Factors Influencing Financial Statement Fraud: An Analysis of the Fraud Diamond Theory from Evidence of Thai Listed Companies

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Abstract: - Since stakeholders of listed companies rely on the financial statement. However, prior studies pointed out that financial statement fraud is a significant cause of fraud among Thai-listed companies. This increases the risk for stakeholders' decision-making. Thus, this study initially examines empirical evidence regarding financial statement fraud in line with the Fraud Diamond Theory in Thailand. It proposes to reflect factors of financial statement fraud that exist. The objectives of this study were 1) to analyze the factors of the Fraud Diamond Theory that influence financial statement frauds of listed companies in Thailand 2) to examine the effects of the Fraud Diamond Theory factors on the financial statements of listed companies in Thailand, and 3) to study the relationship between moderator variables, namely the size of the company and the risks of the industry, and the factors of the Fraud Diamond Theory influencing the financial statement fraud of listed companies on the Stock Exchange of Thailand. There were ten independent variables examined as factors influencing financial statement fraud. The independent variables were classified into four categories, pressure, opportunity, rationalization, and capability. This study applied a quantitative research approach. Secondary data were collected from 371 listed companies on the Stock Exchange of Thailand during the 2015–2020 period. There were 1,855 observations in total. The research used descriptive statistics and logistic regression analysis to prove the research hypotheses. The results revealed that 11.48 percent of the samples had a high probability of financial statement fraud. External pressures such as financial targets (ROA), rationalizations such as accrual (ACCRUAL), and the moderator variable, industry risk (IND), influenced the financial statement fraud on the Stock Exchange of Thailand at a statistical significance level of 0.05. On the other hand, the other eight independent variables and the moderator variable, the size of the enterprise, had no significant influence on financial statements fraud on the Stock Exchange of Thailand.

Key-Words: - The Fraud Diamond Theory, Financial Statement Frauds, Thai Listed Companies

Received: April 2, 2023. Revised: July 9, 2023. Accepted: July 18, 2023. Published: July 27, 2023.

1 Introduction

Since the beginning of the economy, fraud has been a constant problem that has grown in the financial world. Even though academics, the government, and other groups try to stop frauds like corruption, misappropriation of assets, and accounting fraud, they still happen. Studies show that there are a lot of financial statement frauds in business, [1], including in Thailand, [2]. On the one hand, financial statements are a way for management to tell investors, regulators, clients, and the public how the company did in the last fiscal year. Because of this, they tend to pressure corporations to show a "good image and healthy profits." On the other hand, pressure from outside sources and other factors may contribute to financial statement fraud, which destroys the economy, [3]. Nevertheless, the motivations behind fraudulent financial reporting are vague and difficult to identify, [4]. Academics researched to understand the rationales of financial statement frauds by analyzing components of fraud theories such as the Fraud Triangle Theory, [4], [5], [6], the Fraud Diamond Theory, [7], [8], and the Fraud Pentagon Theory, [9], [10]. At the same time, some researchers researched to detect financial statement fraud and explain the relationship between fraud components in the fraud theories by applying quantitative techniques. The ratio analysis, [11], and statistical models such as the F-score model, [4], [6], [12], [13], and the M-score model, [3], were applied to measure fraudulent financial statement reporting. [3], cited that the results of prior studies

could be more consistent. The research has yet to study some variables, [3]. Also, a deliberated analysis of factors contributing to financial statement fraud is rarely mentioned in the Thai context. To this end, further study is needed to study in Thailand.

1.1 Problem Formation

As previously stated, there was a paucity of empirical research concerning the elements influencing financial statement fraud in Thailand. Specifically, there was less evidence when the aspects of the Fraud Diamond Theory were included. This study has three primary research topics for this purpose.

I. How much do the factors of the Fraud Diamond Theory affect financial statement frauds at publicly traded companies in Thailand?
II. How does each factor of the Fraud Diamond Theory affect financial statement fraud?
III. How do the factors of the Fraud Diamond Theory that affect financial statement fraud on the Stock Exchange of Thailand relate to the moderator variables (size and industry risk)? Moreover, is there a significant relationship?

1.2 Research Objectives

I. To analyze factors of the Fraud Diamond Theory that influence the financial statement fraud of listed companies in Thailand.
II. To examine the effect of the factors of the Fraud Diamond Theory on the financial statement frauds of listed companies in Thailand.
III. To study the relationship between moderator variables, namely the size of the company and the industry's risks, and the factors of the Fraud Diamond Theory influencing the financial statements fraud of listed companies on the Stock Exchange of Thailand.

1.3 Research Hypotheses

I. H1: External pressure affects the likelihood of financial statement fraud of listed companies in Thailand.
II. H2: Financial targets affect the likelihood of financial statement frauds of listed companies in Thailand.
III. H3: Financial stability affects the likelihood of financial statement frauds of listed companies in Thailand.
IV. H4: The number of audit committees affects the likelihood of financial statement fraud of listed companies in Thailand.
V. H5: The number of audit committee meetings affects the likelihood of financial statement fraud of listed companies in Thailand.
VI. H6: The nature of the industry affects the likelihood of financial statement fraud of listed companies in Thailand.
VII. H7: Change in auditor affects the likelihood of financial statement frauds of listed companies in Thailand.
VIII. H8: Accrual affects the likelihood of financial statement frauds of listed companies in Thailand.
IX. H9: The proportion of outside commissioners affects the likelihood of financial statement fraud of listed companies in Thailand.
X. H10: Institutional relationships affect the likelihood of financial statement frauds of listed companies in Thailand.
XI. H11: The company's size moderates the likelihood of financial statement frauds of listed companies in Thailand.
XII. H12: The risk of industry moderates the likelihood of financial statement frauds of listed companies in Thailand.

1.4 Significance

This research aims to look at the factors of the fraud diamond theory and find real-world evidence of the factors that lead listed companies in Thailand to lie on their financial statements. The results of this study will be beneficial for the management of listed companies in Thailand in terms of corporate governance enhancement. In addition, auditors of listed companies might consider the results of this study as fraudulent warnings when conducting audit and assurance engagements.

2 Literature Review

2.1 Concepts and Elements of the Fraud Diamond Theory

In 2004, Wolfe and Hermanson added to Cressey's fraud triangle theory, [14], by developing the fraud diamond theory, [15]. Fraudulent financial reporting tends to increase constantly and is likely to become more severe, [15]. While many studies mentioned three elements of the fraud triangle theory, composing 1) incentive (pressure), 2) opportunity,

and 3) rationalization, [15], improved the Fraud Triangle theory to prevent and detect corporate fraud effectively. In the fraud diamond theory, [15], added capability as the main component of the fraud act. Thus, they suggested four main features of the fraud acts, namely the "fraud diamond," which is composed of 1) pressure, 2) opportunity, 3) rationalization, and 4) capability, [15]. The fraud diamond theory mentions "a fraudster's thought process," defining "pressure" as the incentive of a fraudster who wants to or needs to commit fraud. "Opportunity" is a weakness of the control system that can cause a fraudster to commit fraud if he could. "Rationalization" is a thought process when a fraudster has convinced himself that his behavior is worthy, though it may be dangerous. "Capability" is a personal attribute or personal ability to play a significant role in conducting fraud. A capable fraudster will "turn an opportunity for fraud into reality", [15]. Researchers popularly applied the fraud diamond theory. For example, studies by [3], [11], [16], assigned the elements of fraud to understand financial statement fraud. Further study is required to identify indicators of pressure, opportunity, rationalization, and capability, [11]. Therefore, this study considers applying the fraud diamond theory to explain financial statement fraud in Thailand.

2.2 Financial Statement Frauds and Fraud Detection

Accounting fraud has been widely spread worldwide, [4], [17]. Various fraud acts include forging documents, embezzlement, and asset misappropriation. However, financial statement fraud is a significant accounting fraud, [18], [17]. Due to its typical command by management and tendency to cause severe corporate collapses, accounting fraud is "the most harmful financial crime", [8]. Accounting fraud is "the calculated misrepresentation of the financial statement that companies publicly disclose", [17]. Personal benefits like compensation and mounting obligations serve as its driving forces. However, most companies must assign audit and assurance services to auditors, and the auditing procedures are often ineffective in detecting financial accounting fraud. In response to eliminating fraud, academics attended to develop various techniques of fraud detection, for example, comparative techniques, ratio analysis, percentage analysis, cash flow analysis, [1], Benford's Law of Odd Numbers, statistical analyses such as Altman Z-score, Benish M-score, Vladu, Amat, and Cuszdiorean Z-score, and F-score, [19]. Computerized techniques are also utilized in detecting financial statement fraud at present. For instance, [20], noted that specialist software with real-time fraud detection, data mining, and data matching is also popularly used in fraud detection, [20].

2.3 Prior Studies and Independent Variables

Several studies on fraud theories and financial statement fraud detection have been conducted. For example, [5], utilized the fraud triangle as a conceptual theory to understand accounting fraud in Indonesia. He applied the Beneish M-score model to detect earnings manipulation in the Indonesian business context. In his study, panel data is used to test research hypotheses. The results revealed that high pressure on financial stability, leverage, financial targets, low numbers of independent commissioners, the nature of the industry, and frequent changes in auditors influence financial statement fraud in Indonesia.

Fraud theories like the fraud diamond theory and the fraud pentagon theory have been used to determine why people lie on their financial statements. For example, from 2012 to 2016, [7], used the fraud pentagon theory to find and investigate financial reporting fraud in Southeast Asian countries. In their study, the correlation was applied to test hypotheses. The results disclosed that the external pressure nature of the industry has a significant adverse effect on financial statement fraud. In contrast, financial targets, audit opinions, and changes of directors have substantial positive effects.

Also, the fraud diamond theory has been used as a theoretical concept in the past, for example, [3], [11]. [21], assigned the fraud diamond theory and moral reasoning to construct a model. They proved that culture and motivation significantly affect Indonesian officers' fraudulent behaviors in the public sector. Their study utilized structural equation modeling (SEM) as a statistical technique to link theoretical concepts with empirical evidence. [4], applied the fraud diamond theory to analyze factors that affect financial statement fraud. The main findings highlighted that pressure and opportunity are two key factors influencing accounting fraud. [11], used the elements of a fraud diamond in detecting accounting frauds in the banking sector within the stock market of Indonesia. External pressure, financial stability, and capability significantly affect financial reporting frauds. [3], applied the fraud diamond theory to investigate financial statement fraud. The findings showed that

financial statement frauds are influenced by financial stability, personal benefits, the nature of the industry, multiple ownerships of management, a change in auditor, rationalization, and capability.

According to [15], four elements might cause fraud in an organization. Firstly, pressure often occurs when individuals have reasons to commit fraud. [11], mentioned that external pressure might lead to pressure on a company. In their study, pressure from outside the organization may influence management to commit fraud because of the high expectations and demands of the public. [11], applied a debt ratio to measure external pressure on the company. The result revealed that companies in Indonesia had a high debt ratio, which caused the possibility of financial statement fraud. [12], [13], cite that financial targets such as return on assets (ROA) lead companies to commit fraud. The reason is that managers often present high performance if they expect high benefits, such as bonuses. Therefore, a higher ROA can influence fraud commitment.

Moreover, [11], [9], mentioned that financial stability could be a factor of 'pressure' from the outside. External factors such as economics and industry might threaten financial stability. The liquidity ratio of the companies is measured according to [11], [9], and financial stability. It is revealed that the low liquidity ratio leads managers to commit fraud. Secondly, an opportunity usually occurs when an organization has weak control. [4], applied the number of audit committees as an independent variable in their study. They noted that many audit committees could reduce the possibility of financial statement fraud. Also, several audit committee meetings lead to a high quality of the company's controls. [11], [5], cited that the nature of the industry, measured by the receivables ratio, might be an opportunity to commit fraud. Their study revealed that the more advanced the industry's development, the higher the complexity of the companies' activities. The increased complexity of business transactions and management leads to abusing their subjective judgment. Thirdly, rationalization refers to individuals' attitudes or characters that encourage them to commit acts of fraud. [3], applied 'change in auditors' and 'accruals' as independent variables of the rationalization factor. A change in auditors means a change in the frequency of auditor rotation. [3], cites that financial statement fraud is probable if the companies change auditors. Also, accrual can be an independent variable of rationalization. It refers to the gap between net cash inflow and a company's net income. According to [14], high accrual amounts lead to a high probability of financial statement fraud. Fourthly, capability means the ability of individuals with high authorization, which encourages them to commit fraud. Their study used the proportion of outside board commissioners as an independent variable, [11]. The researchers noted that independent commissioners from outside the companies are not accustomed to controlling shareholders, which might cause a high risk of financial statement fraud. In contrast, [13], applied an institutional ownership ratio as their independent capability variable. They cited the possibility that institutional ownership could control management. Higher, adequate supervision helps reduce financial statement fraud. [3], noted that the results of prior studies are inconsistent, and some variables have not been analyzed in the research, [3]. This study was aimed at increasing the evidence supporting fraud in accounting figures in the context of Thailand. Although there have been studies in Southeast Asian countries such as Indonesia, [5], [9], [10], [12], [13], [22], [23], [24], [25], [26], and Vietnam, [6], there is scant empirical evidence in Thailand explaining the factors influencing financial fraud at companies listed on the Thai Stock Exchange. In addition, this research was studied under the fraud diamond theory. Although there were previous studies such as, [13], this research has added the proportion of outside commissioners and institutional ownership (capability) as the independent variables to study in the context of Thailand, and the moderator variables, namely the sizes of companies (SIZE) and risk of industry (IND). To determine which variable influences fraudulent financial statements of companies listed on the Thai Stock Exchange. The conceptual framework is set as follows (Figure 1):

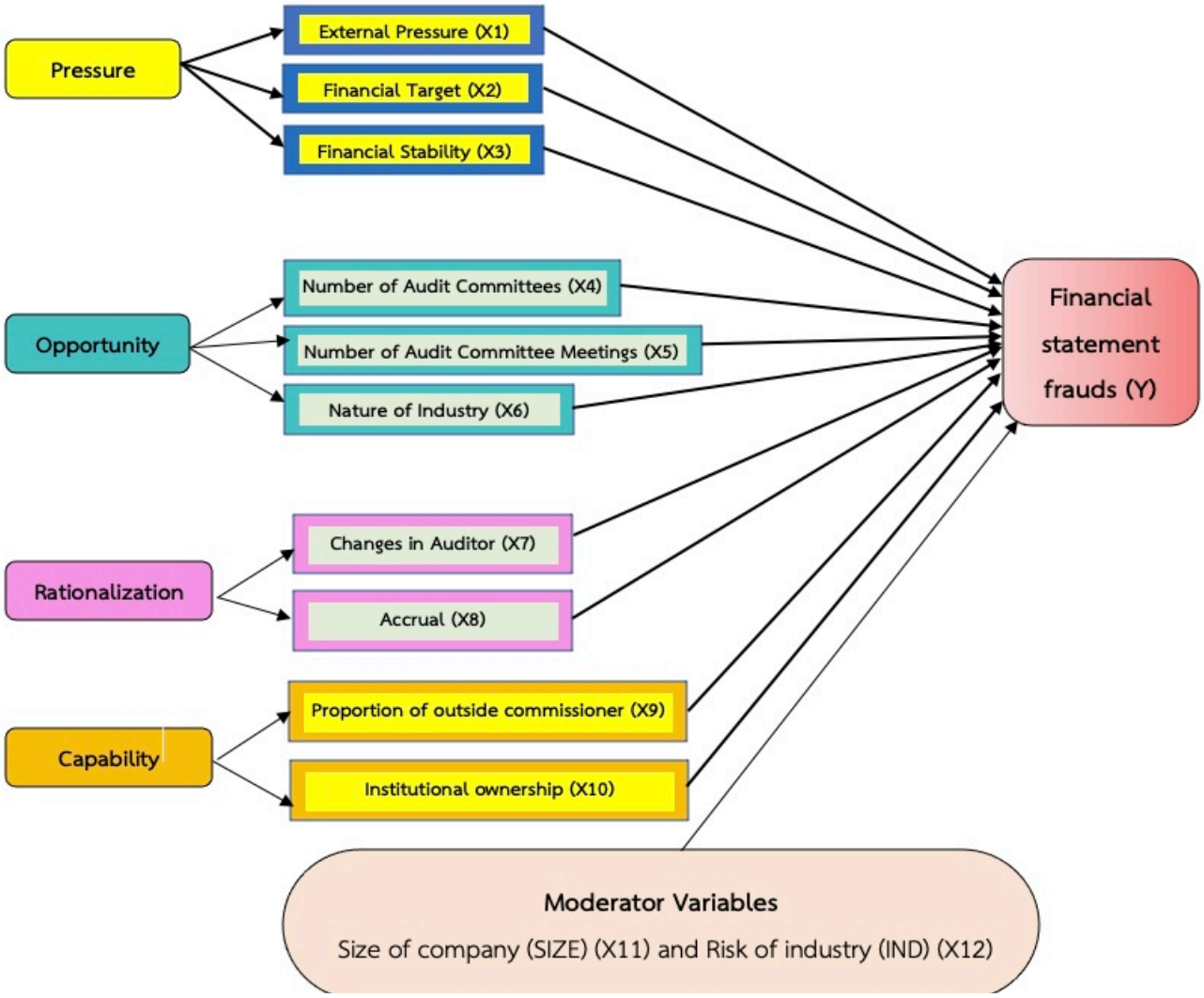

Fig. 1: Conceptual Framework

3 Methodology

3.1 Population and Sample

This research employed a quantitative approach and secondary data. The financial statements and annual reports were collected from 371 companies, excluding those in the finance, property, construction, and unidentified sectors. In 2020, there were 630 listed companies on the Stock Exchange of Thailand (SET) (www.set.or.th, achieved November 2020). The samples were selected using the purposive method. There were 1,855 observations obtained from the SET SMART database, which is the website of the Stock Exchange of Thailand (http://www.setsmart.com). The financial statements of selected companies must present complete annual reports in Thai Baht currency during the 2015–2020 period. The listed companies selected financial statements must disclose research variables' data.

3.2 Measurement of Research Variables

3.2.1 Independent Variables

Based on the Fraud Diamond Theory's independent variables, there are four types of fraud: pressure, opportunity, rationalization, and capability. Financial targets, financial stability, and external pressure served as proxies for the pressure. The number of audit committees indicated the opportunity, the number of audit committee meetings, and the nature of the industry, [22]. Changes in auditors and accrual served as proxies for the rationalization, and the proportion of outside board commissioners (IndCom) and institutional ownership ratio (KI) served as proxies for the capability.

3.2.2 Moderator Variables

Moderator variables refer to variables that are considered additionally in the study. Since it can influence independent and dependent variables, [8], the interaction between the independent and moderator variables may precede the description of the dependent variable. [26], suggested two variables influencing financial statement fraud: company size and industry risks, [26].

Financial statement fraud is less likely to happen at big companies than at small ones. The reason is that large companies are more stable and efficient than smaller companies. For example, large companies have a greater frequency of disclosure—financial reporting requires more attention to accounting standards. Large companies tend to have good-quality financial statement analysis and review of financial reports. Large companies' monitoring processes are more frequent than small companies, [26].

Industry risk can also be considered a moderator variable. The reason is that the quality of each entity's financial statements is subject to industry risk. The type of business operations and environment contribute to industry risk, an external factor. The diversification of business operations led the companies to select different accounting policies. Alternative ways of accounting practice led to the creative accounting practice of management. [27], Indonesia's manufacturing industry has the most vulnerable risk, [27]. Thus, this study assumes that industry risk may also moderate financial statement fraud in the Thai context. The variables used and the measurement is presented in Table 1.

Therefore, the proposed model of this study is as

$$\text{FRAUD} = ß_0 + ß_1\,\text{Express} + ß_2\,\text{Roa} + ß_3\,\text{Stab} + ß_4\,\text{Noaudit} + ß_5\,\text{Nomeet} + ß_6\,\text{Nature} + ß_7\,\text{Change} + ß_8\,\text{Accrual} + ß_9\,\text{Indcom} + ß_{10} \quad (1)$$

Table 1. Variables and measurements

Variables	Measurement
External pressure	$\text{Debt ratio} = \frac{\text{Total Debt}}{\text{Total Assets}}$
Financial targets	$\text{ROA} = \frac{\text{Net profit after tax}}{\text{Total Assets}}$
Financial stability	$\text{Liquidity ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$
Number of audit committees	Number of the audit committee
Number of audit committee meetings	Number of audit committee meetings
Nature of industry	$\text{Special Receivables} = \frac{(\text{Other receivables})_t}{(\text{Total receivables})_t}$
Change in auditors	Code 1 is a change in auditors in the study period, and 0 otherwise
Accrual	$\text{Accrual} = (\text{Profit after tax} - \text{Net cash flow from operation})$
The proportion of outside board commissioners (IndCom)	$\text{IndCom} = \frac{\text{The number of independent commissioners}}{\text{Total number of commissioners}}$
Institutional ownership	$\text{KI} = \frac{\text{Total institutional share}}{\text{Total outstanding share}}$
Size (Moderator Variable)	SIZE = Logarithm of Total Asset
Industry Risk (Moderator Variable)	Code 1 is a company in the manufacturing industry in the study period, and 0 otherwise.

Source: Summarize from the literature review

3.2.3 Dependent Variables

The F-score statistical technique measures the dependent variable. [28], developed the F-score model. The statistical model addresses the probability of detecting fraud on financial statements. [28], stated that this study applied the model to Enron in 2000. The model formula is the following:

$$\text{Logit} = -7.893 + 0.790 \text{ x } (\text{rsst}_{\text{acc}}) + 2.518\text{x}(\text{ch}_{\text{rec}}) + 1.191\text{x}(\text{ch}_{\text{inv}}) + 1.979\text{x}(\text{soft}_{\text{assets}}) + 0.171\text{x}(\text{ch}_{\text{cs}}) + (-0.932)\text{x}(\text{ch}_{\text{roa}}) + 1.029\text{x}(\text{issue}) \quad (2)$$

$$\text{Prob (FFR)} = \text{e\^{}logit/ (1 + e\^{}logit)} \quad (3)$$

Then, the researcher applied the F-score (Enron) formula of [6].

The F-Score (Enron) formula equals (Prob(FFR)/0.0037). In this study, outline variables were omitted using the "Winsorization" technique ($p < 0.10$) of STATA software version 14 to ensure that all variables were normally distributed. Multicollinearity was assessed. The correlation coefficient between independent variables had values ranging from –0.0177 to 0.2366 and was not greater than 0.8, which means that this study's independent variables had fewer multicollinearity problems. Logistic regression analysis was completed in STATA version 14.

3.2.4 Ethical Statement

The Human Research Ethics Committee of Naresuan University granted the ICH-GCP research certification. It was approved regarding the Declaration of Helsinki, the Belmont Report, the CIOMS Guideline, and the International Conference on Harmonization in Good Clinical Practice. The researcher strictly conducted the research with confidentiality and was concerned with the effects on the listed companies' reputations. To maintain the confidentiality of the financial statements of listed companies in Thailand, the researcher did not mention or analyze research results by referring to the names of the companies and the industry groups throughout the research.

4 Results and Discussion

4.1 Descriptive Analysis

The results showed in Table 2.

Table 2. Frequency distribution based on F-Score Enron

Year	Fraud		Non-fraud		Total	
	Obs.	%	Obs.	%	Obs.	%
2016	43	2.32	328	88.41	371	100
2017	47	2.53	324	87.33	371	100
2018	43	2.32	328	88.41	371	100
2019	52	2.80	319	85.98	371	100
2020	28	1.51	343	92.45	371	100
Total	213	11.48	1,642	88.52	1,855	100

Source: Own edition and calculations

Table 2 presents descriptive statistics of this study's dependent, independent, and moderator variables; the proxies EX.PRESS, STAB, NOAUDIT, INDCOM, KI, and SIZE were greater than 0. According to Table 2, the results show that 1,642 observations were diagnosed as non-fraud, whereas 213 were diagnosed as financial statement fraud. Overall, the accuracy of the model was 88.52%.

Table 3 presents descriptive statistics of this study's dependent, independent, and moderator variables; the proxies EX.PRESS, STAB, NOAUDIT, INDCOM, KI, and SIZE were greater than 0.

Table 3. The results of the descriptive statistics test

Proxy	Min	Max	Mean	S.D
FRAUD	0	1	.115	.319
EX.PRESS	.12	.69	.403	.192
ROA	-.05	.12	.037	.053
STAB	.55	6.16	2.237	1.78
NOAUDIT	2	5	3.175	.369
NOMEET	0	23	5.685	2.850
NATURE	0	1	.643	.458
CHANGE	0	1	.491	.500
ACCRUAL	-2357189	185356	-525723	773777
INDCOM	.33	.5	.403	.642
KI	.4	7.26	4.164	2.026
IND	0	1	.216	.411
SIZE	103032.76	254418284	34649636	147536150

Note: Total Observations (N) = 1,855

Source: Results of data processing STATA 14

4.2 Logistic Regression Analysis

This study utilized a 0.05 significance level for the logistic regression analysis. The researcher assessed the feasibility of the regression model using Hosmer and Lemeshow's goodness-of-fit test to ensure that the empirical data was appropriate for the model. It was found that the chi-square was 5.22, and a significant value was 0.7339 ($p > 0.05$), demonstrating that the model can predict the value of observations. Table 4 illustrates that the log-likelihood statistics were -649.8735, and -2Log likelihood = 1,322.56 (the higher the value, the less accurate the model). Thus, the result indicates that the model hypothesized fits the data. However, the Cox & Snell R square value was 0.0115, and the pseudo-R-square was 0.0172, meaning only 1.72% of what affects financial statement fraud. Therefore, this result indicates the weakness of independent variables in explaining fraud in this study. Based on Table 4, financial targets (ROA) and accrual (ACCRUAL) are the factors that affect the financial statement fraud of listed companies in Thailand. Therefore, the second hypothesis (H2) and (H8) were accepted. The mathematical model can be presented as follows:

Fraud = -1.96 – (4.708 x ROA) + (2.56 x ACCRUAL) + e (4)

Table 4. The results of Logistic regression models

Proxy	Coef.	OR.	Sig.	HA
ROA	-4.708	.00902	0.00	Accepted
ACCRUAL	2.56	1	0.02	Accepted
Constant	-1.96	0	0.02	

Source: Results of data processing STATA 14
Note: The number of obs. = 1,855
LR chi2 (10) = 22.1
Prob > chi 2 = 0.0115
Pseudo R2 = 0.0172
Log-likelihood = -649.8735

According to Table 4, OR. or Odds Ratio refers to the logistic coefficient (b_0, b_1,……, b_{10}). Thus, the logistic model can be presented as follows:

$$Exp(B) = e^{B} = e^{b_i} : \text{I} = 1, 2, 3, ..., 10 \quad (5)$$

When

$$Odds = \frac{P\hat{}(Fraud)}{1-P\hat{}(Fraud)}$$

$$= e^{b_0 + b_1 Express + b_2 Roa + b_3 Stab + \cdots + b_{10} Ki} \quad (6)$$

If b_i > 0, then e^(b_i) > 1 means that the odds value increases or the likelihood of financial statement fraud increases.
If b_i < 0, then e^(b_i) <1 means that the odds value decreases or the likelihood of financial statement fraud decreases.
If b_i = 0, then e^(b_i) = 1 means that the odds value is neither increasing nor decreasing.
Model interpretation:

The pressure factor, which represents a proxy value with financial targets (ROA), increasing by 0.01 unit, reducing the likelihood of financial statement fraud by one unit, can account for the odds ratio of variable ROA = 0.01, which is less than 1. According to the STATA statistical program result, the interval estimates of the odds ratio at a 95% confidence level found that P (0.000507 <= of the ROA variable <= 0.1603336) = 0.95 had a minimum value of 0.000507, which is less than one. The maximum is 0.1603336, which is also less than 1. It can be concluded that ROA variables are related to changes in the odds ratio.

The rationalization factor, a stand-in for ACCRUAL, has a positive effect on financial statement fraud in Thailand for companies on the stock market. This explains why the odds ratio of the variable ACCRUAL equals 1. Let's say the listed companies' accrual (profit after taxes or net cash flow from operating activities) increases by one point. In that case, there will be a one-point increase in the possibility of financial statement fraud. Interval estimation of the odds ratio at a 95% confidence level found that P(1 <= of ACCRUAL <= 1) = 0.95 had the highest and lowest values of 1. In conclusion, the ACCRUAL variable is related to the odds ratio change.

4.2.1 H1: External Pressure Affects the Likelihood of Financial Statement Fraud of Listed Companies in Thailand

The results revealed that the EX.PRESS coefficient was 0.878446, more than 0.05. External pressure measured by debt ratios positively affected financial statement fraud. However, the effect was not significant. This result contrasted with [11], and the Fraud Diamond Theory, [15], where the researcher claimed that pressure proxied by debt ratio significantly affected financial statement fraud. According to [9], a low leverage (debt) ratio can be achieved to convince investors that the companies do not struggle with financial problems, [9]. The possible reason is that those companies have less borrowing capital than capital market investors. Therefore, the total debt to total assets ratio positively influences financial statement fraud but is not statistically significant, [9].

4.2.2 H2: Financial Targets Affect the Likelihood of Financial Statement Frauds of Listed Companies in Thailand

The result showed that financial targets (ROA) had a coefficient of - 4.71 and a significant value of 0.00. It means the financial targets have negatively and significantly affected the financial statement fraud of listed companies in Thailand. The result went against, [4], [11], [12], [15], [16], [22], [23], [24], [27], [29], [30], who said that a higher ROA tends to lead to more financial statement fraud. One reason could be that financial targets proxied by ROA cannot cause financial statement fraud unless managers' bonuses depend on how much money the company makes, [9]. On the other hand, the company will try to keep the return on assets (ROA) low or decrease it because management is concerned that if the rate of return on assets increases to a very high level, the likelihood of monitoring and fraud detection will also increase. So, management tends to promote a culture where the rate of return on assets stays low or goes down. This action can cause a high probability of financial statement fraud, [31]. The negative relationship between ROA and financial statement fraud was consistent with the results of [6], [26], [32], [33]. Further, researchers explained that companies with a lower ROA than the previous year would try to increase their earnings per asset ratio in the current year. Therefore, the company's executives' pressure may force them to commit fraud in financial statements, [9].

4.2.3 H3: Financial Stability Affects the Likelihood of Financial Statement Frauds of Listed Companies in Thailand

The STAB coefficient was 0.071578, and a significant value was 0.23, greater than 0.05. Therefore, financial stability had a positive effect but was not significant. The result of this study is consistent with the research of, [23]. The probable reason was that the listed companies had a high level of monitoring and control. In addition, external factors such as economic conditions and social situations might delay fraud by the entities, [23]. However, these findings contradict, [11], which found a statistically significant negative correlation

between financial stability and financial statement fraud. The researcher explains that companies experiencing liquidity problems due to economic conditions may struggle to settle their debts and obligations. The company's management is therefore pressured to distort the financial statements.

4.2.4 H4: The Number of Audit Committees Affects the Likelihood of Financial Statement Fraud of Listed Companies in Thailand

The result shows that the number of audit committees negatively affected the financial statement fraud of listed companies in Thailand (coefficient = - 0.292357) but had no statistical significance (Sig = 0.88), which was more than 0.05. The result is in line with the study in [11]. The possible reasons are that the public believes several external auditors can deliver high-quality financial reports and reduce fraud. Instead, companies build the reliability of their entities through external audit engagement.

4.2.5 H5: The Number of Audit Committee Meetings Affects the Likelihood of Financial Statement Fraud of Listed Companies in Thailand

The results show a statistically insignificant number of audit committee meetings (beta value = -0.014751, sig. = 0.6) that have a negative effect on financial statement fraud in listed businesses in Thailand (sig. = 0.60). According to [4], there is a negative correlation between audit committee meetings and financial statement fraud. The reason is that organizations with fewer audit committee meetings are more likely to perpetrate financial statement fraud. Moreover, regular audit committee meetings can convince investors that a company's financial reports are of high quality. Furthermore, the outcome is compatible with the Fraud Diamond Theory, [15].

4.2.6 H6: The Nature of the Industry Affects the Likelihood of Financial Statement Fraud of Listed Companies in Thailand

The results show that industry characteristics make financial statement fraud more likely (Beta = -0.183257). The significance value for the sixth hypothesis test was 0.25, which was less than 0.05. Hence, the nature of the industry has no major effect on financial statement fraud among Thailand's publicly traded firms. The result is consistent with, [13], in which the researcher asserts that the board of directors cannot strike a balance between the nature of the industry and financial statement fraud because companies sometimes require cash for operations, resulting in the deduction of accounts receivable owned by the companies. The statement of financial status must reflect the high value of cash, but there is a limit to the amount of cash on hand. Thus, this may push businesses to manipulate their financial figures. By neglecting outstanding trade accounts receivable, management may understate accounts receivable, [23].

4.2.7 H7: Change in Auditor Affects the Likelihood of Financial Statement Frauds of Listed Companies in Thailand

A change in auditors had a beta value of 0.076712, influencing financial statement fraud. Still, the significant value was 0.60, which exceeded 0.05. Thus, the outcome suggested that a change in auditor had no impact on financial statement fraud. This conclusion contradicts, [24], which found that auditing switching positively impacted financial statement fraud. According to [24], yearly auditor changes may result from falsifying financial statements. The corporation committing misbehavior does not want any administrative irregularities to be probed. Hence, there is a high rate of audit company turnover. It may take a significant amount of time for a newly hired audit team to get familiar with the company's business environment. New auditors are often unable to discover fraud within a single accounting period.

4.2.8 H8: Accrual Affects the Likelihood of Financial Statement Frauds of Listed Companies in Thailand

Accrual significantly positively affected financial statement fraud of listed companies in Thailand (beta value = 2.56, sig. = 0.02). When considering the odds ratio of the ACCRUAL variable as equal to 1, the accrual factor (rationalization) increase of one unit would also increase the likelihood of financial statement fraud by one unit with a statistically significant level of 0.05. This positive relationship was consistent with the Fraud Diamond Theory, [3], [4], [6], [25], [26], [34], [35], results. The possible reason is that management policies caused accrual changes—the higher the value of changes, the higher the likelihood of fraudulent accounting, [3]. It can be implied that financial statement dilemmas could occur among listed companies in Thailand when executives exercise their rationalization to apply accounting policies relating to accrual transactions. Therefore, management should appropriately scrutinize the accrual policies before practice to prevent financial statement fraud.

4.2.9 H9: The Proportion of Outside Commissioners Affects the Likelihood of Financial Statement Fraud of Listed Companies in Thailand

The results show that the number of outside board members had no statistically significant effect on financial statement fraud (beta value = -0.118620, sig. = 0.92). The results of this study agree with the Fraud Diamond Theory's, [15], hypothesis and, [11], findings. [11], argued that external managers, who are independent, do not have access to shares in the company and do not have a say in how it is run or who runs it. So, they thought that the outside board commissioners would help improve the financial statement's quality. Thus, an outside board of commission can significantly reduce the likelihood of fraud, [11].

4.2.10 H10: Institutional Relationships Affect the Likelihood of Financial Statement Frauds of Listed Companies in Thailand

The result demonstrates that institutional ownership had a negative effect on financial statement fraud. (Beta value = -0.007380, sig = 0.84). In other words, if the ownership from other external institutions increases by 0.0073780 units, the financial statement fraud will decrease by 1 unit. Nevertheless, there is no statistical significance. The negative relationship between institutional ownership and financial statement fraud aligns with [13], [15]. However, [13], mentioned that institutional ownership could not significantly affect financial statement fraud because insufficient evidence supports the link between institutional ownership and the decreasing number of frauds. The number of institutional owners cannot guarantee that the management will not commit fraud on the financial statements. Therefore, it cannot be concluded that institutional ownership relates to financial statement fraud, [13].

4.2.11 H11: The Company's Size Moderates the Likelihood of Financial Statement Fraud of Listed Companies in Thailand

The result shows that there is no proxy effect on financial statement fraud in Thai companies that are on the stock market. The ROASIZE and ACCRUALSIZE proxies positively relate to fraud (beta values of 1.31972 and 4.50, respectively). However, no significant relationships existed (Sig. = 0.23 and 0.66, respectively). Thus, the company's size does not moderate the likelihood of financial statement fraud in listed companies in Thailand. Therefore, the eleventh hypothesis (H11) was rejected.

4.2.12 H12: The Risk of Industry Moderates the Likelihood of Financial Statement Frauds of Listed Companies in Thailand

The effect of a moderator variable (Risk of Industry) revealed that ROA had a significant negative effect on the financial statement fraud of listed companies in Thailand (beta value = -5.53715, sig. = 0.00). Inter_ACCRUALINDUS significantly positively affected the financial statement fraud of listed companies in Thailand (beta value = 9.48, sig. = 0.04). However, ACCRUAL and Inter_ROAINDUS were not considerably affected by the financial statement fraud (beta values of 1.81 and 1.301582, and sig values of 0.09 and 0.67, respectively). Therefore, the twelfth hypothesis (H12) was accepted. The industry risk moderates the likelihood of financial statement fraud in listed companies in Thailand. The mathematical model can be presented as follows:

$$Fraud = -1.74 - (5.54\, x\, ROA) + e \qquad (8)$$

The Hosmer and Lemeshow test showed that Chi-square = 10.96, greater than 5.00, and sig. = 0.2039, which was greater than 0.05. Thus, this model is appropriate. In addition, Log-likelihood equal to -648.90308 is calculated for -2Log Likelihood (-2LL), which is equal to 1,297.81, which is less than -2Log Likelihood (-2LL), which has only constants (= 1,322.56). The pseudo-R square (Nagelkerke R square) was 0.0187. Industry risk is another variable expected to influence this research's independent and dependent variables. This study found that industry risks significantly influenced accrual variables and financial statement fraud. Contrary to research by [35], the research found that industry risks could not moderate financial statement fraud in Indonesia. The quality of the financial reports of listed companies in the Thai context depends on industry risks, which are external factors. Each industry is sensitive to financial information, especially accrual transactions. The higher the industry's risk, the greater the possibility of financial statement fraud because of the inherent risk to the company. However, this correlation can only be explained by the sample selected in this study. This may change if other examples are selected to study, [28].

5 Conclusion

This study was done to look at the factors of the Fraud Diamond Theory and see how those factors and the moderate factors affect financial statement fraud in Thai companies listed on the stock market. The researchers used four parts of the Fraud Diamond Theory to classify ten independent variables: pressure, opportunity, rationalization, and capability. Independent pressure variables are external pressure, financial targets, and financial stability. The number of audit committees, the frequency of audit committee meetings, and the nature of the industry serve as proxies for independent variables of opportunity. Independent variables of rationalization are changing in auditors and accrual. Independent variables of capability were the proportion of outside commissioners and institutional ownership (K.I.). Moderator variables were the size of the company and the industry's risk. The dependent variable was the F-score (Enron) model, proxied by fraud = 1 and non-fraud =0, [28]. Logistic regression was analyzed using STATA version 14. One thousand eight hundred fifty-five observations of the period 2015–2020 were gathered from www.set.or.th and the SET SMART database of the Stock Exchange of Thailand. The findings revealed that 231 (11.48%) would likely commit fraud on financial statements. It can be concluded that the factors of the Fraud Diamond Theory did not significantly affect the financial statement fraud of listed companies in Thailand, except for pressure (financial targets proxied by ROA) and rationalization (ACCRUAL). The moderator variable, such as industry risk (IND), influenced the financial statement fraud on the Stock Exchange of Thailand at a statistical significance of 0.05.

This research adds to the Fraud Diamond Theory, [15], which can be used to describe fraud in financial statements at the Stock Exchange of Thailand. The Fraud Diamond Theory says that there is a chance of fraud in financial statements because of two elements: 1) pressure (financial targets) and 2) rationalization (accrual). On the other hand, industry risks can make fraud at the Thai Stock Exchange and the financial statements of the Stock Exchange of Thailand less likely. However, from the study results from 2016–2020, it was found that companies listed on the Stock Exchange of Thailand were only 11.48% likely to commit financial statement fraud, which is considered a minority by comparison. An overview of the Stock Exchange of Thailand shows the reliability of financial and annual reports communicated to shareholders and other company stakeholders. This research also provides practical contributions for the executives of listed companies in improving good corporate governance. Management should consider the return on assets (ROA) and Accrual when they employ the business's management policy. Executives of listed companies can motivate transparency and verifiable accounting information. As a result, profits are added to financial statements. Moreover, using outstanding items due to improper discretion will be reduced.

Acknowledgement:
I thank the Faculty of Business, Economics, and Communications, Naresuan University, Thailand, for supporting the research funding.

References:

[1] Association of Certificated Fraud Examiners (ACFE), *How to Detect and Prevent Financial Statement Fraud, 2020*, Retrieved from https://www.acfe.com/-/media/files/acfe/pdfs/chapter/howtodetectandpreventfinancialstatementfraud2019_chapter-excerpt.ashx.

[2] Yarana, C., & Praithong, P., A Study of Law Violations and Punishments of Accounting and Taxation Frauds: Case Studies of Thai Listed Companies, *Naresuan University Law Journal*, Vol.12, No.2, 2019, pp. 143 – 165.

[3] Inayanti, S. N., & Sukirman, S., The Effect of Factors in Fraud Diamond Perspective on Fraudulent Financial Reporting, *Accounting Analysis Journal*, Vol. 5, No.3, 2016, pp. 155 – 162.

[4] Rengganis, RR. M. Y. D., Sari, M. M. R., Budiasih, I. G. A. N., Wirajaya, I. G. A., & Suprasto, H. B., The Fraud Diamond: Element in Detecting Financial Statement of Fraud. *International Research Journal of Management, IT and Social Sciences*, Vol. 6, No. 3, 2019, pp. 1 – 10, doi: 10.21744/irjmis.v6n3.621.

[5] Fitri, F. A., Syukur, M., & Justisa, G., Do the fraud triangle components motivate fraud in Indonesia? *Australasian Accounting, Business and Finance Journal*, Vol.13, No.4, 2019, pp. 63 – 72. doi: 10.14453/aabfj.v13i4.5.

[6] Hung, D. N., Ha, H. T. V., & Binh, D. T., Application of F-Score in Predicting Fraud, Errors: Experimental Research in Vietnam, *International Journal of Accounting and*

Financial Reporting, Vol. 7, No.2, 2017, p. 303, doi: 10.5296/ijafr.v7i2.12174.

[7] Pamungkas, I. D., & Utomo, S. D., Fraudulent Financial Reporting: an Application of Fraud Pentagon Theory to Association of Southeast Asian Nations Corporate Governance Scorecard, *J. Advanced Res. L. & Econ*, Vol. 9, 2018, p. 1729.

[8] Stone-Romero, E. F., & Liakhovitski, D., Strategies for Detecting Moderator Variables: A Review of Conceptual and Empirical Issues, *Research in Personnel and Human Resources Management*, Vol. 21, 2002, pp. 333 – 372, doi: 10.1016/S0742-7301(02)21008-7.

[9] Rahman, A., Negeri, P., Jl, M., & Almamater, N., Detection of Financial Statement Fraud Triangle (Fraud Triangle) in LQ45 Companies Listed in Indonesia Stock Exchange Deliana Deliana Nine Rihaney, *International Journal of Technical Vocational and Engineering Technology*, Vol. 2, No. 1, 2020, pp. 70 – 78.

[10] Christian, N., Basri, Y. Z., & Arafah, W., Analysis of fraud triangle, fraud diamond and fraud pentagon theory to detecting corporate fraud in Indonesia, *The International Journal of Business Management and Technology*, Vol. 3, No. 4, 2019, pp. 73 – 78.

[11] Indarto, S. L., & Ghozail, I., Fraud diamond: Detection analysis on the fraudulent financial reporting, *Risk Governance & Control: Financial Markets & Institutions*, Vol. 6, No. 4, 2016, pp. 116 – 123.

[12] Noble, M. R., Fraud diamond analysis in detecting financial statement fraud, *The Indonesian Accounting Review*, Vol. 9, No. 2, 2019, pp. 121 – 132, doi: 10.14414/tiar.v9i2.1632.

[13] Sari, M. P., Kiswanto, Rahmadani, L. V., Khairunnisa, H., & Pamungkas, I. D., Detection Fraudulent Financial Reporting and Corporate Governance Mechanisms using Fraud Diamond Theory of the Property and Construction Sectors in Indonesia, *Humanities & Social Sciences Reviews*, Vol. 8, No. 3, 2020, pp. 1065 – 1072, doi: 10.18510/hssr.2020.83109.

[14] Cressey, D. R., *Other people's money; a study of the social psychology of embezzlement*, The Free Press, New York, NY, 1953.

[15] Wolfe, D. T., & Hermanson, D. R. *The Fraud Diamond: Considering the Four Elements of Fraud*, 2004, Retrieved from www.nysscpa.org/printversions/cpaj/2004/1204/p38.htm.

[16] Skousen, C. J., Smith, K. R., & Wright, C. J., Detecting and Predicting Financial Statement Fraud: The Effectiveness of the Fraud Triangle and SAS No. 99, *Advances in Financial Economics*, Vol. 13, 2009, pp. 53 – 81, doi: 10.1108/S1569-3732(2009)0000013005.

[17] Jofre, M., & Gerlach, R., Fighting Accounting Fraud Through Forensic Data Analytics, *ArXiv Preprint ArXiv:1805.02840*., 2018, Retrieved from http://arxiv.org/abs/1805.02840.

[18] Godwin Emmanuel, O., Enyi, P., Dada, A., & Olajide, S., Forensic accounting techniques and integrity of financial statements: an investigative approach, *Journal of African Interdisciplinary Studies (JAIS)*, Vol. 2, No. 3, 2018, pp. 1 – 23.

[19] Singh, N., & Oriol, A. S., *Detecting accounting fraud using quantitative techniques*, Barcelona: Universitat Pompeu Fabra, Department of Economics and Business, 2020.

[20] Oyedokun, G. E., Forensic Accounting Investigation Techniques: Any Rationalization?, *SSRN Electronic Journal*, 2016, doi: 10.2139/ssrn.2910318.

[21] Triyuni Rohmawati Ambari, S., Culture and Its Effect on Fraud with Intervening Morality Variable, (Published Conference Proceedings style) in *Proseding Seminar Nasional Akuntansi*, *Indonesia*, 2020, Retrieved from www.detik.com.

[22] Harmenawati, R., & Muhammadiyah Jakarta, S., Measuring the Level of Fraud on Financial Statements: Model of Fraud Triangle (Case Studies on Companies Listed on the Indonesia Stock Exchange in 2014 - 2018), *In Bisnis & Manajemen*, Vol. 11, 2021, Retrieved from http://ejournal.stiemj.ac.id/index.php/ekobis.

[23] Khamainy, A. H., Ali, M., & Setiawan, M. A., Detecting financial statement fraud through new fraud diamond model: the case of Indonesia, *Journal of Financial Crime*, Vol. 29, No. 3, 2022, pp. 925 – 941, doi: 10.1108/JFC-06-2021-0118.

[24] Nurcahyono, N., Hanum, A. N., Kristiana, I., & Pamungkas, I. D., Predicting Fraudulent Financial Statement Risk: The Testing Dechow F-score Financial Sector Company in Indonesia, *Universal Journal of Accounting*

and Finance, Vol. 9, No. 6, 2021, pp. 1487 – 1494, doi: 10.13189/ujaf.2021.090625.

[25] Ratmono, D., Darsono, D., & Cahyonowati, N., Financial Statement Fraud Detection With Beneish M-Score and Dechow F-Score Model: An Empirical Analysis of Fraud Pentagon Theory in Indonesia, *International Journal of Financial Research*, Vol. 11, No. 6, 2020, p.154, doi: 10.5430/ijfr.v11n6p154.

[26] Yusrianti, H., Ghozali, I., Yuyetta, E., Aryanto, & Meirawati, E, Financial Statement Fraud Risk Factors of Fraud Triangle: Evidence from Indonesia, *International Journal of Financial Research*, Vol. 11, No. 4, 2020, pp. 36 – 51, doi: 10.5430/ijfr.v11n4p36.

[27] Saleh, M. M. A., Aladwan, M., Alsinglawi, O., & Almerai, M. O. S., Predicting Fraudulent Financial Statement using Fraud Detection Models, *Academy of Strategic Management*, Vol. 20, (Special Issue 3), 2021, pp. 1 – 17, Retrieved from https://www.researchgate.net/publication/355478325.

[28] Dechow, P. M., Ge, W., Larson, C. R., & Sloan, R. G., Predicting Material Accounting Misstatements, *Contemporary Accounting Research*, Vol. 28, No. 1, 2011, pp. 17 – 82. doi: 10.1111/j.1911-3846.2010.01041.x.

[29] Irawan, P. A., Susilowati, D., & Puspasari, N., Detection Analysis on the Fraudulent Financial Reporting Using Fraud Score Model, *SAR (Soedirman Accounting Review): Journal of Accounting and Business*, Vol. 4, No.2, 2019, pp. 161 – 180.

[30] Handoko, B. L., & Natasya., Fraud diamond model for fraudulent financial statement detection, *International Journal of Recent Technology and Engineering*, Vol. 8, No. 3, 2019, pp. 6865–6872. doi: 10.35940/ijrte.C5838.098319.

[31] Amara, I., Amar, A. Ben, & Jarbout, A. Detection of Fraud in Financial Statements: French Companies as a Case Study, *International Journal of Academic Research in Accounting, Finance and Management Sciences*, Vol. 3, No. 3, 2013, doi: 10.6007/ijarafms/v3-i3/34.

[32] Brazel, J. F., Jones, K. L., & Zimbelman, M. F., Using Nonfinancial Measures to Assess Fraud Risk, *Journal of Accounting Research*, Vol. 47, No. 5, 2009, pp. 1135 – 1166. doi: 10.1111/j.l475-679X.2009.00349.x.

[33] Harman, S. A., & Bernawati, Y., Determinant of Financial Statement Fraud: Fraud Pentagon Perspective in Manufacturing Companies, *Review of International Geographical Education*, Vol. 11, No. 4, 2021, pp. 554 – 566. doi: 10.17051/ilkonline.2020.04.166.

[34] Sabatian, Z., & Hutabarat, F. M., The Effect of Fraud Triangle in Detecting Financial Statement Fraud, *Jurnal Akuntansi*, Vol. 10, No. 3, 2020, pp. 231 – 244, doi: 10.33369/j.akuntansi.10.3.231-244.

[35] Sabău(Popa), A., Mare, C., & Safta, L. L., A Statistical Model of Fraud Risk in Financial Statements: Case for Romania Companies, *Risks*, Vol. 9, No. 6, 2021, p. 116, Retrieved from https://doi.org/10.3390/risks9060116.

Contribution of Individual Authors to the Creation of a Scientific Article (Ghostwriting Policy)

The author contributed in the present research, at all stages from the formulation of the problem to the final findings and solution.

Sources of Funding for Research Presented in a Scientific Article or Scientific Article Itself

This research has been granted funding from the Faculty of Business, Economics, and Communications, Naresuan University, for the fiscal year 2021.

Conflict of Interest

The author has no conflicts of interest to declare that are relevant to the content of this article.