"Effectiveness of the fraud triangle model in the detection of financial statement fraud in South African municipalities"

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EFFECTIVENESS OF THE FRAUD TRIANGLE MODEL IN THE DETECTION OF FINANCIAL STATEMENT FRAUD IN SOUTH AFRICAN MUNICIPALITIES

Abstract

There is a high prevalence of financial statement fraud and wasteful expenditure in South African municipalities. According to the fraud triangle model, pressure, opportunity, and rationalization are the underlying causes of financial statement fraud. The study aimed to examine the effectiveness of the fraud triangle model in detecting financial statement fraud in South African municipalities. The study developed variables serving proxy measures for pressure, opportunity, and rationalization. The variables were analyzed and tested using the logistics regression model and publicly available financial data for the 257 municipalities in South Africa over six years, from 2015/16 to 2020/21. The results showed a high correlation between fraud in financial statements and four fraud risk markers. High capital expenditure, high accrual amounts, poor liquidity ratios, and high leverage ratios are the risk elements. The results contribute fresh perspectives to the corpus of information already available on financial statement fraud in South Africa. To ascertain the effectiveness of the fraud triangle model in identifying and preventing financial statement fraud, future studies should incorporate different range of variables, techniques, and sample sizes.

INTRODUCTION

Fraud is a worldwide issue that cannot be overstated (Rabiu et al., 2017; Mongwe & Malan, 2020). Fraud is prevalent worldwide and significantly harms businesses in terms of losses and high bankruptcy rates (ACFE, 2020). Furthermore, fraud causes businesses worldwide to lose about 5% of their income. In addition, ACFE (2020) reported 2,504 actual fraud cases from 125 countries, where the corporations lost over USD 3.6 billion. Specifically, financial statement fraud is the most prevalent type of occupational fraud (ACFE, 2020). It causes the largest loss, accounting for about 10% of instances with an average loss of USD 800,000. Courtois and Gendron (2020) state that because the consequences of financial statement fraud are usually severe and frequently harm an organization's finances and reputation, they are not often reported. The complexity of occupational frauds makes them extremely challenging to detect. Many frauds are only unintentionally detected after continuing for extended periods, even with improved prevention and detection techniques.

According to the IAASB (2009), external auditors must give reasonable assurance that financial reports are presented honestly and without material misstatements that might result from fraud or er-

ror. Following ISA 240, the auditor must ensure that neither fraud nor error has caused any significant misstatements in the financial data. However, studies and practitioners disagree on the function of external auditors in fraud detection (Kassem, 2014). Although international accounting professional associations, scholars, and different regulatory agencies generally support the fraud triangle model (FTM), there are not many empirical statements connecting the FTM's theory to false financial reporting in South Africa. This study attempts to bridge the gap by experimentally examining how well the fraud triangle model detects financial statement fraud in South African municipalities.

1. LITERATURE REVIEW

The impact of fraudulent reporting on the South African public sector and potential underlying reasons have been widely researched over the last decade. This demonstrates the magnitude and gravity of the issue facing the nation. According to Laubscher (2012), a lack of consequence management and inefficient financial management brought on by hiring inexperienced employees are two major factors contributing to financial statement fraud in South African towns. This assertion was bolstered by the 2009/2010 report of the Auditor General of South Africa (AGSA), showing R5.6 billion, or USD 300 million, squandered in certain Free State Province municipalities without adequate accounting for expenses. Furthermore, the AGSA (2022) noted that the high frequency of fraud and unapproved, irregular, fruitless, and wasteful spending are among the major concerns that many municipalities in South Africa experience. Kelly (2016) pointed out that the primary responsibility for preventing and identifying fraud rests with those in charge of the entity's governance and administration, even though auditors are still obligated to alert management when they find evidence of fraud.

This study uses the fraud triangle model (FTM) as a theoretical framework to investigate how financial statement fraud can be detected in South African municipalities. To understand trust breaches and the causes of fraudulent behavior in companies, Cressey (1950) created the FTM, a three-pronged model that offers an efficient framework for assessing an organization's vulnerability to fraud and unethical activities. Businesses may reduce fraud and other unethical behavior by concentrating on preventing each component. Determining who is more likely to commit fraud and what circumstances increase the likelihood of fraud is another useful application of the concept. Businesses might use this to target specific areas with their anti-fraud efforts. According to the assumptions, three requirements must be satisfied for someone to act unethically. These include the following:

1) fraudsters require an inducement or coercion to perform misbehavior;

2) there must be a possibility of fraud, and internal auditors frequently concentrate on this area; and

3) fraudsters may frequently defend or explain their acts.

The three interconnected components of the FTM, pressure/motives, opportunities, and rationalization, are discussed. The perceived, typically non-shareable, financial necessity on the part of the fraudster is the pressure (motivation or incentive) component of the FTM. It is what motivates someone to commit fraud. Higson and Kassem (2013) divided pressure into three groups: external forces, work-related factors, and personal factors. According to Rabiu et al. (2017), societal and political forces can also exert pressure.

The conditions that make fraud possible are referred to as opportunities. A company has considerable, if not total, influence over this one element of the fraud triangle. According to Rabiu et al. (2017), inadequate or ineffective internal controls create opportunities for employees to perpetrate and cover up fraud. Organizations without internal controls are the source of 35% of reported fraud cases (ACFE, 2020). Therefore, in most situations, the chance of fraud happening rises as the danger of detection falls. According to Mohd-Sanusi et al. (2015), personnel will have the chance to engage in fraud if there are poor control environments, such as a lack of responsibility segregation and internal control flaws. Ghazali

et al. (2014) contend that perceived opportunity is caused by internal control flaws (Fitri et al., 2019). To rationalize the fraud, a moral justification must be created. This is the most challenging situation to see because it occurs in the perpetrator's head. Since many fraudsters see themselves as decent, everyday people rather than criminals, they must find a way to make their act of deception consistent with their ethical standards.

Rationalization has two components. The fraudster must first determine that the benefit of engaging in fraudulent activities outweighs the risk of being caught, and then, they must justify their actions. Job unhappiness, a sense of entitlement, or a plan to benefit the victim in the future can all be used as justifications. One can identify rationalization by observing the fraudster's remarks or dispositions. The existence of the fraud triangle model's risk components in South African municipalities increases the chance of fraudulent reporting.

Thus, the study aims to experimentally investigate the application and efficacy of the FTM:

$$Fraud = f \begin{pmatrix} Pressure, \ Opportunity, \\ Rationalization \end{pmatrix}. \quad (1)$$

According to the literature, fraud in many businesses is usually motivated by financial gain. According to Suyanto (2009), financial ratios can be a useful tool for identifying fraud in financial reports because the components of FTM are not readily visible. For example, unexpected changes in financial ratios can reveal information about potential fraud by the organization's administrators.

Aghghaleh and Zakiah (2014) stressed a greater chance of underlying fraud when businesses have financial difficulties since managers must meet financial targets, and fraud can be readily and temporarily covered up. Moreover, Özcan (2016) observes that businesses with high leverage may inflate their earnings to pay off their debt by falsifying financial statement data. Sabatian and Hutabarat (2020) also asserted that financial targets and fake financial statements are tightly related. It is plausible that pressure and financial statement fraud are positively correlated. In light of the preceding discussion, this study posits that financial ratios are substantially linked to the pos-

sibility of financial statement fraud. When managers are struggling financially or have a lot of leverage, they are more likely to commit fraud (Suyanto, 2009). False financial reporting, which transfers risk from owners to creditors, is more common in businesses with a large debt load, and management usually fabricates results in order to meet debt covenant obligations (Amara et al., 2013; Kirkos et al., 2007). Companies with notably high debt ratios are more likely to conduct crimes in this context. In this study, the debt ratio (Total liabilities/Total assets) was used to represent external pressure.

Since the debt ratio has been used extensively by previous studies as a gauge of financial leverage and a predictor of proximity to debt covenants, a good outcome is anticipated (Lou & Wang, 2009). Amara et al. (2013) contend that companies that are having trouble with liquidity are more prone to present false financial accounts. In other words, management may exaggerate the worth of the company's assets or reevaluate some liabilities to present a positive image of its liquidity status. Leverage and liquidity ratios serve as proxy indications of strain. A high leverage ratio raises the possibility of false financial reporting, while low liquidity ratios lead to dishonest financial reporting.

As mentioned before, opportunity describes the circumstances that make fraud possible. Without opportunity, fraud is impossible. In the fraud triangle, an opportunity is typically described as

a)   the existence of a control flaw; and

b)   the distant possibility of being detected, according to Roebuck (2016).

To decrease opportunities, the focus is on raising the perceived likelihood of detection and punishment (ACFE, 2020; Roebuck, 2016). Therefore, evaluating and guaranteeing the effectiveness of fraud detection and prevention strategies is essential. Several proxy indicators are available to assess efficacy. Some of the most popular techniques include comparing the median loss and detection period (ACFE, 2020), employees' assessments of the efficacy of anti-fraud controls (Ahmad et al., 2016), and an organization implementing a specific measure – such as a whistleblowing pro-

gram – with one that is not (Tunley et al., 2018). According to Maria and Gudono (2017), the quantity of capital expenditure serves as a stand-in for opportunity and can be changed to create a fictitious one. The likelihood of municipalities engaging in deceptive financial reporting increases with capital spending.

According to Maria and Gudono (2017), the quantity of capital expenditure serves as a stand-in for opportunity and can be changed to create a fictitious one. The likelihood of municipalities engaging in deceptive financial reporting increases with capital spending. Nonetheless, auditors may be aware of a logical explanation for the possible presence of managers' attitudes that encourage their dishonest behavior, Nakashima (2017) claims. Some earlier research has proposed employing some variables as stand-ins for rationalization (Aghghaleh & Zakiah, 2014; Nahartyo et al., 2020). These consist of audit views, audit quality, accruals accounting, and auditor modifications. The quality of external audits and total accruals were employed in this study as measures of risk rationalization.

This study suggests that the three fraud risk factors may help anticipate financial statement fraud in addition to helping identify fraud. The results may be advantageous since organizations that are more prone to engage in fake financial reporting might be identified using publicly available data. This study therefore tests the following hypotheses:

H1: *There is a positive relationship between financial statement fraud and pressure in municipalities in South Africa.*

H2: *There is a positive relationship between financial statement fraud and opportunity in municipalities in South Africa.*

H3: *There is a positive relationship between financial statement fraud and rationalization in South African municipalities.*

2. METHODS

The auditor's responsibility to identify materially misstated financial statements serves as the foundation for studies that examine the effectiveness of the fraud triangle model in preventing and detecting fraud. The aim of this study was to examine the fraud triangle model's efficacy in identifying financial statement fraud in South African municipalities. To achieve this purpose, a quantitative method was used to collect financial data from all 257 South African municipalities that AGSA audited throughout the six fiscal years from 2015/2016 to 2020/2021. This period is considered to be sufficiently long to give a plausible trend of the municipalities' performance. The sample comprises 205 local, 44 district, and 8 metropolitan municipalities. Due to the high potential of financial statement fraud associated with municipalities, all 257 South African municipalities were chosen for examination, regardless of whether their audit results were qualified or unqualified during the chosen 6-year period.

The data collected for the study were based on the three components of the FTM: pressure, opportunity, and rationalization. The data were gleaned from the websites of local government agencies, the AGSA, and the publicly available audited financial records of the municipalities. The data were organized using Microsoft Excel and analyzed using the logistics regression model. Pressure, opportunity, and rationalization are the independent variables. Since the independent variables cannot be measured directly, relevant financial ratios were used (as proxies) to measure indicators of financial condition and internal control systems for both pressure and opportunity. Table 1 displays the independent variables, indicators, corresponding proxies, description, and coding.

To investigate the relationship between fraud risk indicators and financial statement fraud, the study used the logistic regression model. The empirical framework takes into account risk elements, including pressure, opportunity, and rationalization, that raise the possibility of financial statement fraud.

The logistic regression model used to analyze the data is stated as follows:

$$Fraud_i = \beta_0 + \beta_1 LEV_i + \beta_2 LIQ_i + \beta_3 CAPEX_i + \beta_4 QEA_i + \beta_5 TA_i + \varepsilon_i, \tag{2}$$

where $Fraud = 1$, if the municipality experienced a qualified audit report previously, and 0, otherwise. $\beta_i ... \beta_n$ are the coefficients of the independent

Table 1. Fraud triangle model coding

Independent Variables	Indicators	Proxies	Description	Coding
Pressure	Financial efficiency	Financial leverage	$\dfrac{Total\ liabilities}{Total\ assets}$	LEV
	Financial position	Liquidity	$\dfrac{Current\ assets}{Current\ liabilities}$	LIQ
Opportunity	The complexity of the transaction and the organization	Capital Expenditure	$\dfrac{Capital\ expenditure\ by\ municipality}{Total\ provincial\ municipality\ expenditure}$	CAPEX
Rationalization	Audit reports	Quality of external audit	$Number\ of\ unqualified\ audits$	QEA
	Annual financial statements	Accrual ratio	$\dfrac{Surplus\ less\ cash\ flows}{Total\ assets}$	AR

variables (pressure, opportunity, and rationalization); *LEV* = Financial leverage (*Total Liability/ Total Assets*); *LIQ* = Liquidity (*Current Assets/ Current Liabilities*); *CAPEX* = Capital Expenditure (*Capital expenditure per municipality/Total provincial municipality expenditure*). *QEA* = Quality of external audit (*Number of unqualified audit reports*). *AR* = Accruals (*Surplus less cash flows from investing and operating activities/Total assets*); ε_i = Error term.

3. RESULTS

The data description in Table 2 shows that 47% of the municipalities had qualified audits, meaning that during the six years, 53% had unqualified audits.

Table 2. Descriptive statistics for dependent and independent variables

Variable	Mean	Std. dev.	Observations
Fraud (dependent)	0.470	0.360	1,542
LEV	0.287	0.314	1,538
LIQ	1.345	14.163	1,538
AR	0.014	0.258	1,537
CAPEX	0.035	0.061	1,542

Note: LEV = financial leverage; LIQ = liquidity; AR = accruals; CAPEX = capital expenditure.

According to the findings, municipalities having qualified audit reports demonstrate a high probability of financial statement fraud. The average values for the independent variables (fraud risk factors) can be interpreted as follows. Firstly, the financial leverage with a mean of 0.287 indicates the possibility of a 0.287 increase in the probabil-

ity of financial statement fraud occurring for every unit rise in financial leverage. This is in line with the results of some prior studies, such as Feruleva and Shtefan (2017) and Spathis (2002).

Secondly, the mean value of 0.014 for accruals indicates a 0.014 increase in the probability of the dependent variable (fraud) happening for every unit increase in accruals. Since the accruals risk is minimal, it may be said that there is a low chance of fraud happening. The results of earlier studies, such as Wadhwa et al. (2020), are in line with this finding. Compared to municipalities with unqualified audits, those with qualified audits had a lower accruals ratio. This result is consistent with previous studies that found municipalities with qualified audits had significantly lower quality earnings than those with unqualified audits (Wadhwa et al., 2020; Mehanna & Soliman, 2021).

According to Table 2, the mean for capital expenditure is 0.035, meaning that there is a 0.035 rise in the likelihood of the dependent variable (fraud) for every unit increase in capital expenditure. This implies that while there is a capital expenditure risk, the likelihood of fraud occurring is low. This is in line with the findings by Maria and Gudono (2017). Thus, it can be concluded that municipalities with high capital expenditures are more prone to understate their spending to commit financial statement fraud (AGSA, 2022). Typically, less municipal spending is the cause of a lower mean.

Figure 1 is a disaggregated analysis of audit outcomes in terms of qualified and unqualified audits for municipalities in the nine provinces. Compared
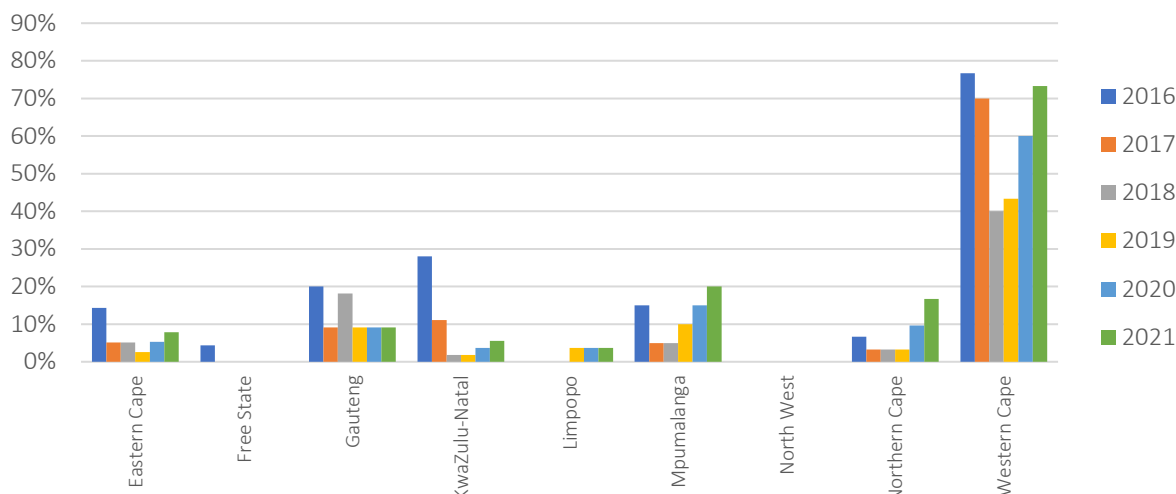
Figure 1. Provincial distribution of audit outcomes

to the other eight provinces, the Western Cape has by far the most unqualified audits of all nine of South Africa's provinces.

The model estimation of the average proxies employed in the study for each year is shown in Table 3.

Table 3. Aggregate mean values of fraud risk proxies (2016–2021)

Year	LEV	LIQ	AR	CAPEX
2016	0.241	1.617	0.018	0.035
2017	0.278	1.713	0.006	0.035
2018	0.272	1.814	0.040	0.035
2019	0.304	−0.441	0.020	0.035
2020	0.304	1.589	−0.008	0.035
2021	0.320	1.758	0.010	0.035

Note: LEV = financial leverage; LIQ = liquidity; AR = accruals; CAPEX = capital expenditure.

Table 3 shows that, except for 2019, when the risk factor was low, liquidity has the highest pressure risk factor in all fiscal years. Higher risk is indicated by all average proxies for liquidity greater than 1. This means that current assets are greater than current liabilities, raising the possibility of fraud at the level of financial statements. Since overall liabilities are more than total assets, financial leverage generated a mean of 0.2 to 0.3, which also raises the possibility of fraud. Fraud and the pressure risk factor are positively correlated. For each of the six fiscal years, the accrual ratio has the lowest average proxies. The financial year 2018 recorded the highest proxy, indicating a high likelihood of fraud. The results also show rationalization is possible because surplus cash flows are less than total

assets. The rationalization risk factor and fraud resulting from possible earnings manipulation are positively correlated. Across all six fiscal years, capital expenditures remain constant. When compared to other capital expenditures, the provincial capital expenditure is higher. This means that the rationalization risk factor is positively correlated with financial statement fraud.

Table 4. Disaggregated mean values of fraud risk proxies by province

Province	LEV	LIQ	AR	CAPEX
Eastern Cape	0.16	1.83	0.02	0.01
Free State	0.40	−3.11	−0.04	0.05
Gauteng	0.55	0.77	0.02	0.02
KwaZulu-Natal	0.16	2.33	0.04	0.04
Limpopo	0.21	1.81	0.05	0.02
Mpumalanga	0.32	1.67	0.00	0.04
North West	0.39	1.13	−0.12	0.05
Northern Cape	0.43	1.00	0.04	0.04
Western Cape	0.32	2.44	0.04	0.05

Note: LEV = financial leverage; LIQ = liquidity; AR = accruals; CAPEX = capital expenditure.

Table 4 shows the disaggregated mean values of fraud risk proxies per province. Gauteng Province has the highest financial leverage (0.55), indicating a very high risk of pressure fraud. With a financial leverage of 0.16, KwaZulu-Natal and the Eastern Cape were expected to have a minimal risk of fraud pressure. With proxies of 2.44 and 2.33, respectively, KwaZulu-Natal and the Western Cape have high liquidity, which indicates that pressure was on the municipality to falsify financial statements to commit fraud. The accrual ratios for the

Table 5. Pairwise correlation matrix for fraud risk factors (2015–2021)

Variables	Unqualified Audit	LEV	LIQ	AR	CAPEX
Unqualified Audit	1	–	–	–	–
LEV	0.017	1	–	–	–
	0.510	–	–	–	–
LIQ	0.036	−0.008	1	–	–
	0.155	0.760	–	–	–
AR	0.048	−0.038	0.116	1	–
	0.060*	0.133	0.000***	–	–
CAPEX	0.045	0.084	−0.038	−0.037	1
	0.080*	0.001***	0.133	0.153	–

Note: LEV = financial leverage; LIQ = liquidity; AR = accruals; CAPEX = capital expenditure. ***Significant at 1%; **Significant at 5%; * Significant at 10%.

Free State and Northwest provinces show a negative outcome because of losses incurred, which may be the result of understating profits to commit fraud. Due to excess and a higher danger of fraud, accruals for other provinces are positive. The high average capital expenditure figures for North West, Free State, and Western Cape suggest that fraud is more likely.

Table 5 presents the pairwise correlation matrix for the fraud risk factors for the six years, from 2016 to 2021.

Table 5 shows that the liquidity ratio, current assets to current liabilities, and total liability to total assets are positively correlated with the incidence of fraud.

The association between the independent factors and financial statement fraud was further tested using the logistics regression framework. The results are displayed in Table 6.

Table 6. Logistic regression results for estimating the fraud triangle model

Variables	Estimates		Marginal effect	
LEV	0.188	0.133	0.041	0.029
LIQ	0.106	0.017	0.023***	0.004
AR	0.271	0.164	0.060*	0.036
CAPEX	1.251	0.556	0.275**	0.123
_cons	-1.334	0.072		

Note: N = 1,537; likelihood ratio χ^2 = 46.57; Prob(χ^2) = 0.000; Pseudo R^2 = 0.035; log likelihood = −633.92. * $\rho < 0.1$, ** $\rho < 0.05$; *** $\rho < 0.01$. LEV = financial leverage; LIQ = liquidity; AR = accruals; CAPEX = capital expenditure.

Table 6 shows that the financial leverage risk (0.188) is positive but statistically insignificant (H1 = 1). This means that financial statement fraud is expected to increase by 0.188 times a year. Regarding liquidity, Table 6 demonstrates that the risk of liquidity (0.106) is both positive and significant. Accordingly, financial statement fraud is anticipated to increase by 0.106 times a year. Accruals risk (0.271) is positive and significant, as Table 6 demonstrates. Accordingly, financial statement fraud is anticipated to rise by 0.271 times annually. Additionally, there is a strong correlation between total accrual and financial statement fraud. This outcome is in line with earlier research (Wadhwa et al., 2020; Mehanna & Soliman, 2021; Nakashima, 2017). Fourthly, Table 6 shows that the capital expenditure risk (1.251) is higher than the average of 1. Accordingly, financial statement fraud is anticipated to increase dramatically annually. Municipalities with significant capital expenditures are found to be more vulnerable to such fraud risk factor as opportunity (Beasley et al., 2000; Nakashima, 2017; Wadhwa et al., 2020; Mehanna & Soliman, 2021).

4. DISCUSSION

The findings indicate that the mean value for leverage is positive, indicating that the dependent variable, fraud, has a high likelihood of occurring with each unit increment in the fraud risk factor, financial leverage. Furthermore, the largest leverage ratio was found in Gauteng, followed by the Eastern Cape and KwaZulu-Natal, respectively, indicating that municipalities in these provinces are more likely to commit fraud than those in other provinces. Additionally, the results show that the leverage ratio began to rise between the financial years of 2019 and 2021, in-

dicating that municipalities were at a high risk of pressure-related fraud during these years. Also, the logistics regression results showed a positive association between fraud and leverage ratio, despite the correlation matrix showing a negative correlation. This suggests municipalities with high leverage ratios are more likely to commit financial statement fraud. The results of the logistics regression analysis revealed a strong positive correlation between fraud and liquidity ratio, despite the correlation matrix showing a negative correlation between the two. This may suggest that municipalities with poor liquidity ratios are more likely to engage in financial statement fraud. The findings agree with studies by Amara et al. (2013) and Lou and Wang (2009) who concluded that companies are more likely to misrepresent financial statements when faced with poor liquidity circumstances by increasing the value of assets or manipulating reported.

The regression results show that opportunity and fraud in the municipalities are significantly positively correlated. Despite the modest size of the proxies, the study indicated that the average proxies for capital expenditure across the entire 6-year period were positive, supporting the idea that there is a positive correlation between municipal expenditures and fraud. The study also discovered that the Western Cape, Free State, and Northwest provinces have the highest average capital expenditure, indicating a higher likelihood of financial statement fraud. Although the correlation matrix showed a negative association between capital expenditure and fraud, the regression results showed that the two variables were positively correlated. In light of these findings, it may be said that municipalities with higher capital expenditures are more likely to engage in financial statement fraud. The findings support the studies by Maria and Gudono (2017) and Nakashima (2017) who found that increased capital expenditure may give more opportunity for the occurrence on fraudulent financial reporting.

The regression results suggest that fraud and rationalization in South African municipalities are significantly positively correlated. According to the analysis, because of AGSA's high-quality audit, the number of municipalities that earned qualified audit outcomes dropped from 144 in 2019 to 111 in 2021, while the number of municipalities that gained unqualified audit outcomes increased from 113 in 2019 to 139 in 2021. On average, there were more unqualified audit results than qualified audit results (53% unqualified audit results versus 47% qualified audit results). These findings indicate that AGSA's auditing reduced the likelihood of municipalities committing financial statement fraud. The results further indicate that municipalities' average accrual ratio over the six years was low and positive, indicating a low level of accrual risk fraud. Compared to other provinces, the Western Cape, KwaZulu-Natal, and Limpopo had the highest accrual ratios, indicating that municipalities in these provinces had a higher risk of rationalization fraud. Lower average proxies during the study period provide more support for this. It should be emphasized that the results of the logistics regression showed a significant positive association between fraud and total accrual ratio, despite the correlation matrix showing a negative correlation between the two. Therefore, it may be said that municipalities' propensity to engage in financial statement fraud is reflected in the notable positive total accruals. The findings agrees with extant studies that found that rationalization is positively corelated with the occurrence of fraudulent financial reporting (Aghghaleh & Zakiah, 2014; Nahartyo et al., 2020).

CONCLUSION

Several accounting scandals, including the State Capture and VBS saga, have previously unsettled South Africa. As a result, the public began to question the accuracy of published annual reports and financial figures. The study aimed to examine the effectiveness of the fraud triangle model in detecting financial statement fraud in South African municipalities. To assess the probability of fraud, the current study used a logistics regression framework, with proxy variables, that examined three fraud risk indicators taken from the fraud triangle model, which serves as the basis for several standards.

The association between a low liquidity ratio and a significant leverage ratio is shown to be positively consistent with previous studies. All of the mean and average proxies' results are significant. Leverage was found to be positive but not significant using the logistics regression framework, while liquidity was found to be significant. According to the findings, pressure is a good indicator of financial statement fraud, even if the mean and average proxies are negligible. It is further established that there is a positive link between the accrual ratio and capital expenditure, which is consistent with earlier studies. However, the accrual ratio was revealed to be a significant indicator of fraud by the logistics regression framework. Finally, it has been demonstrated that the two risk fraud factors, rationalization and opportunity, are effective in detecting financial statement fraud.

The literature on fraud risk factors, in particular the fraud triangle model, has benefited from this study. Although fraud is a broad topic and can involve complex situations, this study has looked into fraud risk variables. The results can be used to reveal fraud aspects in private enterprises and other countries' financial statements. Fraud risk assessments can also help other stakeholders, such as internal auditors. Additionally, this study can help professional associations and organizations discover early fraud indicators and take steps to prevent it. Subsequent investigations can be conducted by classifying the municipalities into three categories: those that have committed fraud, those that have attempted to commit fraud, and those that have not.

AUTHOR CONTRIBUTIONS

Conceptualization: Ambani Tshikovhi.
Data curation: Ambani Tshikovhi.
Formal analysis: Ambani Tshikovhi, Emmanuel Oseifuah, Arthur Reynolds.
Funding acquisition: Ambani Tshikovhi.
Investigation: Ambani Tshikovhi.
Methodology: Ambani Tshikovhi.
Project administration: Ambani Tshikovhi.
Resources: Ambani Tshikovhi.
Supervision: Emmanuel Oseifuah, Arthur Reynolds.
Validation: Ambani Tshikovhi, Emmanuel Oseifuah, Arthur Reynolds.
Visualization: Ambani Tshikovhi.
Writing – original draft: Arthur Reynolds.
Writing – review & editing: Emmanuel Oseifuah.

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