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Forensic Accounting and Fraud Management in Nigeria

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Abstract

The study evaluated forensic accounting techniques on fraud management in the public sector ministries, departments and agencies (MDAs) in Nigeria. Based on the rise in corruption in Nigeria, evidenced in the latest Transparency International corruption perception index of Nigeria, and the fact that the public sector constitutes a larger part of the economy in Nigeria, this study was undertaken to ascertain the operational ability of forensic accounting techniques in public sector accounting departments. The study investigated how data mining, accounting ratios and trend analysis tools detect to prevent fraudulent activities in MDAs. A survey research design was adopted for the study. The ordinary least squares (OLS) multiple regression analysis technique revealed that the adoption of forensic accounting tools (data mining, accounting ratios and trend analysis) will significantly enhance the ability to detect and/or prevent fraud in MDAs. It also revealed a knowledge gap in the application of these preventative control techniques and the usefulness of trend analysis as a technique for detecting fraudulent practices in public service operations. It is thus recommended that the human capital of MDAs is developed by making professional qualifications and knowledge of information technology mandatory requirements for staff working in the accounts department and ensuring robust IT facilities.

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1. Introduction

It is a common perception in Nigeria that government ministries, departments and agencies (MDAs) are among the most vulnerable to fraudulent practices, with weak anti-corruption laws and management (Ewa, Adesola, & Kankpang, 2019). The 2004 Association of Certified Fraud Examiners (ACFE) Report to the Nations, stated that MDAs, among others, were the most represented sectors in the occupational fraud cases (1,483) analyzed (ACFE, 2004). According to ACCA and EY (2020), the magnitude of fraudulence and financial crimes is huge globally.

Ewa, Adesola, and Eseneyen (2020) revealed a significant relationship between the application of forensic accounting techniques and fraud detection and prevention. The study showed that ratio analysis, data mining and trend analysis techniques are considered significant in preventing or detecting fraudulent practices in the banking sector. Ministries, departments and agencies (MDAs) of government or private sector organizations' daily operational activities are evaluated, monitored and measured in monetary terms (financial statements).

This covers personnel, production, capital, and recurrent and overhead expenditure recognition. The recording of these transactions may be clouded with fraudulent intentions by employees who wish to satisfy personal ambitions. Financial statements are the means through which the worth or health of entities are appraised for investment and policy decisions. The growing trend of personnel manipulating financial statements and covering their tracks to prevent their fraudulent activities from being discovered (making an otherwise unprofitable proposal look profitable to influence investment decisions) is a matter of concern necessitating essential controls to prevent such manipulation within the system. These sinister motives negatively impact organizations' survival and are often perpetrated through various methods or schemes, be it in revenue recognition or expense classification.

As various techniques are being adopted to commit fraud, organizations are also deploying anti-fraud techniques (forensic accounting techniques) to detect fraudulent activities. In Nigeria, the public sector comprising MDAs drives economic growth as it plays a leading role in capital formation. Fraud causes reputational damage that can affect any organization, and virtually all sectors of the Nigerian state are exposed to it because they all depend on public funds to be profitable and solvent. The consequences of these criminal acts have affected Nigeria's corruption perception ranking, and this has resulted in a drop in investment in Nigeria, which has had an adverse effect on economic growth.

1.1. Research Problem

With the developments in telecommunication facilities, fraudsters are continuously developing new techniques to outwit organizations' internal control systems. Also, with the introduction of electronic banking services, which are online in real time, it is essential to implement controls to ensure that fraudulent activities are identified and blocked in real time. As Wall and Fogarty (2016) stated, fraud mitigation remains crucial and thus implementation of robust internal control applications, auditing and regulatory policies are essential. Exposing and addressing dishonest activity and unlawful financial flows entails setting up relevant and effective control mechanisms that can track and expose these acts. Earlier research on this area considered responses from participants drawn from deposit money banks operating in Nigeria. This study replicates a previous study that focused on participants drawn from banks but now considers participants recruited from the public sector of the Nigerian economy with a view to validating the earlier results and findings.

1.1.1. Research Objective

Arising from the continuous invention of fraudulent schemes to outwit organizations' internal controls, this study evaluates the impact of forensic accounting techniques in preventing/detecting fraudulent practices in MDAs in Nigeria.

Specifically, this study aims to:

a) Determine the ability of data mining in detecting or preventing fraudulent practices in MDAs.
b) Determine the ability of the ratio analysis technique (RAS) in detecting or preventing fraudulent practices in MDAs.
c) Determine the ability of the trend analysis technique (TRD) in detecting or preventing fraudulent practices in MDAs.

1.2. Research Problems

The following questions are postulated to address the research objectives:

i. To what extent does data mining detect/prevent fraudulent practices in MDAs?
ii. To what extent does the ratio analysis technique (RAS) detect/prevent fraudulent schemes in MDAs?
iii. To what extent does the trend analysis technique (TRD) detect/prevent fraudulent practices in MDAs?

1.3. Research Hypotheses

The research hypotheses are:

H_{01}: *The utilization of the data mining technique in the accounting systems of MDAs has no substantial effect in preventing/detecting fraudulent acts.*

H_{02}: *The application of the ratio analysis technique has no significant effect in preventing or detecting fraudulent financial practices in MDAs in Nigeria.*

H_{03}: *The adoption of the trend analysis technique in the financial analysis of MDAs has no significant effect in preventing or detecting fraudulent activities in the organizations.*

2. Literature Review

2.1. Theoretical Framework

Fraud is defined by different authors in different ways according to the circumstances. Some define fraud as deception with intent to obtain someone else assets. Black's Law Dictionary defines fraud as "*...all multifarious means which human ingenuity can devise, and which are resorted to by one individual to get an advantage*

over another by false suggestions or suppression of the truth. It includes all surprise, trick, cunning, or dissembling, and any unfair way by which another is cheated."

It thus involves deception, confidence, and trickery. This study is based on the Fraud Diamond Theory and the Fraud Triangle Theory.

2.1.1. The Fraud Diamond Theory

The Fraud Diamond Theory is an extension of the Fraud Triangle Theory. David Wolfe and Dana Hermanson fused 'the element of capability—personal traits and abilities' that plays a major role in determining whether fraud will actually be carried out or not. The theory, which was propounded by Wolfe and Hermanson (2004), considers the four perceptions as triggering elements that must be contemporaneous for fraud to occur. The fraud theory model, which was propounded by Cressey, highlights certain elements or features that increase the probability of fraud occurring in any given situation, but the theory didn't provide perfect guidance. The Fraud Diamond Theory, therefore, is an improvement of the Fraud Triangle Theory to address the other precipitating factors not addressed by the fraud triangle model by introducing a fourth perceived element (capability) that must exist in the system for fraud to occur. Thus, in addition to addressing incentive, opportunity and rationalization, Wolfe and Hermanson added the individual capability or capacity of the fraudster as an essential ingredient that leads to the occurrence of fraud. They reasoned that although there may be opportunity, pressure, and rationalization for fraud to occur, without the right capabilities of the fraudster, the fraud will not occur.

2.1.2. Fraud Triangle Theory

Classic Fraud Theory elucidates the motives behind fraud as a triangle of perceived opportunity, pressure, and rationalization. The term 'Fraud Triangle' is credited to Edwin Sutherland, who coined the term in his book *White Collar Crime* in 1949. He is thus adjudged as the primary contributor to the model. Cressey (1953) developed the theory in an attempt to explain what causes or motivates people to commit fraud or crime. Arising from extensive talks with convicted swindlers in prison, he discovered that for fraud to occur, three elements must be present – motivation or pressure, rationalization and opportunity. He observed that deception or crime will take place only when the individual is under pressure or there is a motivating factor. This factor may be great financial need, an unrealistic target set by the organization, or the organization's reward system, such as performance bonuses or penalties for individuals if they fail to achieve set targets. Nevertheless, even with the pressure to commit fraud, without the presence of an enabling environment (opportunity), the fraud will not occur. Therefore, clear opportunities, such as weak internal controls, absence of proper accountability, or lack of supervision to enable the swindler to gain access or control over the resources to be defrauded, must be present. The cost or repercussions of the fraudster being caught and the potential benefits from committing the crime must be weighed. Although there may be pressure and opportunity for fraud to occur, the theory postulates that without rationalization, which is justification for a given action, fraud will not be committed. Rationalization finalizes the precipitating factors that must be contemporaneous for fraud to occur. This is self-justification for deviant behavior, e.g., justifying the criminality by advancing probable reasons why the action is necessary and therefore acceptable or normal.

2.2. Forensic Accounting

Forensic accounting, which is the utilization of accounting, auditing, and investigative skills to support in litigation, expert determination and investigation of suspected fraudulent practices, irregularities or impropriety disputes, involves the use of investigative tools as well as an investigative mindset. It incorporates financial expertise, fraud awareness and a sound knowledge and understanding of business operations and the functioning of the prevailing legal system in a given organization or entity. The objective of forensic accounting is to support propagation of the necessary data regarding governance and ethical policies to interested parties within and outside the organization with a view to maintaining a good image of the respective organizations to its stakeholders and building effective communication processes and transparency.

2.2.1. Forensic Investigative Tools

Forensic accounting techniques or tools assist investigators in discovering and examining unexpected or unusual patterns and relationships in financial systems. As fraud is the intentional misappropriation of an organization's funds by employees, agents or customers, financial analysis is a useful investigative technique when the subject matter of the investigation is more likely to be reflected in the records and financial statements of the organization. As the objective of analytical procedures is identification of unexpected relationships that do not make sense, various tools are applied to streamline the investigation using certain sections of the organizations' accounts that might have been affected by fraudulent activity. Abnormal or unusual transaction patterns may indicate errors, illegal acts or fraud. These forensic accounting analysis tools or technique are detailed in the following sub-sections.

2.2.1.1. Trend Analysis

Trend analysis involves matching features of financial statements (revenue, expenditure, assets, and liability heads) with a common base item. This may be a vertical trend analysis or a horizontal trend analysis. The process of performing the same analysis on a disaggregated or a geographical basis often gives the forensic accounting investigator a deeper insight into which branch or unit of the organization is driving an unusual relationship or if one segment of the entity is an outlier. Arising from the criticism of horizontal and vertical trend analysis that is commonly applied by organizations, Enyi (2019) proposed a combination of horizontal and vertical trend analyses, which he named relational trend analysis (RTA).

2.2.1.2. Data Mining

The data mining concept gained prominence in the 1990s. It is widely applied in organizations to enhance performance and gain a competitive edge over their competitors (Hormozi & Giles, 2004). The technique helps in extracting and analyzing various data patterns, information, or trends from large databases. Queries or searches are performed within accounts or other clients' data to identify anomalous individual items. This involves scanning transaction listings, identifying gaps in check runs, identifying duplicate invoice numbers or payment vouchers numbers, identifying payroll payments made to the same payee within the query period, and matching return dates and credit memos to test for proper cut-offs. It also includes comparing recent invoice prices with costs on the archived inventory records, filtering transactions to identify all new suppliers, identifying non-standard journal entries under dispute, and grouping customers' accounts by balance size or employees by overtime pay. The technique applies decision trees, neural networks and Bayesian belief networks.

2.2.1.3. Financial Ratios

A ratio analysis assesses the correlation among different financial statement transaction items. It also assesses the relationships among non-financial data. These computed ratios are compared either on a historical basis or on an industry basis or against a defined benchmark. Ratio analysis is only a guide for further inquiries, as when unanticipated changes occur, source documents and related accounts are examined in more detail.

2.2.1.4. Reasonableness Testing

This is a technique of benchmarking the results recorded in the financial statements against an independent expectation. Here, the forensic accountant benchmarks the individual transaction items against a defined external benchmark standard, and any unusual fluctuations identified when comparing this independent view with the amount recorded in the financial statements is investigated. This tool makes use of a regression analysis technique, which will yield an explicit prediction based on solid inputs to establish the prediction against which to make a comparison.

2.3. Empirical Review

Many researchers have assessed the position of forensic accounting in business and its impact in detecting and/or preventing fraudulent practices in Nigeria and globally. Ewa et al. (2020) revealed a significant positive relationship between forensic accounting techniques and fraud detection/prevention in the banking sector in Nigeria. Izedonmi and Ibadin (2012) investigated forensic accounting and financial crimes by assessing rudimentary and common financial crimes in enterprises operating in Nigeria and revealed that the motive for financial crimes hinges around the pressure, opportunities and rationalizations that the fraudsters are exposed to.

Zachariah, Masoyi, Ernest, and Gabriel (2014) carried out a study on the utilization of forensic auditing tools in fraud management. They suggested the use of forensic auditors in Nigeria by redrafting the country's Audit Act to make it mandatory to have forensic auditors in each audit team. Njanike, Dube, and Mashayanye (2009) found that the lack of technical capacity and essential working resource materials, management meddling on audit assignments, and non-recognition of the profession all served as impediments.

Okafor and Agbiogwo (2016) opined the need to review improve accountants' skills to improve their efficiency and effectiveness in service delivery. Enofe, Omagbon, and Ehigiator (2015) opined that frequent utilization of forensic auditing services will considerably enhance fraud detection and prevention and reduce dishonest activities.

Okoye and Gbegi (2013) showed that the creditably of forensic accountants assisted in reviewing the extent and methodology of audits when the risk of management fraud was considered high. The study suggested enhanced training and the use of forensic accountants from the planning stage of an audit of high risk enterprises. Bassey (2018) revealed that strict litigation support and forensic examination services by forensic accountants of microfinance banks significantly reduced scams and played an important part in crime and corruption deterrence.

Modugu and Anyaduba (2013) found substantial compromise among the interested parties on the proficiency of forensic accounting services in monitoring fraudulent practices, enhancing the features of financial reports as well as upgrading the quality of internal control systems in organizations.

Enofe, Agbonkpolor, and Edebiri (2015) highlighted the urgent necessity for fraud examiners or investigators in the banking sector in Nigeria as their study found forensic accounting to be an essential ingredient to checkmate financial misconduct. Ezejiofor, Nwakoby, and Okoye (2016) studied the impact of forensic accounting in combating fraud in the banking sector and revealed its effectiveness as a tool to contain financial delinquencies and transparency in the banking sector. Enofe, Okpako, and Atube (2013) revealed that the number of fraud incidences in the organizations studied was positively affected by the application of forensic accounting services.

Onodi, Okafor, and Onyali (2015) applied a survey research design method and found a significant relationship between the forensic investigative application and corporate fraud deterrence. But Alabdullah, Alfadhl, Yahya, and Rabi (2014), who also adopted a survey research method, found a significant relationship between audit firms detecting fraudulent activities in financial records and the application of forensic accounting techniques in their work programme.

Arising from the worryingly high percentage of reported financial statement fraud globally, Gupta and Gill (2012) examined the data mining framework for fraud prevention and detection and proposed a framework with features that should include the various financial ratios that measure profitability, liquidity, safety and efficiency as well as incorporate behavioral characteristics. In their study of data mining for fraud detection and prevention, Sheela and Sandip (2011) stated that this technique is a potent method employed by many organizations to improve their operations and competitive advantage. Kirkos, Spathis, and Manolopoulos (2007) explored the efficacy of decision trees, neural networks and Bayesian belief networks in identifying fraudulent financial statements and found reliance between falsification and debt to equity, net profit to total assets, sales to total assets, working capital to total assets and the Z score under the Bayesian model. Mousa (2016) found the logistic regression model tool to be the leading data mining tool adopted by many entities in detecting financial fraud. In their study, Onuorah and Ebimobowei (2012) found a robust influence of forensic accounting applications on the extent of fraudulent activities taking place in the banks examined.

3. Research Design

The study implemented a survey research design to ascertain the extent to which forensic accounting prevents or detects fraudulent practices in MDAs in Nigeria. Respondents were drawn from among accountants, auditors, information technology (IT) specialists and related disciplines working in MDAs in the South South geopolitical zone of Nigeria's public service. Purposive sampling was adopted to ensure that only knowledgeable respondents were recruited in the study. The choice of purposive sampling means that the researcher needs to use his dexterity and prior understanding to choose respondents (Ogunbameru, 2003) based on their specialty. A total of 350 respondents were chosen from the population of the study. A five-point Likert scale was used to grade the responses (to a very large extent (TAVLE) – 5 points; to a large extent (TALE) – 4 points; not to a large extent (NTALE) – 3 points; not to a very large extent (NTAVLE) – 2 points; and to no extent at all (TNEAA) – 1 point. A total of 251 questionnaires (72%) were returned.

Since this study is perception-based, primary data were collected from the questionnaire responses. This choice is centered on the theory that the best method to gather information regarding what is happening is to ask questions (Patton, 1990). The questionnaire is divided into Section A and Section B. Section A comprises demographic questions, while section B comprises belief questions that produced answers on the relationship between the use of forensic accounting techniques and fraud prevention and detection in the public sector in Nigeria.

3.1. Data Analysis Techniques

The study tested the application of forensic accounting techniques on fraud prevention and detection in the public sector in Nigeria by using a multiple regression analysis model and descriptive statistics.

3.2. Model Specification

The model specification for examining forensic accounting techniques as tools in detecting or preventing fraudulent practices is as follows:

$$FRP = f(DM, RA, TRD)$$

It is stated econometrically as:

$$FRP = \beta_0+\beta_1 DM+\beta_2 RA+\beta_3 TRD+\mu$$

Where:
β_0 = Unknown constant term to be estimated.
FRP = Fraud prevention and detection.
DM = Data mining technique.
RA = Ratio analysis technique.
TRD = Trend analysis technique.
μ = Stochastic error term.
β_1–β_3 = Unknown coefficients to be estimated.
$\beta_0, \beta_1, \beta_2, \beta_3 \geq 0$

Table 1A. Results summary of the analysis of the commercial data mining technique.

S/N	Belief questions	TAVLE	TALE	NTALE	NTAVLE	TNEAA
1	Your MDA has a facility that can query or search accounts entries or clients' data to identify anomalies	14	35	3	171	28
2	Your MDA has scanning software that can scan transaction listings	9	31	10	197	3
3	Your MDA has a facility that can identify gaps in check runs	4	29	11	195	4
4	Your MDA has a facility that can identify duplicate numbers in invoice and payment voucher numbers	11	32	9	2	197
5	Your MDA has a facility that can identify duplication in payroll payments within a query period	16	31	9	193	2
6	Your MDA has a facility to compare recent invoice prices with archived inventory records	7	29	13	5	195
7	Your MDA has a facility to filter transactions to identify new suppliers, profile customers by account balance, and profile staff by overtime earned	5	30	14	5	195

Source: Field survey analysis (2021).

Table 1A presents a summary of the responses to the belief questions regarding the application of commercial data mining techniques in MDAs; Table 1B contains a summary of responses regarding the application of the ratio analysis technique; Table 1C contains a summary of responses on the use of the trend analysis technique; and Table 1D presents a summary of responses regarding the ability of the variables in Tables 1A, B and C to detect or prevent fraudulent practices in MDAs.

Table 1B. Results summary of ratio analysis technique.

S/N	Belief questions	TAVLE	TALE	NTALE	NTAVLE	TNEAA
1	It is a mandatory requirement in your establishment that when unexpected changes are observed in the accounts during ratio analysis, source documents and related accounts are examined in more detail	13	19	18	3	198
2	Your establishment is routinely required to carry out a ratio analysis and compare on a historical, industry and benchmark basis	6	16	20	6	202
3	A ratio analysis is mandatorily adopted for monitoring line, sector and unit income and expenditure heads in your establishment	8	13	21	5	204

Source: Field survey analysis (2021).

Table 1C. Results summary of the trend analysis technique.

S/N	Belief questions	TAVLE	TALE	NTALE	NTAVLE	TNEAA
1	It is mandatory for your agency to analyze, by department and location, yearly capital vote expense heads with a base year over a 4-year period	11	17	21	3	198
2	It is mandatory for your MDA to carry out an analysis of its financial statements' line items with a base year over a 4-year period	7	25	15	3	200
3	It is mandatory for your treasury department to analyze revenue heads yearly against budgeted estimates over a 4-year period	9	14	20	6	202

Source: Field survey analysis (2021).

Table 1D. Results summary of the analysis of fraud prevention/detection.

S/N	Belief questions	TAVLE	TALE	NTALE	NTAVLE	TNEAA
1	How would you rank your organization in the application of data mining techniques for preventing and detecting fraud in the system?	6	29	13	198	5
2	There is no possibility of fraudulent practices in your establishment not being discovered	17	27	9	195	3
3	My establishment is equipped to track double payments and ghost worker payments	13	23	15	195	5
4	My establishment is equipped to prevent duplication of payments	13	27	13	2	194
5	My establishment has controls embedded in the system to detect fraud	5	28	20	195	1
6	My establishment has the ability to trace over-invoicing in the accounts department	7	34	14	195	1
7	My establishment has on many occasions prevented and/or detected fraudulent infractions in the system from carrying out an analysis	4	22	22	5	197
8	My establishment highly utilizes ratio analysis in preventing and/or detecting fraudulent practices in the system	6	17	21	196	11
9	My establishment is able to track abnormalities between periods following a ratio analysis	8	17	16	195	14
10	My establishment highly utilizes the trend analysis technique in preventing or detecting fraudulent practices in the system	9	15	23	4	200
11	My establishment is able to discover unusual expenditure patterns in a trend analysis of its operations	6	18	22	4	200
12	My establishment is able to track abnormalities via a trend analysis	6	21	21	3	200

Source: Field survey analysis (2021).

4. Data Presentation

4.1. Data Analysis

In Table 2, the mean values of the raw data are 14.2430, 4.5259, 4.5857 and 24.0797 for DM, RA, TRD and FRP, respectively. The minimum values are 10.0, 3.0, 3.0 and 19.0 for DM, RA, TRD and FRP, respectively, and the maximum values are 33.0, 15.0, 15.0 and 55.0 for DM, RA, TRD and FRP, respectively. The standard deviations for each of the variables are 6.53550 for DM, 3.12319 for RA, 3.27347 for TRD and 10.10157 for FRP. The results show the absence of forensic accounting tools in the administration of financial control in the MDAs.

The Pearson product-moment formula was adopted to compute the inter-variable correlations. These correlation coefficients are given in Table 3 and show that three independent variables (DM, RA, and TRD) correlated significantly with the dependent variable (FRP). The inter-correlations among the independent variables are also significant.

Although this phenomenon is not desirable in a multiple regression analysis, it validates our assertion that they are all elements of one variable called the forensic accounting technique. The significance of their correlation with the dependent variable suggests that they may be significant predictors of fraud prevention and detection. The result implies a significant agreement in their variations.

Table 2. Descriptive statistics results on the effect of data mining (DM), ratio analysis (RA), and trend analysis (TRD) techniques on fraud prevention/detection (FRP).

Description	N statistic	Minimum statistic	Maximum statistic	Mean statistic	Std. deviation statistic	Kurtosis	
						Statistic	Std. error
Gender	250	1.00	2.00	1.196	0.398	0.377	0.307
Qualification	245	1.00	5.00	3.988	1.189	-1.151	0.310
Age range	248	1.00	4.00	2.726	0.972	-0.469	0.308
DM	251	10.00	33.00	14.243	6.536	1.014	0.306
RA	251	3.00	15.00	4.526	3.123	2.182	0.306
TRD	251	3.00	15.00	4.586	3.273	1.634	0.306
FRP	251	19.00	55.00	24.079	10.102	1.763	0.306

Table 3. Intercorrelation among the variables.

Description	Variable	FRP	DM	RA	TRD
Pearson correlation	FRP	1.000	0.904	0.931	0.934
	DM	0.904	1.000	0.883	0.861
	RA	0.931	0.883	1.000	0.872
	TRD	0.934	0.861	0.872	1.000
Sig. (1-tailed)	FRP	1.000	0.000	0.000	0.000
	DM	0.000	1.000	0.000	0.000
	RA	0.000	0.000	1.000	0.000
	TRD	0.000	0.000	0.000	1.000
N	FRP	251	251	251	251
	DM	251	251	251	251
	RA	251	251	251	251
	TRD	251	251	251	251

The adjusted R-squared value of 0.935 in Table 4 means that about 93% of the variation in the ability to prevent and/or detect fraudulent practices in MDAs is accounted for by DM, RA and TR techniques, with a tolerable standard error of 2.57058, while 6.5% of the variation is explained by the variables not captured in the model. The relative prediction contributions of each of the independent variables to the measurement of fraud prevention and detection is estimated and tested for significance using the t-test (see Table 5). Although the t-statistics are not the same for DM (5.112), RA (9.902), and TRD (12.135) (independent variables), they all have a positive influence on the dependent variable (fraud prevention and detection). The Durbin–Watson (DW) test result of 1.832 is below 2.0, indicating the detection of non-autocorrelation in the sample.

Table 4. Model summary and analysis of variance (ANOVA).

R	R-squared	Adjusted R-squared	Std. error of the estimate	Change statistics					Durbin-Watson
				R-squared change	F change	df1	df2	Sig. F change	
0.967	0.936	0.935	2.571	0.936	1204.532	3.00	247	0.000	1.833
Source of variation	Sum of squares		Df	Mean square	F	Sig.			
Regression	23878.256		3.00	7959.419	1204.532	0.000			
Residual	1632.150		247	6.608					
Total	25510.406		250						

Table 5. Test for significance of regression constant and coefficients.

Model	Unstandardized coefficients		Standardized coefficients	T	Sig.	Collinearity statistics	
	B	Std. error	Beta			Tolerance	VIF
(Constant)	8.107	0.431		18.793	0.000		
DM	0.295	0.058	0.191	5.112	0.000	0.186	5.380
RA	1.242	0.125	0.384	9.902	0.000	0.172	5.804
TA	1.341	0.111	0.435	12.135	0.000	0.202	4.953

Hypothesis Testing

Hypothesis 1:

H_{o1}: The deployment of data mining (DM) in the accounting system of MDAs has no significant effect in preventing or detecting fraudulent activities in MDAs in Nigeria.

H_{A1}: The deployment of data mining (DM) in the accounting system of MDAs has a significant effect in preventing or detecting fraudulent activities in MDAs in Nigeria.

Decision rule: Ho1 is accepted if the t-stat probability is greater than 0.05%, it is rejected otherwise. From the results, the data mining (DM) technique has a probability of 0.00, which is less than the test significance of

0.05. Therefore, the assumption that the application of DM has no significant effect in preventing or detecting fraudulent financial practices in public sector MDAs in Nigeria is hereby rejected. Contrary to the assumption, the result indicates that the application of DM has a significant effect in preventing or detecting fraudulent activities in public sector MDAs. This result conforms with Gupta and Gill (2012); Sheela and Sandip (2011) and Mousa (2016).

Hypothesis 2:

H_o2: *The application of the ratio analysis (RA) technique has no significant effect in preventing or detecting fraudulent financial practices in MDAs in Nigeria.*

H_L2: *The application of the ratio analysis (RA) technique has a significant effect in preventing or detecting fraudulent financial practices in MDAs in Nigeria.*

Decision rule: Ho2 is accepted if the t-stat probability is greater than 0.05%, it is rejected otherwise. From the results, RA has a probability of 0.00, which is less than the test significance of 0.05. Therefore, the assumption that the application of the RA technique has no significant effect in preventing or detecting fraudulent financial practices in MDAs in Nigeria is hereby rejected, as the result shows that the application of the RA technique has a significant effect in preventing or detecting fraudulent financial practices.

Hypothesis 3:

H_o3: *The adoption of trend (TRD) analysis in the financial analysis of MDAs has no significant effect in preventing or detecting fraudulent activities in the organizations.*

H_L3: *The adoption of trend (TRD) analysis in the financial analysis of MDAs has a significant effect in preventing or detecting fraudulent activities in the organizations.*

Decision rule: Ho3 is accepted if the t-stat probability is greater than 0.05%, it is rejected otherwise. From the result, TRD has a probability of 0.00, which is less than the test significance of 0.05. Therefore, the assumption that the application of TRD has no significant effect in preventing or detecting fraudulent financial practices in MDAs in Nigeria is hereby rejected, as the result indicates that the application of TRD has a significant effect in preventing or detecting fraudulent financial practices.

5. Discussion of Findings

The descriptive statistics in Table 2 show mean values of 14.2430, 4.5259, 4.5857 and 24.0797 for DM, RA, TRD and FRP, respectively, which indicates an average response to the individual variables' belief statements that clustered between strongly agree (SA) and strongly disagree (SD). This shows the level of awareness of the respondents to the forensic accounting techniques examined as well as their perception of fraud prevention and detection. The mean response from evaluating the data mining technique is 14.2430, with a minimum score of 10.00 and a maximum score of 33.00. On evaluating the ratio analysis technique, the mean response shows a value of 4.5259, with a minimum score of 3.00 and a maximum score of 15.00. Similarly, after evaluating the trend analysis technique, the mean response stood at 4.5857, with a minimum score of 3.00 and a maximum score of 15.00. The results highlight the reservation of respondents on the availability of forensic accounting services in MDAs. This is in agreement with Ewa et al. (2020). In their ability to detect or prevent fraudulent practices in MDAs, the mean response stood at 24.0797, with a minimum score of 19.00 and a maximum score of 55.00. The results affirm the conviction of respondents of the efficacy of forensic accounting tools in fraud detection and prevention in MDAs.

The standard deviations for each of the variables are 6.53550 for DM, 3.12319 for RA, 3.27347 for TRD and 10.10157 for FRP. The kurtosis values in Table 2 are 1.014 for DM, 2.182 for RA, 1.634 for TRD, and 1.634 for FRP. Also, the kurtosis values for the respondents' demography variables stood at 0.377 for gender, -1.151 for qualification, and -0.469 for age range. If the kurtosis values are greater than 1, the distribution is outside the range of normality, and the result thus implies that the three variables are leptokurtic.

Table 3 revealed positive and significant relationships between DM, RA, TRD and From, as evidenced by their correlation coefficients of 0.904, 0.931 and 0.934 and their probability values of 0.000, 0.000 and 0.000. The result implies that the use of forensic accounting tools will drastically prevent and/or detect fraudulent schemes and practices in the financial system of MDAs. This confirms various studies on the impact of forensic accounting in fraud prevention and detection (Bassey, 2018; Enofe, Agbonkpolor, et al., 2015; Enofe et al., 2013; Ewa et al., 2020; Ezejiofor et al., 2016; Onodi et al., 2015).

The econometric linear model results, as stated in Table 4, which shows the adjusted R-squared value of 0.935, or 93.5%, indicates that the variation in fraud detection and prevention is explained by the three variables (DM, RA and TA), while 6.4% of the variation may be explained by variables not considered in the study. The results also show all those three variables are significant and positively related to fraud prevention and/or detection. The F-change of 1204.532 attests to the high value of the adjusted R-squared. This demonstrates the high predictive power of the model.

The results of the study also show that a 1% increase in DM will lead to a 0.295% increase in fraudulent financial scheme prevention and/or detection with a p-value of 000. Also, a 1% increase in the use of RA will lead to a 1.242% increase in detecting or preventing fraudulent schemes with a p-value of 000, while a 1%

increase in TA will also lead to 1.341% increase in detecting or preventing fraudulent schemes in MDAs' financial systems with a p-value of 000.

6. Conclusion/Recommendation

This study underscores the importance of forensic accounting techniques in mitigating fraudulent financial practices in public sector financial systems and the complementary contribution of these techniques in curbing fraudulent activities. Also, the study reveals that there is a lack of human capital and infrastructure for providing forensic accounting services in the public sector. Thus, the recommendations are as follows:

i. Further research on forensic accounting and fraud prevention should exploit other variables, such as relative size factor (RSF), relational trend analysis, and Benford's law technique.
ii. Government agencies and departments should be equipped with the latest IT infrastructure and software programmes with data-mining capabilities.
iii. Public sector MDAs should recruit multi-task professional accountants with good knowledge in information technology as members of the faculty in both the accounts and auditing departments.

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