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Which is better at detecting financial statement fraud: Beneish M-Score or OMI model

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Abstract

According to the Association of Certified Fraud Examiners (ACFE), financial statement fraud has the most significant impact in Indonesia. Therefore, the need for the best model in detecting financial statement fraud is crucial. This research examines the influence of the fraud hexagon on the Beneish M-Score model and the Overall Manipulation Indexs (OMI) model in detecting financial statement fraud, as well as comparing which model is the most effective in detecting financial statement fraud. The analytical technique employed in this study involves panel data regression using the Fixed Effect Model and Common Effect Model approaches, utilizing STATA17 software. The population under investigation comprises state-owned enterprises for the period 2017-2021. Sample selection was carried out using the purposive sampling method, resulting in a sample size of 24 companies. The findings indicate that the Beneish M-Score model does not exhibit an influence on the fraud hexagon in detecting financial statement fraud. Conversely, the testing conducted using the OMI method, focusing on elements within the fraud hexagon such as capability, stimulus, and rationalization, shows an influence on financial statement fraud. As a result, the model that holds the most impact in detecting financial statement fraud is the OMI model, due to its greater influence compared to the Beneish M-Score model.

Keywords: Beneish M-Score, OMI, Fraud Hexagon

INTRODUCTION

According to the Association of Certified Fraud Examiners (ACFE), fraud remains a persistent issue, and no company is entirely immune to the possibility of fraud (ACFE, 2019). A survey conducted by ACFE in 2022 explains that the most damaging type of fraud to the country is asset misappropriation, accounting for 86% of cases, followed by corruption at 50%, and financial statement fraud at 9% (ACFE, 2022). Although financial statement fraud has the fewest number of cases, it has the most significant impact in terms of losses, with losses reaching $593,000.

There are three categories of fraud, namely corruption, asset misappropriation, and financial statement fraud. From 2014 to 2022, fraud in financial statements resulted in the largest losses compared to corruption and asset misappropriation. The losses due to financial statement fraud in 2014 amounted to $1,000,000, in 2016 it was $975,000, in 2018 it was $800,000, in 2020 it was $954,000, and in 2022 it was $593,000. This indicates that research related to financial statement fraud is important because it has a high impact on losses.

In Indonesia, the sector most affected by fraud is State-Owned Enterprises (BUMN), ranking second at 31.8%, followed by private companies at 15.1%, and non-profit organizations at 2.9%. One of the instances of fraud occurred in a State-Owned Enterprise, PT Garuda Indonesia (Persero). The Financial Services Authority (OJK) issued a written order to rectify and restate the annual financial statements of PT Garuda Indonesia (Persero) due to errors in recording net profit, supported by a collaboration between PT Garuda Indonesia (Persero) and PT Mahata Aeko Teknologi amounting to Rp 3.48 trillion. This amount was still considered receivables but was erroneously booked as revenue in the first year.

The increasing cases of financial statement fraud have prompted researchers to develop fraud detection theories, as seen in previous studies such as the one conducted (Nindito, 2018). Nindito utilized

the fraud pentagon to detect financial statement fraud. The results indicated that pressure, opportunity, rationalization, and capability have a negative influence on financial statement fraud.

Further research Alfian & Triani (2019) tested the Beneish M-Score model in detecting financial statement fraud. The results show that there are three variables in the Beneish M-Score model that are often manipulated by manipulative and non-manipulative companies, namely Sales and General and Administration Expenses Index (SGAI), Depreciation Index (DEPI), and Asset Quality Index (AQI). Eight variables in the Beneish M-Score model do not affect the detection of financial statement fraud.

The research conducted Santyo Nugroho & Diyanty (2022), serving as a primary contributor to this study, compares the Beneish M-Score model with OMI. The findings indicate slight differences when measuring financial statement fraud using the Beneish M-Score model and OMI. Rationalization has been proven to influence the occurrence of financial statement fraud, as measured by both the Beneish M-Score model and OMI. The research highlights that DEPI (Days' Sales in Ending Inventory) is the most frequently used variable in committing financial statement fraud. The sector most frequently implicated in financial statement fraud is consumer cyclicals.

The study conducted Tarjo et al. (2021) examined the influence of the fraud hexagon on financial statement fraud using the Beneish M-Score model. The results indicated that financial stability, financial targets, external pressure, industry nature, and the duality of the Chief Executive Officer (CEO) have an impact on financial statement fraud. Meanwhile, personal financial needs, ineffective monitoring, external auditor quality, auditor turnover, director turnover, and marginal costs do not affect the occurrence of financial statement fraud.

A study Sukmadilaga et al. (2022) detected financial statement fraud using the fraud hexagon. The results show that opportunity, arrogance, and collusion significantly influence financial statement fraud. Meanwhile, pressure, rationalization, and capability do not affect financial statement fraud.

A study Sihombing & Panggulu (2022) detected financial statement fraud using the fraud hexagon. The results show that financial targets have a positive impact on financial statement fraud. External pressure, rationalization, and collusion have a negative impact on financial statement fraud. Meanwhile, director turnover, CEO education, ineffective supervision, whistleblowing systems, and arrogance do not affect financial statement fraud.

Based on the description above, the author intends to propose a research title regarding the comparison of the Beneish M-Score and OMI models in detecting financial statement fraud within the context of the fraud hexagon. The fraud hexagon comprises capability, stimulus, ego, rationalization, opportunity, and collusion. The use of the Fraud Hexagon is considered beneficial as it incorporates collusion as a significant factor Vousinas (2019) and provides an opportunity to demonstrate the alignment of the model with actual fraudulent practices. Capability is measured by director turnover, stimulus is measured by financial targets, specifically free cash flow, ego is measured by director remuneration, rationalization is measured by auditor turnover, opportunity is measured by the accounts receivable to sales ratio, and collusion is measured by market performance.

This research further investigates the use of the Beneish M-Score, both without the OMI model and with the OMI model, which is considered to better differentiate manipulative companies. There are two contributions in this study. First, it examines the influence of the fraud hexagon on financial statement fraud using the Beneish M-Score and OMI models, a study already conducted (Nugroho & Diyanty, 2022). In their research, collusion did not affect financial statement fraud, with collusion being calculated by comparing the total receivables from related parties to the total receivables of the company. In this study, collusion is measured by market performance, aligning with the findings of (Miftahul Jannah & Rasuli, 2021), which concluded that collusion affects financial statement fraud. A market with high concentration levels and high profit margins indicates collusive behavior (market power theory) (Miftahul Jannah & Rasuli, 2021).

The second contribution involves differences in the research results regarding stimulus compared to previous studies. When measured by the Beneish M-Score model, stimulus influences financial statement fraud, but with OMI, it does not. This implies that not all companies indicated for fraud engage in manipulative transactions involving free cash flow. Sometimes, companies only manipulate specific parts of financial statements without using free cash flow as a stimulus for financial statement fraud. This study

measures stimulus by the company's financial condition, specifically revenue divided by total assets, aligning with the research of Tarmizi Achmad et al. (2022), which found that stimulus affects financial statement fraud.

LITERATURE REVIEW

Agency theory is a framework that elucidates the relationship between a principal and an agent. In this theory, the agency relationship emerges when one or more individuals employ others to provide a service and subsequently delegate decision-making authority to the agent. Therefore, the agent is obligated to provide information about the company's condition to the principal. One form of information provided is the disclosure of accounting information, such as financial statements.

In this study, shareholders act as principals, while management serves as agents within a relationship known as the nexus of contract. Shareholders (principals) of a company have the desire to achieve a high level of profit or return on investment by delegating authority to the management (agents) to fulfill these interests. However, management also has its own interests in obtaining higher compensation, such as bonuses, salary increases, or promotions based on their excellent performance, ultimately enhancing their well-being. The management's desire for such compensation leads them to employ various means, including actions like financial statement fraud, to obtain these rewards.

Financial statement fraud is the presentation of financial statements that contain material misstatements that are detrimental to the users of the financial statements (Ghozali, 2019).

The Hexagon Theory, developed Vousinas (2019), explains the factors that contribute to fraud in the Fraud Hexagon Theory, also known as "The SECCOR Fraud Model." The components of this model are stimulus, ego, capability, collusion, rationalization, and opportunity.

Capability, or competence, refers to an individual's ability or trait to engage in fraudulent activities. In the context of financial statement fraud, capability is associated with a person's capacity to commit fraudulent acts within the corporate environment. One example of this is evident when there is a change in the board of directors, which can be considered a form of conflict of interest. Dummy variable coded as 1 if there is a change in the board of directors. Dummy variable coded as 0 if there is no change in the board of directors. Financial stability is approximated by the Sales to Total Asset Ratio (SALTA) and measured using a ratio scale. To calculate the Sales to Total Asset Ratio. Ego can be measured by the total director remuneration each year. Opportunity is the chance an individual gains from their position in the company to engage in fraud. Opportunities arise due to weaknesses in internal controls, poor managerial oversight, or the abuse of power. Opportunity can be measured by receivables divided by sales. Rationalization is measured by a dummy variable with a code of 1 if there is a change in auditors, and a dummy variable with a code of 0 if there is no change in auditors. A market with high concentration levels and high profit margins can indicate either collusive behavior (market power theory) or simply that companies in the market are highly efficient (efficiency hypothesis), enabling them to set prices well above marginal costs. Therefore, in this study Collusion is measured by Price to Book Value (PBV).

The replacement of directors can bring about shifts in corporate governance and policies, potentially influencing the likelihood of fraudulent activities. This change may create an environment where individuals with the capability to commit fraud could exploit the altered dynamics. Therefore, capability, as demonstrated through actions such as director turnover, plays a role in shaping the conditions that may lead to financial statement fraud. If you have further questions or if there's anything else you'd like to discuss, feel free to let me know.

Model Beneish M-Score was developed by Professor Messod (Beneish, 1999), utilizing a forensic accounting approach. The Beneish M-Score model is a probabilistic model, and one of its limitations is that its ability to detect fraud is not 100% accurate (Tarjo & Herawati, 2015).

OMI (Overall Manipulation Index) is an indicator used to measure the level of manipulation in a study. Here is the calculation formula for OMI as follows.

$OMI=\sum ((Oi))/n$

Explanation:

Oi: the number of M-Score elements exceeding the benchmark.

N: the total number of available elements (8 Beneish M-Score variables)

The threshold values, as established (Hasan et al., 2017) for OMI, are as follows: DSRI: 1.031

GMI: 1.014, AQI: 1.039, SGI: 1.134, DEPI: 1.001, SGAI: 1.054, TATA: 0.018, LVGI: 1.037 For each value in each component that exceeds the specified threshold, a value of 1 is assigned, indicating the presence of financial statement fraud.

The impact of the Beneish M-Score model on the fraud hexagon in detecting financial statement fraud

The Beneish M-Score model is a quantitative approach to investigative auditing and forensic accounting that can detect the likelihood of companies engaging in financial reporting fraud and classify companies as fraudulent or non-fraudulent. This model gained particular attention from the public following the Enron accounting scandal, and the Beneish M-Score was able to detect fraudulent companies with an accuracy of 76% (Beneish, 1999). This aligns with research conducted Yadiati et al. (2023), Tarmizi Achmad et al. (2022), and Agusputri & Putri (2019), which indicates that the fraud hexagon influences financial statement fraud using the Beneish M-Score model. Therefore, the hypothesis in this study is.
H1: The influence of the Beneish M-Score model on the fraud hexagon in detecting financial statement fraud.

The influence of the OMI model on the fraud hexagon in detecting financial statement fraud
OMI can better distinguish manipulative companies, and it is used to reinforce findings obtained from measuring the Beneish M-Score. Consistent with the research conducted Tarjo et al. (2021), and Nugroho & Diyanty (2022), which indicates the influence of the OMI model on the fraud hexagon in detecting financial statement fraud, the hypothesis in this study is.

H2: The influence of the OMI model on the fraud hexagon in detecting financial statement fraud

Which model is the best in detecting financial statement fraud against the fraud hexagon?

After obtaining the results of the Beneish M-Score and OMI models, the next step involves comparing which model is the most influential. Therefore, the hypotheses for this research are as follows:

H3: The Beneish M-Score model is the most influential in detecting financial statement fraud against the fraud hexagon.

H4: The OMI model is the most influential in detecting financial statement fraud against the fraud hexagon.

RESEARCH METHODS

Based on the type of data used, this study falls under quantitative research as it involves numerical data. Regarding the timing of data collection, this research is classified as panel data, which is a collection of data at a single point in time (cross-section) observed simultaneously over time (time series) (Sriyana, 2014). Using the purposive sampling technique, a total of 24 state-owned enterprises (BUMN) listed on the Indonesia Stock Exchange were selected for the period from 2017 to 2021.

Table 1. Sample Criteria

No	Criteria	Amount
1	State-owned companies registered on the IDX in 2017-2021	27
2	State-owned companies that do not provide remuneration information in their 2017 - 2021 financial reports	-3
Number of companies willing to be sampled		24

Source: Processed data

The data collection method used in this study is documentation. The documentation method is carried out by copying and archiving data from available sources, namely secondary data that can be obtained from the Indonesia Stock Exchange (www.idx.co.id) website and other supporting websites. The

secondary data in this research consist of the annual financial reports of state-owned enterprises that have been published.

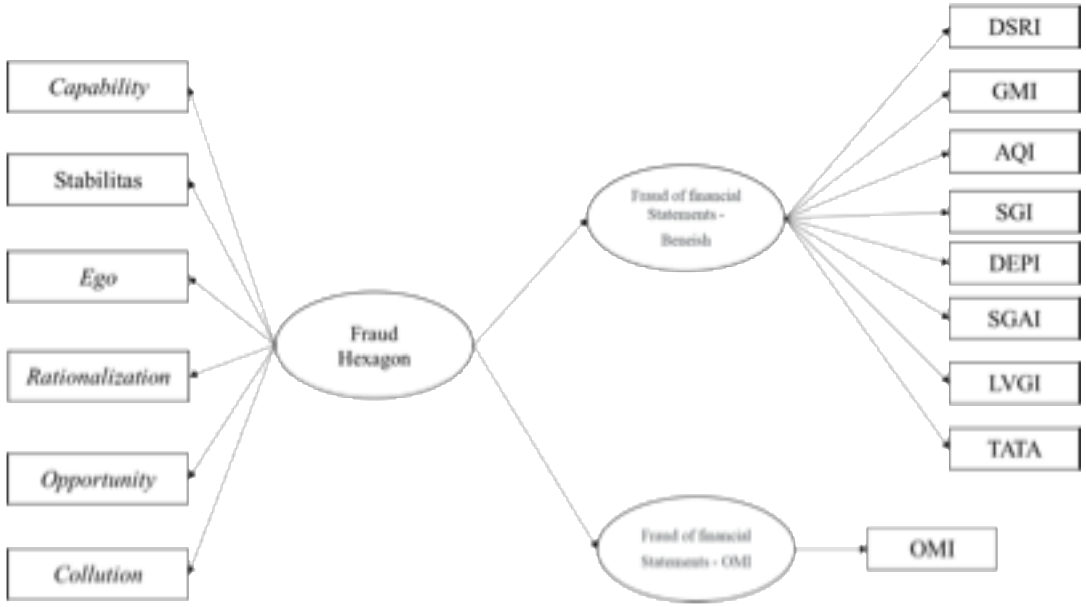

Figure 1. Research Path Models and Diagrams
Source: The authors

The regression equation for this research is:

Model 1 is as follows:
FFS=a+β1STI+β2KAP+β3PEL+β4RAS+β5ARO+β6KOL+β7CONTROL+e

Model 2 is as follows:
OMI= a+β1STI+β2KAP+β3PEL+β4RAS+β5ARO+β6KOL+β7CONTROL+e

FFC : Fraudulent Financial Statement (Model Beneish M-Score)
OMI : Overall Manipulation Index
α : Constanta
β : Coefficient regression
STI : stimulus
KAP : capability
PEL : opportunity
RAS : rationalization
ARO : arrogance/ego
KOL : collusion
e : error

RESULTS AND DISCUSSION

The object of this study is state-owned enterprises (BUMN) listed on the Indonesia Stock Exchange (BEI) from 2017 to 2021, which meet the criteria determined by purposive sampling technique. Data were obtained from the BEI website (www.idx.co.id) and other supporting websites.

The population of this study consists of 27 state-owned enterprises. Meanwhile, the number of state-owned enterprises used as research samples is 24 companies. The total companies used in this study amount to 120 observations covering the period from 2017 to 2021 over a 5-year observation period.

The independent variables in this study are the Fraud Hexagon, consisting of capability, stability, Ego, Rationalization, Opportunity, and Collusion. The dependent variables are the OMI Model and Beneish M-Score Model, consisting of DSRI, GMI, AQI, SGI, DEPI, SGAI, LVGI, and TATA.

The Beneish M-Score model test

Conducting tests for the Common Effect Model, Fixed Effect Model, and Random Effect Model. The best model is the Fixed Effect Model.

The Fixed Effect Model takes into account the possibility of omitted variables, where omitted variables may bring changes to the time series or cross-sectional intercept. Dummy variables function to reveal differences in intercepts between individuals and over time. The command used in testing the Fixed Effect Model is xtreg Y1_ModelBeneish X1_Cability X2_Stimulus X3_Ego X4_Opportunity X5_Rationalization X6_Collution, fee.

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Fixed-effects (within) regression               Number of obs      =       120
Group variable: ID                              Number of groups   =        24

R-squared:                                      Obs per group:
     Within  = 0.0952                                         min =         5
     Between = 0.0635                                         avg =       5.0
     Overall = 0.0793                                         max =         5

                                                F(6,90)            =      1.58
corr(u_i, Xb) = -0.1414                         Prob > F           =    0.1627
```

Y1_ModelBeneish	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
X1_Cbility	-.1758555	.1223422	-1.44	0.154	-.4189097	.0671986
X2_Stimulus	.4157992	.2941978	1.41	0.161	-.1686761	1.000274
X3_Ego	2.02e-13	8.70e-13	0.23	0.817	-1.53e-12	1.93e-12
X4_Opportunity	.0850623	.0112368	0.45	0.653	-.0172617	.0273862
X5_Rationalization	.1523139	.1111447	1.37	0.174	-.0684944	.3731222
X6_Collution	.0005921	.0006608	0.90	0.373	-.0007206	.0019049
X6_Collution	0	(omitted)				
_cons	.2230114	.2174355	1.03	0.308	-.2089622	.654985
sigma_u	.25947522					
sigma_e	.43009764					
rho	.26684248	(fraction of variance due to u_i)				

F test that all u_i=0: F(23, 90) = 1.62 Prob > F = 0.0573

Figure 2. The Beneish M-Score Model Test
Source: Data Processed STATA 17

The OMI model test

Conducting tests for the Common Effect Model, Fixed Effect Model, and Random Effect Model. The best model is Common Effect Model.

The command used for the Common Effect Model testing is reg Y1_ModelOMI X1_Cability X2_Stimulus X3_Ego X4_Opportunity X5_Rationalization X6_Collution

Source	SS	df	MS		
Model	.50021855	6	.083369758	Prob > F	0.0002
Residual	1.93728145	113	.017144084	R-squared	0.2052
Total	2.4375	119	.020483193	Adj R-squared	0.1630
				Root MSE	.13094

Y1_OMI	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
X1_Cbility	-.0700823	.0337072	-2.08	0.040	-.1368622	-.0033023
X2_Stimulus	.1303145	.0423355	3.08	0.003	.0464401	.2141888
X3_Ego	-7.56e-14	4.26e-14	-1.77	0.079	-1.60e-13	8.79e-15
X4_Opportunity	.0009216	.0011088	0.83	0.408	-.001275	.0031183
X5_Rationalization	.0856475	.0281082	3.05	0.003	.0299601	.141335
X6_Collution	-.0001703	.0001432	-1.19	0.237	-.0004541	.0001134
_cons	.2454803	.0381268	6.44	0.000	.1699443	.3210164

Figure 3. The OMI Model Test
Source: Data Processed STATA 17

In the testing of the Common Effect Model (OMI model), the prob > f value is 0.0002, which means that simultaneously, the relationship between the fraud hexagon affects financial statement fraud using the OMI model. Partially, capability, stimulus, and rationalization have an impact on financial statement fraud using the OMI model.

The Beneish M-Score model influences the fraud hexagon in detecting financial statement fraud.

Simultaneously, considering the prob > f value of 0.1627 > 0.05, it indicates that the Beneish M-Score model does not have a simultaneous effect on the fraud hexagon in detecting financial statement fraud. Partially, all values of fraud hexagon > 0.05, indicating no relationship between the Beneish M-Score model and the fraud hexagon in detecting financial statement fraud. For example, capability yields a result of 0.154, stimulus 0.165, ego 0.817, opportunity 0.653, rationalization 0.174, collusion 0.373. This is not in line with the study conducted by Tarjo et al. (2021) that the Beneish M-Score model has the ability to detect financial statement fraud.

The OMI model influences the fraud hexagon in detecting financial statement fraud.

According to the Common Effect Model test, the prob > f value is 0.0002, where 0.0002 < 0.05, indicating an influence of the OMI model on the fraud hexagon in detecting financial statement fraud simultaneously. Partially, the values of capability, stimulus, and rationalization affect financial statement fraud using the OMI model. Meanwhile, ego, opportunity, and collusion do not affect financial statement fraud using OMI. This is consistent with the study by Nugroho & Diyanty (2022) that the OMI model can better distinguish manipulating companies and can strengthen the results of the Beneish M-Score.

CONCLUSION

1. Capability, stimulus, ego, rationalization, opportunity, and collusion, elements of the fraud hexagon, do not influence the Beneish M-Score model in detecting financial statement fraud."
2. Capability, stimulus, and rationalization influence financial statement fraud using the OMI model. Meanwhile, ego, opportunity, and collusion do not affect financial statement fraud using the OMI model. It can be concluded that the fraud hexagon influences financial statement fraud using the OMI model."
3. Based on the test results and analysis in points 1 and 2, the most influential model in detecting financial statement fraud is the OMI model.

In this study, there are several limitations that warrant further research:

1. The observation period is only 5 years, and the sample size is limited to 120.
2. The sample is limited to state-owned enterprises (BUMN), so generalization to other countries may not be applicable.
3. The identification of companies is based on the Beneish M-Score, which is inherently probabilistic and may not accurately reflect the actual conditions.
4. The study does not demonstrate the impact of the collusion variable on financial statement fraud, whether using the Beneish M-Score or OMI models.

Suggestions:

1. Since the study did not demonstrate the influence of collusion on financial statement fraud, future research could develop a theoretical framework related to the collusion variable in detecting financial statement fraud.
2. Testing the fraud hexagon model using different measurements than those used in this study.
3. Subsequent research is expected to use a longer time period to produce more accurate data."

Research implications

The theoretical implications of this study indicate that the concept of the fraud hexagon can be a valuable theoretical framework in understanding the phenomenon of financial statement fraud in the environment

of state-owned enterprises (BUMN) in Indonesia. The findings that elements within the fraud hexagon, such as capability, stimulus, and rationalization, influence financial statement fraud through testing using the OMI model, support the importance of considering psychological and situational factors in fraud detection analysis. Furthermore, the lack of influence of the Beneish M-Score model on the fraud hexagon suggests the need for a more holistic and integrated analytical approach in identifying potential fraud, going beyond aspects solely based on financial variables. Thus, the results of this study contribute to the understanding of factors influencing financial statement fraud and prompt further studies in integrating psychological and situational aspects into a more comprehensive theoretical framework for fraud detection.

The practical implications of this research suggest that the use of the OMI model as a tool for detecting financial statement fraud can help state-owned enterprises (BUMN) in Indonesia more effectively identify potential fraud and take more precise preventive measures. By considering elements within the fraud hexagon such as capability, stimulus, and rationalization, companies can develop more precise strategies in addressing the risk of fraud. Additionally, awareness of the importance of psychological and situational factors in understanding and preventing fraud may prompt companies to provide more holistic training and development for employees, as well as enhance transparency and internal supervision in financial management. The results of this research also offer valuable guidance for regulators and supervisory institutions in designing more effective guidelines to prevent and address financial statement fraud in the state-owned enterprises sector.

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