test conducted in this study, the DEPI ratio has a negative and insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value of -35.750 with a significance level (Sig.) of 0.999 indicates that DEPI has no significant effect on the dependent variable.

The results of this study are in line with the findings expressed bySuheni & Arif (2020)which states that DEPI does not have a significant effect on the probability of financial statement fraud, this is because depreciation is generally calculated using procedures or policies that are clearly defined, standard, and not easily changed flexibly by management. and documented, such as straight-line or declining balance, and related to strict accounting standards (PSAK in Indonesia or IFRS).

Different from the research results Annisa & Ghozali (2020) states that DEPI has a positive and significant effect on the probability of financial statement fraud, indicating that a higher level of sales during a particular year compared to the previous year is a signal that the company may be involved in earnings management. Based on the test results, it was found that the DEPI ratio was not significant on the probability of financial statement fraud. The alternative hypothesis (HA5) stating that DEPI influences the probability of financial statement fraud was rejected. The null hypothesis (H05) stating that DEPI does not influence the probability of financial statement fraud was accepted.

6) The effect of the SGAI ratio on the probability of financial statement fraud

Based on the results of the binary logistic regression test conducted in this study, the SGAI ratio has a negative and insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value of -579.360 with a significance level (Sig.) of 0.985 indicates that SGAI does not significantly influence the dependent variable.

The results of this study are in line with the findings expressed byAdilla & Ferli (2021)states that SGAI shows insignificant results on the probability of financial report fraud, because when a company can maintain its sales activities, the company cannot commit fraud by utilizing company assets to generate income. Based on the test results, it was found that the SGAI ratio was not significant on the probability of financial statement fraud. The alternative hypothesis (HA6) stating that SGAI influences the probability of financial statement fraud was rejected. The null hypothesis (H06) stating that SGAI does not influence the probability of financial statement fraud was accepted.

7) The effect of the LVGI ratio on the probability of financial reporting fraud

Based on the results of the binary logistic regression test conducted in this study, the LVGI variable has a negative and insignificant effect on the probability of financial statement fraud through the Beneish M-Score. The regression coefficient value of -28.349 with a significance level (Sig.) of 1.000 indicates that LVGI does not significantly influence the dependent variable.

The results of this study are in line with the findings expressed byAdilla & Ferli (2021)which states that LVGI does not significantly influence the probability of financial statement fraud. High leverage creates conditions in which creditors impose stricter credit requirements, including incentives to improve company performance. This situation encourages management to comply with various provisions to avoid violating agreed agreements. Failure to meet external demands can create pressure that could potentially push a company to commit fraud to maintain its performance image.

Different from the research results Annisa & Ghozali (2020) states that LVGI has a negative and significant effect on the probability of financial statement fraud. Based on the test results, it was found that the LVGI ratio is not significant on the probability of financial statement fraud. The alternative hypothesis (HA7) which states that LVGI influences the probability of financial statement fraud is rejected. The null hypothesis (H07) which states that LVGI does not influence the probability of financial statement fraud is accepted.

8) The effect of the TATA ratio on the probability of financial reporting fraud

Based on the results of the binary logistic regression test conducted in this study, the LVGI variable has a positive and significant influence on the probability of financial reporting fraud through*Beneish M-Score***.**The significance value is 0.019 and the regression coefficient is positive at +40.890. This variable is the only ratio that has a statistically significant contribution to the model.

These findings are in line with the results of previous research conducted by Annisa & Ghsozali (2020), showing that TATA has a positive and significant effect on the probability of financial reporting fraud through *Beneish M-Score* which is reflected in the regression results which produce a coefficient of +4.819 with a significance level of 0.000 at a significance level of 5%.

The findings in this study support and strengthen the concept of the TATA theory put forward by Beneish (1999), that increasing accruals is a tool frequently used by management in earnings

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

manipulation attempts. The TATA value reflects the extent to which reported earnings are matched by actual cash flows. The greater the proportion of accruals to total assets, the higher the risk of financial statement manipulation.

Different from the research results Adilla & Ferli (2021) stated that TATA was insignificant in influencing the probability of financial statement fraud. Management's desire to increase accrued income motivated management to commit financial statement fraud, thus increasing fraud. This result supports the findings of Annisa and Ghozali (2020) and Suheni and Arif (2020), who found that accrual-based measures are strong indicators of earnings manipulation and financial reporting fraud.

Based on the test results, it was found that the TATA ratio was significant on the probability of financial statement fraud. The alternative hypothesis (HA8) stating that LVGI influences the probability of financial statement fraud was accepted. The null hypothesis (H08) stating that LVGI does not influence the probability of financial statement fraud was rejected.

4.2 Managerial Aspects (Decision Making)

The managerial aspect reflects management's ability to make strategic decisions based on data and risk analysis to efficiently achieve company goals. The implications of the managerial aspect are practical recommendations derived from the research findings that can be used as a basis for decision-making by relevant parties, particularly company management and investors. The managerial implications of this research are as follows:

1) The managerial implications of this study indicate that companies, particularly in the construction sub-sector, need to strengthen their internal control systems as a primary step in minimizing the potential for financial reporting fraud, including through clear separation of functions and optimization of the role of internal audit as an early detection mechanism;
2) The application of the Beneish M-Score method can be used as a routine monitoring tool within the risk management framework to identify indications of manipulation earlier;
3) Management needs to pay special attention to the management of accrual ratios, especially Total Accruals to Total Assets (TATA), by ensuring that accounting policies are carried out transparently and are not used for excessive earnings management practices;
4) Increasing transparency and accountability is important, considering that internal and external pressures can encourage manipulation, so companies must present honest and relevant financial information;
5) Strengthening corporate governance through the active role of the audit committee, board of commissioners, and the independence of external auditors is key to maintaining the integrity of financial reports;
6) Management is required to be able to manage financial pressure wisely by developing realistic and sustainable strategies so as not to be pushed to manipulate in order to meet performance targets;
7) Companies can benchmark against entities that are consistently not indicated to be manipulating as a form of implementing best practices in the industry, as well as;
8) Management must be aware that the quality and integrity of financial reports greatly influence investor and stakeholder trust, so that a commitment to honesty and transparency is a crucial factor in maintaining the company's reputation in the market.

4.3 Conclusion

Based on the results of the research that has been carried out, it can be concluded that:

1) The results of the Beneish M-Score calculation for four state-owned companies in the building construction sub-sector listed on the Indonesia Stock Exchange (WIKA, WSKT, ADHI, and PTPP) during the 2019-2024 period, show that there are variations in the status of indications of financial report manipulation from year to year.
2) The results of the binary logistic regression analysis show that of the eight Beneish M-Score ratios, only the Total Accruals to Total Assets (TATA) ratio has a significant influence on the probability of financial statement fraud. Other ratios, such as DSRI, GMI, AQI, SGI, DEPI, SGAI, and LVGI, do not show a statistically significant influence.
3) The significance value of each is > 0.05, which indicates that statistically there is not enough evidence to state that these ratios contribute to predicting the occurrence of financial reporting fraud.

4.4 Suggestion

Based on the conclusions above, here are some suggestions that can be taken into consideration, including:

1) Management of state-owned construction companies is advised to increase oversight of accrual-based accounts. Excessive use of accruals has the potential to be exploited as a tool to manipulate financial statements. Controls over accounts receivable, accrued expenses, and revenue estimates need to be tightened through risk-based internal audit procedures.
2) Future researchers are advised to consider expanding the variables or using more adaptive analytical approaches, such as decision trees or machine learning. These approaches have the potential to produce financial statement fraud risk maps that are more responsive to complex and changing manipulation patterns.
3) The use of binary logistic regression depends on data adequacy and certain statistical assumptions. Limited sample size, imbalances between firms suspected of manipulation and those not, and inter-firm variability can affect the significance of the results. Some ratios may be theoretically relevant but statistically undetectable due to limitations in the amount and distribution of data.
4) Future studies are recommended to use larger sample sizes, extend the observation period, incorporate additional explanatory variables, apply machine learning techniques, and employ alternative fraud detection models to improve the accuracy and generalizability of financial reporting fraud detection.

Acknowledgements

The authors would like to thank all participants and individuals who contributed to this study and supported the completion of this research.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Author Contributions

The authors confirm contribution to the paper as follows: ***study conception and design****: Selvia Erninda Rosalia, Yohan Bakhtiar, and Ahmad Saifi Athoillah;* ***data collection****: Selvia Erninda Rosalia and Yohan Bakhtiar;* ***analysis and interpretation of results****: Selvia Erninda Rosalia and Ahmad Saifi Athoillah;* ***draft manuscript preparation****: Selvia Erninda Rosalia and Ahmad Saifi Athoillah. All authors reviewed the results and approved the final version of the manuscript.*

Appendix A: Beneish M-Score Calculation Results

Table A1 presents the Beneish M-Score calculation results and the corresponding classification of firms based on their likelihood of earnings manipulation.

Appendix 1

Table A1 *Beneish M-Score calculation results*

N	ISSUER CODE	Y	*BENEISH M-SCORE RATIO*								*M-Score*	Note
			DSR	GMI	AQ	SGI	DEP	SGA	LVG	TATA		
1	WIKA	2	0.96	1.11	1.5	0.8	0.99	1.36	0.97	0.03	**-1.90**	**M**
		2	0.80	0.72	0.9	0.6	1.00	1.59	1.09	0.00	**-2.95**	**N**
		2	0.97	1.03	1.5	1.0	1.15	0.82	0.99	0.06	**-1.54**	**M**
		2	1.03	1.08	1.0	1.2	0.93	0.77	1.02	0.04	**-1.63**	**M**

Johor Business School (JBS) Nexus Vol. 3 No. 1 (2026) p. 91-109

N	ISSUER CODE	Y	*BENEISH M-SCORE RATIO*							*M-Score*	Note
			DSR	GMI	AQ	SGI	DEP	SGA	LVG	TATA		
		2	1.12	0.81	1.1	1.0	1.10	1.29	1.12	-0.08	**-2.45**	**N**
		2	0.82	0.96	0.9	0.8	1.09	1.47	0.95	-0.04	**-2.65**	**N**
2	**WSKT**	2	1.47	0.98	1.3	0.6	0.71	1.27	0.99	-0.07	**-2.28**	**N**
		2	2.41	-0.65	1.1	0.5	0.49	2.43	1.11	-0.09	**-2.83**	**N**
		2	0.87	-1.27	0.8	0.7	0.83	1.63	1.01	-0.02	**-3.94**	**N**
		2	0.51	0.61	1.1	1.2	0.65	0.95	1.01	-0.02	**-2.61**	**N**
		2	1.24	0.82	1.5	0.7	0.75	1.00	1.03	-0.07	**-2.36**	**N**
		2	1.13	1.70	0.7	0.9	1.18	0.89	1.00	-0.08	**-2.11**	**M**
3	**ADHI**	2	1.19	0.95	0.1	0.9	0.99	1.31	1.03	0.03	**-2.29**	**N**
		2	1.08	1.05	0.1	0.7	0.99	1.17	1.05	-0.04	**-2.83**	**N**
		2	0.86	0.95	0.1	1.0	1.00	0.83	1.01	-0.04	**-2.70**	**N**
		2	0.93	0.87	0.2	1.1	1.01	0.97	0.91	-0.03	**-2.50**	**N**
		2	1.54	0.87	0.2	1.4	1.00	0.82	0.99	0.01	**-1.50**	**M**
		2	0.54	1.05	0.3	0.6	1.00	1.58	0.94	-0.03	**-3.33**	**N**
4	**PTPP**	2	0.51	1.02	1.4	0.9	0.99	1.04	0.83	0.01	**-2.33**	**N**

N	ISSUER CODE	Y	*BENEISH M-SCORE RATIO*								*M-Score*	Note
			DSR	GMI	AQ	SGI	DEP	SGA	LVG	TATA		
		2	1.58	1.01	1.3	0.6	1.00	1.06	1.09	0.01	**-1.72**	**M**
		2	0.98	0.92	0.9	1.0	0.95	1.01	0.92	0.00	**-2.15**	**M**
		2	0.95	1.09	1.2	1.1	1.06	0.99	0.93	0.00	**-1.88**	**M**
		2	1.20	0.91	1.0	0.9	0.98	1.09	1.05	-0.01	**-2.03**	**M**
		2	0.80	1.03	1.1	1.0	0.94	1.04	0.97	0.00	**-2.18**	**M**
	Information:											
	M: Manipulator											
	N: Non-Manipulator											

References

ACFE Global. (2020). Report to the Nations on Occupational Fraud and Abuse: 2020 Global Fraud Study. In Association of Certified Fraud Examiners, Inc. https://acfepublic.s3-us-west-2.amazonaws.com/2020-Report-to-the-Nations.pdf

Adilla, R., & Ferli, O. (2021). How Effective is the Beneish M-Score Model in Detecting Financial Statement Fraud in Manufacturing Companies on the Indonesia Stock Exchange? Journal of Applied Business Administration, 7(2), 200–209. https://jurnal.polibatam.ac.id

Annisa, RA, & Ghozali, I. (2020). Detecting Financial Statement Fraud Using Beneish M-Score Analysis in Non-Financial Companies Listed on the Indonesia Stock Exchange in 2017-2018. Diponegoro Journal of Accounting, 9(3), 1–12. http://ejournal-s1.undip.ac.id/index.php/accounting

Beneish, M.D. (1999). The Detection of Earnings Manipulation. Financial Analysts Journal, 55(5), 24–36. https://doi.org/10.2469/faj.v55.n5.2296

Binekasri, R. (2023). Deputy Minister of State-Owned Enterprises Says WIKA Polished Its Financial Reports, Is That True? CNBC Indonesia. https://www.cnbcindonesia.com/market/20230606120354-17-443345/wamen-bumn-sebut-wika-poles-laporan-keuangan-benarkah

Christiansen, N., Hanida, I., Irawan, JG, & Ginting, R. (2024). Beneish Ratio Index Analysis: Does It Play a Role in Detecting Fraud in Financial Reporting? (Case Study of Construction Companies Listed on the IDX for the 2018-2022 Period). JUSAPAK: Journal of Financial Tax Accounting Studies, 2(1), 43–50.

Efendi, I., Dewi, DN, Rini, L., Wijaya, P., Lampung, PN, & Lampung, B. (2024). Financial Health Analysis of State-Owned Enterprises in the Construction Sector Listed on the Indonesia Stock Exchange. Management Balance Sheet, Economics, 10(1). https://doi.org/10.8734

Ghozali, I. (2021). Multivariate Analysis Application with IBM SPSS 26 Program IBM" SPSS" Statistics » (10th Edition). Diponegoro University Publishing Agency.

Herianti, E., Suryani, A., & Marundha, A. (2023). Financial Statement Fraud Audit (D. Winarni (ed.)). CV. Eureka Media Aksara.

Husein, H., Saleh, P.A., Kriaswantini, D., & Bonara, R.S. (2023). Detecting Financial Statement Manipulation Using the Beneish M-Score Model in State-Owned Enterprises Listed on the Capital Market. Journal of Accounting, 18(1), 1–10. https://doi.org/10.37058/jak.v18i1.5609

ACFE Global. (2020). Report to the Nations on Occupational Fraud and Abuse: 2020 Global Fraud Study. In Association of Certified Fraud Examiners, Inc. https://acfepublic.s3-us-west-2.amazonaws.com/2020-Report-to-the-Nations.pdf

Adilla, R., & Ferli, O. (2021). How Effective is the Beneish M-Score Model in Detecting Financial Statement Fraud in Manufacturing Companies on the Indonesia Stock Exchange? Journal of Applied Business Administration, 7(2), 200–209. https://jurnal.polibatam.ac.id

Annisa, RA, & Ghozali, I. (2020). Detecting Financial Statement Fraud Using Beneish M-Score Analysis in Non-Financial Companies Listed on the Indonesia Stock Exchange in 2017-2018. Diponegoro Journal of Accounting, 9(3), 1–12. http://ejournal-s1.undip.ac.id/index.php/accounting

Beneish, M.D. (1999). The Detection of Earnings Manipulation. Financial Analysts Journal, 55(5), 24–36. https://doi.org/10.2469/faj.v55.n5.2296

Binekasri, R. (2023). Deputy Minister of State-Owned Enterprises Says WIKA Polished Its Financial Reports, Is That True? CNBC Indonesia. https://www.cnbcindonesia.com/market/20230606120354-17-443345/wamen-bumn-sebut-wika-poles-laporan-keuangan-benarkah

Christiansen, N., Hanida, I., Irawan, JG, & Ginting, R. (2024). Beneish Ratio Index Analysis: Does It Play a Role in Detecting Fraud in Financial Reporting? (Case Study of Construction Companies Listed on the IDX for the 2018-2022 Period). JUSAPAK: Journal of Financial Tax Accounting Studies, 2(1), 43–50.

Efendi, I., Dewi, DN, Rini, L., Wijaya, P., Lampung, PN, & Lampung, B. (2024). Financial Health Analysis of State-Owned Enterprises in the Construction Sector Listed on the Indonesia Stock Exchange. Management Balance Sheet, Economics, 10(1). https://doi.org/10.8734

Ghozali, I. (2021). Multivariate Analysis Application with IBM SPSS 26 Program IBM" SPSS" Statistics » (10th Edition). Diponegoro University Publishing Agency.

Herianti, E., Suryani, A., & Marundha, A. (2023). Financial Statement Fraud Audit (D. Winarni (ed.)). CV. Eureka Media Aksara.

Husein, H., Saleh, P.A., Kriaswantini, D., & Bonara, R.S. (2023). Detecting Financial Statement Manipulation Using the Beneish M-Score Model in State-Owned Enterprises Listed on the Capital Market. Journal of Accounting, 18(1), 1–10. https://doi.org/10.37058/jak.v18i1.5609

IAPI. (2014). SA 240.pdf. http://spap.iapi.or.id/1/files/SA 200/SA 240.pdf

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. Journal of Financial Economics, 3, 305–360.

Kasmir. (2019). Financial Statement Analysis (Revision). Rajawali Pers.

Kieso, DE (2018). Introduction to IFRS-Based Accounting 1 (2nd Edition). Salemba Empat.

Lestari, W., Alvina, Y., Fatika, CS, & Riza, A. (2023). Analysis of Accounting Information Systems in the Preparation of PT WYCA Financial Reports Using the PIECES Method. Indonesian Journal of Accounting, 12(2), 153. https://doi.org/10.30659/jai.12.2.153-164

Suheni, V., & Arif, M. Faisal. (2020). Detecting Financial Statement Fraud Using the Beneish M-score Model (Study of Manufacturing Sector Companies Listed on the Indonesia Stock Exchange). Proceedings of SNAM PNJ, 5(2), 92–99.