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Analysis of pentagon fraud elements in detecting financial reporting fraud in healthcare companies

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ABSTRACT

The objective of this research was to analyse the influence of the fraud pentagon elements on the detection of financial reporting fraud in healthcare companies listed on the Indonesia Stock Exchange between 2021 and 2023. The elements examined included pressure (financial targets), opportunity (ineffective monitoring), rationalisation (change in auditor), competence (change in director) and arrogance (frequent number of CEO's pictures). The study population includes 35 healthcare companies listed on the Indonesia Stock Exchange. Using purposive sampling and a time series method, resulting in 33 sample data. The study was conducted from April to June 2025 and analyzed using multiple linear regression. The results showed that financial targets and ineffective monitoring significantly influenced financial statement fraud, while change in auditor, change in director, and frequent number of CEO's pictures showed no significant influence on financial statement fraud. These results support the fraud pentagon's function in detecting fraud and provide regulators and auditors with a point of reference for efforts to avoid fraud in the healthcare industry.

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1. INTRODUCTION

Financial statements are an important element in a company's information system, used by management to account for its performance and as a basis for investors, creditors, and other stakeholders in making decisions (Agustina et al., 2025). High-quality financial statements reflect a company's transparency and accountability (Fahmi, 2020). However, pressure to meet performance targets, maintain reputation, or obtain certain incentives can encourage management to engage in fraudulent activities (Adelia et al., 2023). The Association of Certified Fraud Examiners (ACFE) explains that fraud is an attempt to manipulate data with the aim of maintaining a company's image or deceiving users of financial reports (Putra, 2022).

According to the ACFE, fraud is classified into three types: asset misappropriation, corruption, and financial statement fraud (Sudradjat, 2023). Based on the 2024 report by the Association of Certified Fraud Examiners (ACFE), financial statement fraud is the least frequent type of fraud (only 5% of cases), yet it causes the highest losses, averaging USD 766,000 per case. One of the sectors particularly vulnerable to fraud is the healthcare sector, which ranks 4th with a total of 117 cases (ACFE, 2024). This indicates that the healthcare sector in Indonesia, especially the

pharmaceutical subsector, is not immune to manipulative practices and the presentation of misleading financial information (Putri & Hermi, 2023).

Major fraud cases in this sector, such as those involving PT Indofarma Tbk and PT Kimia Farma Tbk, clearly demonstrate that weak oversight, performance target pressures, and poor internal control systems can create significant opportunities for management to manipulate financial reports (Khoirunnisa et al., 2020). In the case of Indofarma, the Audit Board of Indonesia (BPK) revealed fabricated transactions and inflated inventory, resulting in state losses amounting to IDR 371.83 billion (Betriana et al., 2024). Meanwhile, Kimia Farma faced allegations of revenue manipulation totaling IDR 32.7 billion, which went undetected by external auditors (Frian & Sihombing, 2023).

These cases demonstrate that all forms of fraud have the potential to cause substantial losses for both companies and the state. If financial statement fraud continues to recur in the pharmaceutical sector, the long-term impact will not only involve financial losses but also a significant decline in the company's reputation. A damaged reputation can result in the loss of trust from investors, business partners, and consumers, ultimately affecting the company's ability to maintain its market share. In addition, business sustainability may be threatened as companies could face higher capital costs, regulatory sanctions, and even restricted market access (Adelia et al., 2023). The prevalence of such cases also reflects efforts by companies to maintain their reputation through unethical means, such as presenting inaccurate financial statements (Ghaisani & Supatmi, 2023). In the context of a highly regulated industry such as pharmaceuticals, failure to maintain the integrity of financial statements can jeopardize the continuity of procurement contracts, trigger stricter regulatory intervention, and hinder the company's ability to innovate and grow. Therefore, financial statement fraud must be minimized by identifying the factors that contribute to its occurrence (Khotimah et al., 2020).

To better understand and prevent fraud, various theories have been developed. The fraud pentagon, an evolution of the earlier fraud triangle and fraud diamond theories, introduces competence and arrogance as additional factors contributing to fraudulent behavior (Anwar et al., 2024). In this framework, the five core elements pressure, opportunity, rationalization, competence, and arrogance, serve as critical indicators for investigation (Monica, 2022). Each element in the fraud pentagon framework has specific indicators: pressure is commonly proxied by financial targets such as Return on Assets (ROA), reflecting performance expectations (Anwar et al., 2024). Opportunity is represented by ineffective monitoring, measured through the proportion of independent commissioners (BDOUT), which reflects the strength of oversight (Devi et al., 2021). Rationalization is often identified through the frequency of change in auditor, suggesting managerial attempts to justify or conceal fraudulent behavior (Yanti & Munari, 2021). Competence refers to the capacity of individuals in key positions, such as directors, to commit fraud, is proxied by changes in director (Fadhlurrahman, 2021). Arrogance, measured by the frequent number of CEO's pictures in annual reports, captures behavioral tendencies associated with overconfidence or lack of ethical restraint (Monica, 2022).

This study is theoretically grounded in agency theory, which states that conflicts of interest between agents and principals can drive management to act opportunistically, including through the manipulation of financial statements (Ferina et al., 2023). Principals rely on agents for information due to information asymmetry, as agents know more about the company's condition. This creates differing interests between both parties (Suaidah & Laily, 2024). This theory explains that when oversight is weak and information is asymmetrical, agents tend to pursue their own interests (Monica, 2022). The elements of the fraud pentagon are strongly correlated with the agency theory framework, particularly in terms of external pressure, opportunities arising from weak oversight systems, and the opportunistic behavior tendencies of competent and arrogant management (Devi et al., 2021).

Several studies, including those by (Mintara & Hapsari, 2021), (Putra, 2022), (Devi et al., 2021), (Monica, 2022), (Yanti & Munari, 2021), (Anwar et al., 2024), (Azizah & Henny, 2023), (Wahyutomo & Marsono, 2024), (Nurchoirunanisa et al., 2020),and (Adelia et al., 2023), show that

most research applying the fraud pentagon model has focused on the banking, manufacturing, or public sectors. Research within the healthcare sector, particularly the pharmaceutical subsector, remains limited even though empirical data indicates its high vulnerability to fraud. Furthermore, a research gap exists in the form of inconsistent findings among previous studies regarding the influence of individual fraud elements on financial statement fraud, particularly in terms of rationalization, competence, and arrogance. Therefore, this study focuses on pharmaceutical subsector companies listed on the Indonesia Stock Exchange to determine the influence of each fraud pentagon element in detecting financial statement fraud. The application of this model has significant relevance in the context of regulation and oversight in Indonesia's pharmaceutical industry, as it can identify key factors that cause fraud more comprehensively compared to previous models. This can serve as a reference for regulatory authorities such as the Financial Services Authority (OJK), the National Agency of Drug and Food Control (BPOM), and the Audit Board of Indonesia (BPK) in designing more effective prevention policies. Its urgency is increasing given that the pharmaceutical industry is a strategic sector directly related to public health, has complex transaction flows, and is subject to strict regulations. Failure to detect indications of fraud at an early stage not only results in significant financial losses but also damages public trust, disrupts business sustainability, and undermines the effectiveness of government policies in the health sector. Thus, the application of the fraud pentagon is expected to strengthen oversight mechanisms, enhance transparency in financial reporting, and minimize the risk of fraud that harms all stakeholders.

2. RESEARCH METHOD

This study uses a quantitative approach with secondary data. The data source in this research is secondary data obtained from the annual reports of pharmaceutical companies listed on the Indonesia Stock Exchange, analyzed using the time series method over the period 2021–2023. The population in this study consists of 35 healthcare companies listed on the Indonesia Stock Exchange, 11 were selected as samples through purposive sampling using a time series method (3 years of observation), resulting in 33 sample data. The time series method measures data at consistent and sequential time intervals (Hamirsa & Rumita, 2022). The dependent variable in this study is financial statement fraud, measured using the F-Score model. Meanwhile, the independent variables consist of: (1) financial target, measured by Return on Assets (ROA); (2) ineffective monitoring, measured by the ratio of independent board commissioners (BDOUT); (3) change in auditor, measured using a dummy variable; (4) change in director, measured using a dummy variable; and (5) frequent number of CEO's pictures, measured by the number of CEO images appearing in the annual reports. Data processing and analysis were carried out using SPSS statistical software with multiple linear regression methods, supported by classical assumption tests (normality, multicollinearity, heteroscedasticity, and autocorrelation).

3. RESULTS AND DISCUSSIONS

Results

This study employed the Shapiro-Wilk test to assess the normality of the data. This test is considered the most effective method for detecting a normal distribution, particularly when dealing with a small sample size (Sihotang, 2023).

Table 1. Normality Test

Model	Shapiro-Wilk			Description
	Statistic	df	Sig.	
Unstandardized Residual	0,949	33	0,124	The data are normally distributed

Source: Processed SPSS output, 2025

The test results show a significance value of 0.124. Since the significance value is > 0.05, it can be concluded that the residuals are normally distributed, indicating that the normality assumption in the regression model is satisfied.

Table 2. Multicollinearity Test

Model	Tolerance	VIF	Description
Financial Target	0,667	1,499	No multicollinearity is detected
Ineffective Monitoring	0,966	1,035	No multicollinearity is detected
Change in Auditor	0,934	1,070	No multicollinearity is detected
Change in Director	0,734	1,362	No multicollinearity is detected
Frequent Number of CEO's Pictures	0,812	1,232	No multicollinearity is detected

Source: Processed SPSS output, 2025

The results of the multicollinearity test show that all independent variables have tolerance values > 0.10 and VIF values < 10. These findings indicate that there is no sign of multicollinearity in the regression model, allowing each variable to be analyzed simultaneously without causing distortions in the estimation.

Table 3. Heteroscedasticity Test – Glejser Test

Model	Sig.	Description
Financial Target	0,393	No heteroscedasticity is detected
Ineffective Monitoring	0,371	No heteroscedasticity is detected
Change in Auditor	0,310	No heteroscedasticity is detected
Change in Director	0,782	No heteroscedasticity is detected
Frequent Number of CEO's Pictures	0,057	No heteroscedasticity is detected

Source: Processed SPSS output, 2025

Based on the results of the heteroscedasticity test, all independent variables have significance values greater than 0.05. This indicates that the regression model does not exhibit signs of heteroscedasticity. Therefore, the assumption of homoscedasticity of the residuals is fulfilled.

Table 4. Autocorrelation Test

dU	Durbin-Watson	4 - dU	Description
1,8128	1,840	2,1872	No autocorrelation is detected.

Source: Processed SPSS output, 2025

The test results show a Durbin-Watson (DW) value of 1.840. With a total sample size (n = 33) and total number of independent variables (k = 5), the critical values obtained are (dL = 1.1270) and (dU = 1.8128). Based on these results, it is found that dU < DW < 4 - dU or 1.8128 < 1.840 < 2.1872, thus it can be concluded that the regression model is free from autocorrelation.

Table 5. Multiple Linear Regression Analysis

Model	Unstandardized Coefficients		t	Sig.
	B	Std. Error		
(Constant)	0,111	0,681	0,163	0,872
Financial Target (ROA)	3,495	0,654	5,340	0,000
Ineffective Monitoring (BDOUT)	2,175	0,467	4,150	0,038
Change in Auditor (CPA)	0,161	0,234	0,687	0,498
Change in Director (DCHANGE)	-0,095	0,264	-0,358	0,723
Frequent Number of CEO's Pictures (CEOPIC)	-0,162	0,092	-1,760	0,090

Source: Processed SPSS output, 2025

Based on table 5 above, the regression equation is as follows: Y = 0.111 + 3.495ROA + 0.175BDOUT + 0.161CPA – 0.095DCHANGE – 0.162CEOPIC.

Table 6. Hypothesis Testing Results

Variabel	t-statistic	t-table	Sig.	Results
Financial Target (ROA)	5,340	2,025	0,000	H1 accepted
Ineffective Monitoring (BDOUT)	4,150	2,025	0,038	H2 accepted
Change in Auditor (CPA)	0,687	2,025	0,498	H3 rejected
Change in Director (DCHANGE)	-0,358	2,025	0,723	H4 rejected
Frequent Number of CEO's Pictures (CEOPIC)	-1,760	2,025	0,090	H5 rejected

Source: Processed SPSS output, 2025

Based on Table 4.6, the t-test results indicate that only two out of the five independent variables have a significant influence on financial statement fraud. The financial target variable (X1) has a significance value of 0.000 < 0.05 and a t-value of 5.340 > t-table value of 2.025, thus hypothesis H1 is accepted. The ineffective monitoring variable (X2) also shows a significant effect with a significance value of 0.038 < 0.05 and a t-value of 4.150 > t-table, so hypothesis H2 is accepted. Meanwhile, the auditor turnover variable (X3) has a significance value of 0.498 > 0.05 and a t-value of 0.687 < t-table, indicating no significant effect; therefore, hypothesis H3 is rejected. The board of directors turnover variable (X4) is also not significant with a significance value of 0.723 > 0.05 and a t-value of -0.358 < t-table, hence hypothesis H4 is rejected. Lastly, the CEO image appearance variable (X5) has a significance value of 0.090 > 0.05 and a t-value of -1.760 < t-table, meaning it also has no significant influence, and hypothesis H5 is rejected.

Table 7. Results of the Coefficient of Determination (R^2) Test

Model	R	R Square	Std. Error of the Estimate
1	0,827[a]	0,684	0,63554

Source: Processed SPSS output, 2025

The test results show a correlation coefficient (R) of 0.827, indicating a strong relationship between the variables. The R^2 value of 0.684 means that 68.4% of the variation in the dependent variable is explained by the independent variables. A standard error of 0.63554 reflects a low prediction error, suggesting that the model is suitable for use.

Discussions

The results of the first hypothesis test show that financial targets, proxied by ROA, have a significant effect on financial statement fraud (p = 0.000; t = 5.340 > 2.025). This finding aligns with agency theory, which explains that pressure from principals to meet profit targets encourages managers (agents) to manipulate reports in order to maintain reputation or incentives. A declining or unstable ROA, as observed in PT Indofarma Tbk (INAF) and PT Kimia Farma Tbk (KAEF), reflects high financial pressure that increases the risk of fraud, in contrast to SIDO and MERK, which show stable and healthy ROA. This result is supported by previous studies (Nurchoirunanisa et al., 2020; Mintara & Hapsari, 2021; Monica, 2022; Anwar et al., 2024), which identify financial targets as a critical factor in driving fraudulent behavior. Therefore, setting realistic financial goals and implementing effective oversight are essential to prevent financial statement manipulation.

The results of the second hypothesis test indicate that ineffective monitoring, measured by the ratio of independent commissioners (BDOUT), has a significant effect on financial statement fraud (p = 0.038; t = 2.150 > 2.025). A low BDOUT ratio reflects weak supervisory functions, thereby increasing the opportunity for management to commit manipulation without detection. This finding aligns with agency theory, which posits that when the principal's control over the agent is weak, the likelihood of opportunistic behavior by management increases. In the context of pharmaceutical companies, ineffective oversight creates room for fraudulent practices such as revenue manipulation or fictitious claims, as seen in the cases of PT Kimia Farma Tbk and PT Indofarma Tbk. Empirical data show that companies like KAEF, INAF, and KLBF experienced a decline in BDOUT, indicating weak supervision and a higher risk of fraud, while MERK, PEHA, and SIDO maintained high BDOUT ratios, reflecting strong internal control systems. These findings are consistent with studies by (Devi et al., 2021; Azizah & Henny, 2023; Yustikasari & Sari, 2024), which emphasize that the active role of independent commissioners is crucial in detecting potential fraud, maintaining financial statement transparency, and supporting the implementation of sound corporate governance.

The results of the third hypothesis test indicate that change in auditor does not have a significant effect on financial statement fraud (p = 0.498; t = 0.687 < 2.025). This variable was proxied using a dummy variable, and the findings suggest that auditor changes are more related to regulatory compliance, such as mandatory external auditor rotation, rather than efforts to conceal fraud. This aligns with agency theory, which posits that effective oversight—both internal and external—

continues regardless of auditor changes. Empirical data from 11 pharmaceutical companies show no consistent pattern between auditor turnover and the occurrence of fraud. For example, DVLA did not change auditors over a three-year period yet still carried a risk of fraud, while other companies that did rotate auditors remained stable. Regulations such as Government Regulation No. 20 of 2015 and OJK Regulation No. 13/POJK.03/2017 require auditor rotation to maintain independence, not as a response to suspected fraud. These findings are consistent with previous studies (Nurchoirunanisa et al., 2020; Monica, 2022; Putra, 2022; Adelia et al., 2023; Azizah & Henny, 2023; Anwar et al., 2024; Wahyutomo & Marsono, 2024), which conclude that change in auditor does not significantly influence fraud practices due to the presence of sufficient and ongoing oversight systems.

The results of the fourth hypothesis test show that change in director does not have a significant effect on financial statement fraud ($p = 0.723$; $t = -0.358 < 2.025$). This variable was proxied using a dummy, and the results indicate that changes in directors are more often carried out as managerial improvements and performance enhancements rather than attempts to conceal fraud. This finding aligns with agency theory, which suggests that agency conflicts are more influenced by performance pressure and weak oversight rather than merely leadership changes. In the context of pharmaceutical companies, director turnover can be a strategic move to strengthen internal control, risk management, and transparency. Data from 12 pharmaceutical firms show variations in timing and frequency of board changes, but no direct link to fraudulent practices. These results support previous studies (Monica, 2022; Putra, 2022; Wahyutomo & Marsono, 2024; Anwar et al., 2024) which concluded that change in director tends to reflect business strategy and leadership policy rather than indicating the presence of fraud—especially when supported by sound corporate governance.

The results of the fifth hypothesis test indicate that the frequent number of COE's pictures does not have a significant effect on financial statement fraud ($p = 0.090$; $t = -1.760 < 2.025$). Although the presence of the CEO's image is often perceived as a sign of arrogance that could potentially encourage fraud, in the context of pharmaceutical companies, it is more symbolic in nature and has not been proven to directly influence financial manipulation. According to agency theory, the opportunity for fraud by the CEO as an agent can be mitigated through effective oversight. The data also show no consistent pattern between the frequency of CEO images and the occurrence of fraud. This finding aligns with previous studies by (Yanti & Munari, 2021) that suggest visual aspects of the CEO do not significantly trigger fraudulent behavior, indicating that fraud prevention is more effectively achieved through strengthening supervision and corporate governance.

Although the results of this study indicate that the variables change in auditor, change in director, and frequent number of CEO's pictures have no significant effect on financial statement fraud, this does not necessarily eliminate the possibility of a deeper causal relationship. In research methodology, such a relationship may emerge through moderation or mediation mechanisms involving other variables not tested in this model. For example, a change in auditor might influence the potential for fraud if moderated by the level of audit committee independence or the quality of the internal control system. A change in director could have an effect if mediated by changes in corporate strategy, organizational ethical culture, or the effectiveness of oversight functions. Similarly, the frequency of CEO picture appearances might become a relevant indicator when examined alongside other factors such as leadership style, the degree of power centralization, or public perceptions of management integrity. This suggests that the relationships among variables in the context of fraud prevention and detection are complex, thus requiring further research that considers moderating or mediating variables to achieve a more comprehensive understanding.

4. CONCLUSION

Based on the results of the analysis and hypothesis testing, it can be concluded that financial targets and ineffective monitoring have a significant influence on financial statement fraud. The pressure to achieve high-profit targets motivates management to manipulate reports in order to maintain their corporate image and performance achievements. In addition, weak oversight from independent commissioners creates an opportunity for opportunistic behavior by management due to insufficient

control mechanisms. Theoretically, this study makes a significant contribution to the development and further testing of the fraud pentagon model, particularly in the context of highly regulated sectors such as the healthcare industry. Unlike most previous studies that have focused on the banking, manufacturing, or public sectors, this research provides empirical evidence in the pharmaceutical subsector, which has high complexity, strict regulations, and direct relevance to public interests. On the contrary, variables such as change in auditor, change in director, and frequent number of COE's pictures in annual reports were found to have no significant influence. These factors are generally administrative, symbolic, or part of corporate rotation policies and strategic decisions, and therefore do not directly encourage fraudulent practices.

These results enrich the literature by demonstrating that the validity and predictive power of the fraud pentagon model may vary across industries, thereby requiring indicator adaptation to align with sector characteristics. In the context of agency theory, this study reinforces that information asymmetry and conflicts of interest between principals and agents remain relevant in explaining opportunistic behavior, even in sectors with comprehensive regulation. From a practical implications perspective, the results of this study indicate that fraud prevention in the pharmaceutical sector will be more effective if it focuses on managing performance financial target and ineffective monitoring. Strategic steps that can be taken include setting realistic financial targets, evaluating the structure of management compensation, increasing the proportion of independent commissioners, optimizing the role of the audit committee, and strengthening internal control systems. On the other hand, the finding that three elements of the fraud pentagon are not significant does not necessarily eliminate the possibility of more complex causal relationships, for example through moderation or mediation mechanisms by other variables such as ethical culture, leadership style, or oversight effectiveness.

Therefore, future research is advised to expand the sample size and include various subsectors within the healthcare industry. This research also opens opportunities for developing a more contextualized fraud pentagon model, for example by incorporating additional variables that reflect the unique conditions of the healthcare sector, such as pressure from drug price regulations, dynamics of raw material supply chains, or public procurement policies. Educational institutions are also encouraged to integrate the fraud pentagon theory into their curriculum to strengthen students' understanding of the factors that drive financial statement fraud. Auditors, especially those working in complex and highly regulated sectors like the pharmaceutical industry, must continuously improve their vigilance and audit quality to better detect fraud risks. Meanwhile, companies should manage their financial targets realistically and avoid applying excessive performance pressure on management. Strengthening internal controls, enhancing transparency in financial reporting, and implementing effective corporate governance are essential measures to reduce the risk of fraud and ensure long-term business sustainability. Thus, this study not only re-examines the existing model but also provides direction for future researchers to refine the theoretical framework for fraud prevention and detection in industries with high levels of oversight.

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