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EFFECTIVENESS OF INTERNAL CONTROL SYSTEM ON FRAUD DETECTION IN NIGERIAN PUBLIC SECTOR: A STUDY OF THE CENTRAL BANK OF NIGERIA

EFICÁCIA DO SISTEMA DE CONTROLE INTERNO NA DETECÇÃO DE FRAUDES NO SETOR PÚBLICO NIGERIANO: UM ESTUDO DO BANCO CENTRAL DA NIGÉRIA

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Abstract
This paper attempts to evaluate how the elements of internal control systems affect fraud detection in the Central Bank of Nigeria. It also assessed the moderating role of emotional intelligence on such influence. The research was based on the COSO framework coupled with a quantitative approach and survey strategy. A structured questionnaire with a 5-point Likert scale was adopted. The study received 401 valid responses, which were used for multiple regression and mediation analyses. The research identifies Risk Assessment and Information and Communication, elements of the COSO framework, as well as Emotional Intelligence, to significantly promote fraud detection. Similarly, the three sub-factors of Control Environment, Control Activities, and Monitoring Activities do

Resumo
Este artigo procura avaliar como os elementos dos sistemas de controlo interno afetam a deteção de fraude no Banco Central da Nigéria. Também analisou o papel moderador da inteligência emocional nessa influência. A pesquisa baseou-se no framework COSO, aliado a uma abordagem quantitativa e a uma estratégia de inquérito. Foi adotado um questionário estruturado com escala de Likert de 5 pontos. O estudo obteve 401 respostas válidas, que foram utilizadas para análises de regressão múltipla e de mediação. A investigação identifica a Avaliação de Riscos e a Informação e Comunicação, elementos do framework COSO, bem como a Inteligência Emocional, como fatores que promovem significativamente a deteção de fraude. Da

not have any significant effect on fraud detection. The effects of both Risk Assessment and Information and Communication were also found to be moderated by emotional intelligence and not just a direct predictor. These results highlight the consequences of integrating behavioural competencies with formal control structures to enhance the capability of detecting fraud in the organisation. The study concludes that a combined focus on procedural safeguards and emotional awareness offers a more effective approach to combating fraud, with implications for training, internal system design, and institutional policy reform in high-risk financial institutions.

Keywords: Fraud Detection. Control Environment. Risk Assessment. Control Activities. Information and Communication. Monitoring Activities. Emotional Intelligence.

mesma forma, os três subfatores — Ambiente de Controlo, Atividades de Controlo e Atividades de Monitorização — não apresentam qualquer efeito significativo na deteção de fraude. Verificou-se ainda que os efeitos tanto da Avaliação de Riscos como da Informação e Comunicação são moderados pela inteligência emocional, não sendo apenas preditores diretos. Estes resultados evidenciam as implicações da integração de competências comportamentais com estruturas formais de controlo para reforçar a capacidade de deteção de fraude na organização. O estudo conclui que um enfoque combinado em salvaguardas processuais e consciência emocional oferece uma abordagem mais eficaz no combate à fraude, com implicações para a formação, o desenho de sistemas internos e a reforma de políticas institucionais em instituições financeiras de alto risco.

Palavras-chave: *Deteção de Fraude. Ambiente de Controlo. Avaliação de Riscos. Atividades de Controlo. Informação e Comunicação. Atividades de Monitorização. Inteligência Emocional.*

1 INTRODUCTION

Fraud is an endless menace that cuts across all spheres of life, questioning the integrity of institutions, slowing down economic development, and undermining trust among the people all over the world. Nevertheless, fraud keeps changing with new and efficient ways to do it despite already existing mechanisms that could prevent it. Rafindadi and Olanrewaju (2019) noted that it feeds on intellectual and ethical vulnerabilities in the legal and institutional systems. Despite the enhanced level of awareness and reform in all parts of the world, frauds are still entrenched in organisations, from religious organisations to corporations and even government agencies. The Association of Certified Fraud Examiners (ACFE, 2022) states that organisations lose an average of 5% of its annual revenue due to fraud. The rating given by Transparency International (2022) revealed that Nigeria is ranked 150th of 180 countries in the Corruption Perceptions Index, which highlights the systemic nature of these issues in the country. Spyromitros and Panagiotis (2022) highlighted that an increase in corruption

may hinder the economic growth of a developing nation by 0.15 to 1.5 per cent. Fraud is not only an economic problem, but a social and psychological one, as it fosters distrust, inefficiency, and harms images in industries (Lin, 2022; Mushati, 2023; Yuniarti, 2017).

Traditionally, fraudulent behaviour is closely connected with human nature and has been known for a long time in both moral and legal traditions. The early awareness of deceptive behaviour can be seen in the Biblical teachings of the deception of Eve as explained in Gen 3:16. Fraud has both a moral and legal significance, which is represented in the Latin word fraus, meaning deception and harm (Daly, 2009; Biscotti, 2011). The Roman legislation, which was influenced by Greek philosophy and Christian morals, penalised fraud, and this practice persists to shape the modern law (Bujaki and McConomy, 2022; Paletta and Alimehmeti, 2018). In Nigeria, the legal provisions, such as the Economic and Financial Crimes Commission (EFCC) Act of 2004 and the Code of Conduct Bureau Act, were established to deter fraud and encourage accountability (Rafindadi and Olanrewaju, 2019). However, enforcement proves ineffective in most cases, as it is affected by political interference, weak institutions, and an ingrained patronage system (Simpson, 2019; Werle, 2019). Fraud does persist, not due to the absence of regulation and laws, but due to the inability to apply and maintain an effective control system consistently.

A few theories can be used to explain the reasons behind fraud and the remedial effect of internal control. According to Fraud Triangle by Cressey (1953), there are three drivers of fraud: pressure, opportunity, and rationalisation. Financial or psychological stress and the presence of opportunities through internal control weakness, as well as justification of unethical behaviour, motivate people to commit fraud. Both the public and the private sector studies have supported this model (Atmadjaj *et al*., 2024; Fernandhytia and Muslichah, 2020; Almalki, 2022). Another dimension is provided by agency theory, which refers to the agency conflicts of interest and information asymmetry between the agency (such as managers or officials) and the principal (such as owners or governments) (Jensen and Meckling, 1976; Koutoupis and Malisiovas, 2023). The Cognitive Evaluation Theory (Deci and Ryan, 1985) also explains the role of poor organisational cultures in reducing intrinsic motivation and ethical decision-making. Collectively, these models emphasise the significance of behavioural knowledge in the creation of effective internal controls (Dewi *et al*., 2024; Tram-Nguyen *et al*., 2023; Dasborough, 2019).

Even such large bodies as the Central Bank of Nigeria (CBN), which is supposed to provide financial and monetary stability, cannot escape fraud. Having thousands of employees and offices across the country, it has a complicated structure that makes it vulnerable. Massive institutional fraud allegations in the recent past triggered a forensic audit and massive layoffs, demonstrating internal weaknesses. As Ogwuji and Lasisi (2022) emphasise, financial institutions must have good and vigorous internal controls that prevent fraud. The international benchmark of internal controls is the COSO framework that encompasses the control environment, risk evaluation, control activities, information and communication, as well as monitoring (Barros and Ferreira, 2022; Musah *et al*., 2022). Nevertheless, failures may also happen under this type of structure, when controls are lacking or compromised by human and cultural factors (Setiawan, 2018; Wang *et al*., 2021). The case of the CBN, thus, teaches a lot concerning the balancing between structural adequacy and behavioural integrity in the prevention of fraud.

The aim of the anti-fraud systems is not only to prevent, but also to identify the fraud at an early stage. These structures are based on straightforward policies, procedures, and cross-departmental surveillance (Makau & Muna, 2020). Although the informal control of the smaller business is the supervision of the owner, it is necessary to have formalised methods of control embedded in the foundation of larger organisations, such as the CBN (Musah *et al*., 2022; Baird *et al*., 2019). Nevertheless, despite well-planned systems, the possible failure is always caused by errors made by humans, emotional instability, or collusive actions (Yasa *et al*., 2022). Recent research indicates that emotional intelligence has the potential to improve the efficacy of internal controls, as it promotes self-regulation, ethical decision-making, and collaboration, particularly when working in a high-risk environment (Tram-Nguyen *et al*., 2023; Dewi *et al*., 2024; Dasborough, 2019). Adding emotional intelligence to the COSO model would hence render the system of fraud control more responsive and humanistic.

Although improvements have been made, there are still gaps in the literature. Not many studies have examined the involvement of emotional intelligence as a moderator within a psychologically oriented internal control model, and specifically in developing settings (Dewi *et al*., 2024; Tram-Nguyen *et al*., 2023). In addition, few studies have explored the interaction between social and technical control systems, which is common to study these two variables independently (Setiawan, 2018; Musah *et al*., 2022). A lot of

the current literature also emphasises the form of the private sector or corporate bodies without considering the existence of the central banks as part of the public bodies (Asiimwe *et al*., 2021; Rafindadi and Olanrewaju, 2019). This study addresses these gaps by contextualising the analysis within the Central Bank of Nigeria and advancing a more integrated model of fraud detection.

2 LITERATURE REVIEW

2.1 Theoretical background

This paper uses the Fraud Triangle Theory by Donald Cressey (1953) in its application to examine the psychological and organisational aspects of fraud detection in the Central Bank of Nigeria (CBN). The theory presents three main conditions of fraudulent behaviour, including pressure, opportunity, and rationalisation that interact to form conditions in which fraud is possible. Under the environment of CBN, the pressure can be generated in various ways, such as macroeconomic instability, regulation requirements, or performance requirements. Such institutional and personal forces may distort ethical lines and increase vulnerability to malpractice.

To further elaborate on this, Cognitive Evaluation Theory (CET) brings more insights to the table by looking at the implications of external rewards (i.e. monetary payments or the threat of losing a job) on intrinsic motivation. People might be more prone to making ineffective or unethical decisions under long-term ethical or emotive pressure. The Agency Theory also augments on this perspective in that the relationship between the principals (the people in this case) and the agents (employees) tends to have inconsistent interests, a lack of information, and opportunistic behaviour, which tends to undermine accountability. One way to reduce such behavioural tensions and enhance institutional integrity is to strengthen internal control, which can be achieved by an ethical leadership style, open reporting, and effective whistleblower protection (Rafindadi and Olanrewaju, 2019; Ong'unya and Abbey, 2019; Asiimwe *et al*., 2021).

Weak internal controls are likely to enhance all three components of the Fraud Triangle. Weaknesses in governance: The incomplete audit trails, insufficient separation of duties, weak supervision, etc., provide the environment within which fraud may be

committed with low chances of detection. According to Yuniarti (2017) and Purnamasari *et al*. (2024), mechanisms (real-time surveillance, role-based access restrictions, and high audit systems) are needed to seal these control gaps and minimise risks of fraud in the CBN.

Rationalisation is the justification of unethical actions as necessary or justified by the individuals, which is usually influenced by the institutional culture in general. Lack of a uniform ethical code and enforcement of policies, employees will eventually grow to tolerate malpractice. In response, Demirovic *et al*. (2021) and Otoo *et al*. (2023) highlight the necessity to encourage ethical leadership and drive integrity into routine business operations and staff development initiatives. In such a manner, organisations such as the CBN will have a greater resistance to self-serving justifications and moral disengagement. Combined, these theoretical approaches support the two-sided significance of detection and institutional reform. In the CBN scenario, the manner in which these conditions interact gives a platform upon which more robust control mechanisms can be designed and a culture that is proactive in addressing fraudulent behaviour can be developed.

2.2 Empirical considerations

Empirical studies are still showing that effective internal control systems are critical in preventing and minimising corporate fraud, coupled with enhancing institutional integrity. When discussing the UK retail industry, Almalki (2022) discovered that the probability of fraud depends on the opportunity aspect of the Fraud Triangle the most, which is why internal control mechanisms play a central role in preventing fraud opportunities. Likewise, Atmadjan *et al*. (2024) demonstrated the association between better control systems, including segregated duties, frequent audits, and open reporting systems and the reduced occurrence of accounting fraud in the Indonesian public sector. According to Asiimwe *et al*. (2021), the positive correlation of the internal control practices with the service delivery in the health sector is strong in Uganda, and active monitoring and control practices enhance the accountability and the transparency of the operations. In line with these regional results, Ogwuji and Lasisi (2022) found that in the context of Nigerian financial institutions with well-developed monitoring and control environments, incidences of fraud were low. In general, these studies support the

assumption that properly designed institutional control mechanisms are not only reactive but also proactive fraud prevention and service quality improvement mechanisms.

International statistics are also in line with these outcomes. According to the Association of Certified Fraud Examiners (ACFE, 2022), asset misappropriation occurs most of the time, but the most significant losses are caused by financial statement manipulation. In their analysis, they point out that early detection systems and strong controls are of high importance to curtail such damage. Dewi *et al*. (2024) have discovered that ethical leadership, the so-called tone at the top, is critical in detecting fraud among Indonesian companies, and technical competence is not enough. This means that ethical integrity and leadership that is based on behaviour is as vital as technological systems. On the same note, Jaffer *et al*. (2022) discovered that transparent leadership in South Africa was linked to low financial misreporting. Demirovic (2021) also emphasised that to detect areas of fraud in the corporate financial systems, a specific internal audit risk assessment is necessary.

In addition to deterring fraud, studies also indicate that properly operating control systems increase the overall institutional performance. According to Baird *et al*. (2019), companies that had effective management control systems showed elevated profitability levels, enhanced decision-making and more concrete strategic focus. The article by Barros and Ferreira (2022) connected the successful implementation of control activities to innovation by demonstrating that innovation may be facilitated by clear procedural delimitations, allowing the safety of operations to remain intact. Fana and Villani (2023) postulated that digital innovations and algorithmic control increase efficiency and allow prompt fraud detection and response. In the same vein, the five elements of the COSO framework were also observed to be positively correlated with the financial performance of Ghanaian SMEs, especially when they were supported by robust corporate governance (Musah *et al*. 2022). All these findings demonstrate that internal controls are used for two purposes: they prevent fraud and enhance sustainable institutional performance.

The interaction of internal controls and behavioural and cultural factors has previously been studied. The results of Tram-Nguyen *et al*. (2023) showed that emotional intelligence is a key factor in enhancing the performance of auditors, indicating the complementary effect of human behaviour and emotional awareness with technical protection in determining the presence of fraud. Yasa (2022) demonstrated that

organisational culture moderates the connection between control systems and accounting fraud, i.e., an ethical culture may make control effectiveness stronger or weaker. In other instances, Setiawan (2018) noted, personal morality can be more effective in deterring fraud, compared to formal control measures, which proves the point that internal controls need to be backed by ethical leaders. Lastly, Otoo *et al*. (2023) have discovered that the control activities and the control environment, as well as risk assessment, have a positive impact on the organisational performance of banks. Still, monitoring and communication have a lesser role in the strength of this study; the application of control design should be balanced and context-specific.

In spite of these contributions, there are some crucial gaps in the literature. To begin with, empirical research on the roles of emotional intelligence as a moderating variable in the framework of internal control systems is still deficient in the area of developing economies, especially in the financial sector (Dewi *et al*., 2024; Tram-Nguyen *et al*., 2023). Second, studies seldom combine both behavioural and structural control variables and tend to examine them as two distinct constructs (Setiawan, 2018; Musah *et al*., 2022). Furthermore, most existing evidence is based on the experience of the private-sector organisations, paying little attention to the public regulatory agencies, including central banks (Asiimwe *et al*., 2021; Rafindadi and Olanrewaju, 2019). To resolve these drawbacks, the paper will target the Central Bank of Nigeria (CBN) as the subject of a more unified model of fraud detection. It further provides the way forward in future research by investigating the role of institutional context and organisational culture, particularly systemic culture, in enhancing the relation between the technical controls and behavioural competencies in the strengthening of anti-fraud frameworks.

3 METHODOLOGY

The study took a survey research design, which helped to reveal the most essential elements of the Internal Control System (ICS) of the COSO framework and examine the connection between the emotional intelligence of staff members and the process of detecting fraud at the Central Bank of Nigeria (CBN). The structured questionnaire was used in gathering the data, and a five-point Likert scale was applied to the internal control practices and behavioural aspects of fraud detection. This method enabled objective

evaluation of the opinions of the participants, and at the same time, subjective perceptions and experiences were also captured.

The responses in the form of quantitative data offered a good basis on which patterns and relationships between variables could be analysed. The Likert scale was also used, which helped in further establishment of clear indicators of the internal processes and control mechanisms of the institution. Finally, the results will assist the organisation, as well as its larger sociocultural context, to identify the flaws of the current control mechanisms and develop more efficient plans to empower the fight against fraud and its detection.

3.1 Sample size and sampling technique

The organisation's staff strength is approximately 3,540 permanent workers. The sample size is the part of the population selected for the study. Taro Yamane's (1967) statistical formula is stated:

$$n = \frac{N}{(1+N(e)^2)} \qquad (1)$$

where n-sample size, N-population, 1-statistical constant and e-the margin of error of 0.05. Note: $400 \leq N \leq 10{,}000$

$$n = \frac{3{,}540}{(1 + 8{,}671\ (0.05)^2)} = \frac{3{,}540}{(1 + 8{,}671\ (0.0025)} = \frac{3{,}540}{(1 + 21.6775)} = \frac{3{,}540}{(22.6775)}$$

$$= 352\ approx$$

The calculated sample size of 352 was increased by 30% to enhance the response rate and accommodate potential non-responses, resulting in a final sample of 458. A purposive and judgmental sampling techniques were used. This facilitated a reliable assessment of internal controls and emotional intelligence in detecting fraud.

3.2 Model specification

Asiimwe *et al*. (2021) examined the impact of the internal control system on service delivery by treating components such as control environment, risk assessment, monitoring activities, and information and communication as independent variables, with service delivery in the health sector serving as the dependent variable. The model is as follows:

$$SDD_i = \varphi_0 + \varphi_1 CET_i + \varphi_2 RAT_i + \varphi_3 MAT_i + \varphi_4 ICT_i + \mu_i \quad (2)$$

where:

SDD_i represent service delivery as a measure of organisational performance.
CET_i is the control environment,
RAT_i represents risk assessment, MAT_i
is monitoring activities,
ICT_i stands for Information and Communication,
φ_1 to φ_4 are the parameters to be estimated.
$\varphi_0$is the constant
and μ_i is the white noise.

When examining the subject of fraud detection in the Central Bank of Nigeria (CBN), the use of control activities as a focal point of the internal control system can be considered as a key factor in the way the institutional mechanisms can prevent and control fraudulent behaviour. Control activities: the risk assessments are converted into preventive actions performed by segregation of duties, authorisation procedures and regular reconciliations, which enhance the capacity of an organisation to withstand fraud. These activities render the internal controls operable since they provide that policies are consistently applied and that oversight mechanisms are effective in bridging the gap between risk identification and monitoring.

The omission of control activities from the analysis would undermine the conceptual framework of the model and make it less consistent with the COSO framework, which places them at the centre of internal control effectiveness. It is

supported by empirical research: both Atmadja *et al*. (2024) and Ogwuji and Lasisi (2022) have concluded that control activities are decisive in fraud detection by integrating accountability of processes in the daily operation. Their inclusion in this work, thus, enhances the research and makes it more institutional. The developed conceptual model can be represented, therefore, as follows:

$$FDT_i = \varphi_0 + \varphi_1 CET_i + \varphi_2 RAT_i + \varphi_3 MAT_i + \varphi_4 CAT_i + \varphi_5 ICT_i + \mu_i \quad (3)$$

FDT_i Means Fraud Detection while CAT_i are control activities, and all other variables remain as previously described.

Emotional intelligence is a control variable that should be included in this study to comprehend the role of internal control systems in fraud detection in the Central Bank of Nigeria (CBN). Emotional intelligence uniquely incorporates important human attributes, including self-awareness, empathy, and emotional management, that directly influence the judgment of a professional and their capacity to react to fraud-related threats. Through this behaviour factor, the study can measure the moderating role of emotional intelligence in the relationship between control mechanisms and the result of fraud detection. It not only makes the study more explanatory but also makes it more contextually relevant, and the human and behavioural components of institutional control are fully taken into account in the process of assessing fraud protection measures.

$$FDT_i = \varphi_0 + \varphi_1 CET_i + \varphi_2 RAT_i + \varphi_3 MAT_i + \varphi_4 CAT_i + \varphi_5 ICT_i + \beta_6 EIE_i + \mu_i \quad (4)$$

EIE_i stands for Emotional Intelligence. All other variables remain as previously described. Applying Emotional Intelligence as a moderating factor, the model will be as follows:

$$FDT_i = \varphi_0 + \varphi_1 CET_i + \varphi_2 RAT_i + \varphi_3 MAT_i + \varphi_4 CAT_i + \beta_5 ICT_i + \varphi_6 EIE_i + \varphi_7 (CET \times EIE)_i + \varphi_8 (RAT \times EIE)_i + \varphi_9 (MAT \times EIE)_i + \varphi_{10} (CAT \times EIE)_i + \varphi_{11} (ICT \times EIE)_i \quad (5)$$

3.3 Validity and reliability of research instrument

The study ensured the validity and reliability of its research instrument through a combination of expert review, pilot testing, and statistical verification. To establish face and content validity, professionals in finance and auditing examined the questionnaire to confirm that its items were clear, relevant, and appropriately aligned with the concepts of internal control and fraud detection. This was followed by a pilot test on the selected bank personnel to better the wording and format of the questions to enhance overall clarity and uniformity. Cronbach Alpha was used to test reliability, and all constructs passed the accepted amount of 0.7, which means that they are highly internally consistent. The Control Environment was the most reliable with a coefficient of 0.893, then Control Activities with 0.887 and Risk Assessment with 0.881. The findings prove that the instrument was not only sound but also appropriate during the principal stage of the empirical analysis.

Table 4

Reliability Statistics

Variables	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardised Items**	**N of Items**
Control Environment	0.893	0.897	10
Control Activities	0.887	0.896	10
Risk Assessment	0.881	0.890	10
Monitoring	0.834	0.882	10
Information and Communication	0.820	0.891	10
Emotional Intelligence	0.821	0.841	10
Fraud Detection	0.822	0.867	10

Sources: Author's Computation, 2025

3.4 Technique for data analysis

It was a quantitative study that used multiple regression and correlation analysis to investigate the impact of various components of the internal control system on fraud detection in the Central Bank of Nigeria (CBN) based on the COSO framework (Shamaki *et al*., 2022; Yusuf *et al*., 2023). The study concentrated on five attributes of internal

control, namely Control Environment, Risk Assessment, Control Activities, Information and Communication, and Monitoring Activities and compared the independent and interactive impact of these factors in the capacity of the institution in detecting and averting fraudulent behaviour. The reason why multiple regression analysis was chosen is that it allows complex relationships and can establish the relative predictive values of individual independent variables.

Emotional intelligence was also posed as a moderating variable to further the analysis and enable the study to examine the interaction of behavioural factors with formal control mechanisms in determining institutional responses to fraud. This inclusion assisted in showing the degree to which interpersonal awareness, emotional regulation and sound judgment would strengthen or undermine the efficiency of structural safeguards of the internal control system. The coefficient of determination (R^2) was applied to determine the extent to which the effect of the variation in fraud detection was attributable to the control components. In contrast, statistical significance tests were used to determine the strongest predictors. All in all, this analytical model provided a strong empirical basis for the identification of aspects of internal control that play the most significant role in reducing fraud, which offers realistic suggestions on enhancing governance and operational integrity at the CBN.

Table 2

Demographic Analysis of the Questionnaire

1	Distribution	Distributed 458		Received 401
2	Education	University Degree/Equivalent 177		Professional Qualification 224
3	Participant's Age	20-40 129	41-49 202	50 and above 70
4	Years of Experience with the Bank	1-10 169	11-20 173	21 and above 59

Source: Author's Compilation

4 RESULTS AND DISCUSSIONS

The demographic summary in Table 2 reveals that 88 per cent of respondents provided their response, and 401/458 questionnaires were retrieved successfully. The level of professional competence among the respondents is relatively high: 224 of them possess professional certifications, and 177 of them have university degrees or their equivalents, which indicates a highly qualified workforce. The age distribution indicates that the prevailing group is that of mid-career professionals who are aged 41-49, 220-20-40, and 70 years respectively. The level of experience is rather balanced: the number of those who have served 1-10 years is 169, 11-20 years is 173, and over 20 years is 59. This mix may indicate that the workforce is made up of people who are at different career levels. The variety in qualifications, age, and tenure also offers a strong base for responding to the responses of a greatly diverse cross-section of the staff. Comprehensively, the data support the internal validity and expansiveness of the survey data and provide a balanced perspective of the personnel at operational levels of the Central Bank of Nigeria.

Table 3

Descriptive Statistics

Statistics	CET	RAT	CAT	ICT	MAT	EIE	FDT
N	401	401	401	401	401	401	401
Mean	4.130	4.232	4.569	4.190	4.495	4.128	4.154
Median	4.200	4.250	4.667	4.000	4.500	4.000	4.000
Mode	4.0	4.00	5.000	4.000	5.0	4.00	4.00
Std. Deviation	0.572	0.552	0.476	1.399	0.525	0.5211	0.578
Variance	0.328	0.305	0.227	1.958	0.275	0.272	0.334
Skewness	-1.012	-0.304	-0.785	7.718	-0.471	-0.079	-0.232
Kurtosis	1.848	-0.258	-0.275	73.32	-1.176	-0.665	-0.182
Range	3.0	2.50	2.000	15.333	1.5	2.00	2.50
Minimum	2.0	2.50	3.000	2.000	3.5	3.00	2.50
Maximum	5.0	5.00	5.000	17.333	5.0	5.00	5.00
Sum	450.2	461.25	498.0	456.67	490.0	450.00	452.75

Note: CET-control environment; RAT-Risk Assessment; CAT-control activities; ICT-information and communication; MAT-monitoring activities; EIE¬-Emotional Intelligence; FDT-Fraud Detection
Sources: Author's Computation

4.1 Data analysis

4.1.1 Descriptive statistics and correlation

According to the descriptive statistics as presented in Table 3, the mean scores of all variables are quite large, as respondents have a strong perception of internal control components and fraud prevention. The mean (4.569) and the variability (SD =0.476) of Control Activities (CAT) were the highest and the lowest, respectively, indicating a stable consensus on its effectiveness. Monitoring Activities (MA) came next, and the score was also high (mean = 4.495), which justifies its perceived importance in fraud control. ICT depicted the highest dispersion (SD = 1.399, skewness = 7.718, kurtosis = 73.32), meaning that there were very diverse responses and some outliers could exist. The variables are all negatively skewed (except ICT), indicating an inclination towards higher ratings. The moderate-to-low standard deviation of most of the variables represents more or less stable reactions since the median and mode are close to the means. In general, the data indicate the generally positive evaluation of internal control elements and emotional intelligence regarding fraud prevention at the Central Bank of Nigeria.

Table 4

Pearson Correlation

Variables	CET	RAT	CAT	ICT	MAT	EIE	FDT
CET	1	0.587**	0.518**	0.183	0.424**	0.376**	0.430**
RAT	0.587**	1	0.483**	0.223*	0.447**	0.513**	0.585**
CAT	0.518**	0.483**	1	0.068	0.492**	0.405**	0.296**
ICT	0.183	0.223*	0.068	1	0.127	0.191*	0.362**
MAT	0.424**	0.447**	0.492**	0.127	1	0.370**	0.380**
EIE	0.376**	0.513**	0.405**	0.191*	0.370**	1	0.493**
FDT	0.430**	0.585**	0.296**	0.362**	0.380**	0.493**	1

Noted: **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

CET-control environment; RAT-Risk Assessment; CAT-control activities; ICT-information and communication; MAT-monitoring activities; EIE-Emotional Intelligence & FDT-Fraud Detection

Sources: Author's Computation

Table 4 presents the Pearson correlation coefficients of the study variables, but with special consideration being given to their association with the fraud detection (FDT). All the variables in control, Control Environment (CET), Risk Assessment (RAT), Control Activities (CAT), Information and Communication (ICT), Monitoring Activities (MAT), and Emotional Intelligence (EIE) have positive correlations with FDT, which implies that an improvement in these variables correlates with better fraud detection. The largest correlation is found between RAT and FDT ($r = 0.585$, $p < 0.01$), then EIE, CET, MAT and ICT ($r = 0.493$, 0.430, 0.380 and 0.362). Whereas the Control Activities ($r = 0.296$) have the weakest correlation amongst the significant values, it is, however, positively correlated. Markedly, the general decreased correlations of ICT with other variables, as well as weaker relationships with CAT ($r = 0.068$, not significant), indicate that it may be somewhat independent in the internal control system. These findings support the intermediary contributions of risk management, emotional competence, and institutional monitoring towards facilitating fraud detection.

The result of the correlation analysis shows that the primary variables have statistically significant positive relationships; hence, they have an overall effect on fraud detection. Notably, every correlation coefficient does not exceed the 0.8 mark, which is commonly linked to the issue of multicollinearity, which aligns with the empirical criteria of Azu *et al*. (2025) and Yusuf *et al*. (2024). This statistical situation implies the lack of multicollinearity, which predetermines that predictors are independent and therefore they can be included in a multiple regression framework. As a result, the independent

variables, which include control environment, risk assessment, control activities, information and communication, monitoring activities and emotional intelligence, can be simultaneously analysed. Still, the validity and interpretability of regression results are not compromised.

4.1.2 Test of hypotheses

Table 5 gives the regression on the Impact of the Internal Control System on Fraud detection. The regression analysis gets the value of R-SQ of 0.456, which means that about 45.6 per cent of the variance in fraud detection (FDT) is jointly explained by the internal control and behavioural variables. This estimate is further refined by an adjusted R-SQ of 0.424, which indicates a moderately high fit of the model. The Durbin-Watson statistic of 1.955 is close to the ideal value of 2.0, implying no significant autocorrelation in the residuals and confirming the independence of errors. Furthermore, the Variance Inflation Factor (VIF) values for all predictors range between 1.074 and 1.921, well below the critical threshold of 10, confirming the absence of multicollinearity and supporting the validity of including all six independent variables in the model.

Table 5

Regression on the Impact of Internal Control System on Fraud Detection

	Unstandardised Coefficients		Standardised Coefficients			Collinearity Statistics	
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Constant	0.696	0.478		1.456	0.148		
CET	0.093	0.098	0.092	0.951	0.344	0.571	1.752
RAT	0.375	0.106	0.358	3.540	0.001	0.521	1.921
CAT	-0.105	0.114	-0.086	-0.918	0.361	0.602	1.661
ICT	0.088	0.031	0.214	2.824	0.006	0.931	1.074
MAT	0.123	0.098	0.112	1.264	0.209	0.681	1.469
EIE	0.252	0.098	0.227	2.578	0.011	0.687	1.455
R-Square	0.456	Adjusted R-Square		0.424	Durbin Watson		1.955

a. Dependent Variable: FDT-Fraud Detection

b. CET*EIE-(Emotional Intelligence*control environment); RAT*EIE-(Emotional Intelligence*Risk Assessment); CAT*EIE-(Emotional Intelligence*control activities); ICT*EIE-(Emotional Intelligence*information and communication); MAT*EIE-(Emotional Intelligence*monitoring activities); EIE-Emotional Intelligence

Among the explanatory variables, Risk Assessment (RAT), Information and Communication (ICT), and Emotional Intelligence (EIE) show statistically significant

positive relationships with fraud detection. RAT has the highest standardised coefficient ($\beta = 0.358$, $p = 0.001$), establishing it as the most influential predictor in the model. ICT ($b = 0.214$, $p = 0.006$) is also significant, and it indicates that the timely and correct flow of information improves detection mechanisms. The behavioural dimension is also supported by emotional intelligence ($b = 0.227$, $p = 0.011$), which suggests that interpersonal awareness and regulatory competence of the personnel are a crucial factor in detecting and preventing fraud.

On the other hand, none of the Control Environment (CET), Control Activities (CAT), and Monitoring Activities (MAT) have statistically significant impacts on detecting fraud in this model, as shown by p-values of 0.05 and above. Although CET and MAT show positive but non-significant coefficients, CAT demonstrates a negative beta ($b = -0.086$, $p = 0.361$), which indicates that routine control tasks, as they are in place, may not add value to fraud detection or are not strategically oriented. These observations suggest that structural controls are still significant; however, the dynamic interaction between risk assessment, information systems, and emotional awareness in a positive way supports a sound fraud detection system.

4.1.3 The moderating effect of emotional intelligence on the impact of internal control systems on fraud prevention

The regression results in Table 6 examine the moderating effect of Emotional Intelligence (EIE) on the relationship between components of the internal control system and fraud detection. The model yields an R-Square of 0.474 and an adjusted R-Square of 0.443, indicating that 44.3% of the variation in fraud detection can be explained by the interaction between emotional intelligence and the five internal control variables. The Durbin-Watson statistic stands at 1.979, which is acceptably close to the benchmark of 2, suggesting no autocorrelation in the residuals. However, the VIF values, particularly for the interaction terms RATEIE (5.643), CATEIE (5.955), and CET*EIE (4.525), approach the threshold of concern, indicating moderate multicollinearity due to interaction effects.

The most important and impactful predictor includes the interaction term RATEIE ($b = 0.663$, $p < 0.001$), which points to the fact that emotional intelligence contributes significantly to the effect that risk assessment practices have on fraud detection. A

significant moderating effect can also be observed in ICTEIE (b = 0.246, p = 0.005), in which the efficacy of information and communication systems in fraud detection becomes better when combined with greater emotional intelligence. These findings corroborate that emotionally intelligent staff members are more qualified to read and react to the signals of risk and information warning, which supports internal control execution in terms of fraud prevention.

Table 6

Moderating Effect of Emotional Intelligence on the Impact of Internal Control System on Fraud Detection

	Unstandardised Coefficients		Standardised Coefficients			Collinearity Statistics	
Model	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Constant	3.142	0.398		7.886	0.000		
EIE	-0.383	0.203	-0.345	-1.892	0.061	0.155	6.457
CET*EIE	0.017	0.024	0.109	0.712	0.478	0.221	4.525
RAT*EIE	0.098	0.025	0.663	3.885	0.000	0.177	5.643
CAT*EIE	-0.016	0.028	-0.101	-0.576	0.566	0.168	5.955
ICT*EIE	0.022	0.008	0.246	2.895	0.005	0.717	1.395
MAT*EIE	0.026	0.023	0.169	1.115	0.267	0.225	4.442
R-Square	0.474	Adjusted R-Square		0.443	Durbin Watson		1.979

c. Dependent Variable: FDT-Fraud Detection

d. CET*EIE-(Emotional Intelligence*control environment); RAT*EIE-(Emotional Intelligence*Risk Assessment); CAT*EIE-(Emotional Intelligence*control activities); ICT*EIE-(Emotional Intelligence*information and communication); MAT*EIE-(Emotional Intelligence*monitoring activities); EIE-Emotional Intelligence

Conversely, the interactions CETEIE, CATEIE, and MATEIE are not statistically significant (p = 0.05), and the independent coefficient of emotional intelligence (b = -0.345, p = 0.061) is close to, though not above, the standard level of significance. The negative value of the beta of EIE on its own has a tendency to indicate a suppressor effect on the interaction of the same. This trend is an indication that emotional intelligence alone does not determine the detection of fraud. Instead, it enhances certain aspects of the control system, the most prominent of which is risk assessment and information communication. Therefore, it seems that the moderating effect of emotional intelligence is not universal but rather selective, working as a facilitator of some control mechanisms but not as a moderator.

4.2 Discussion of findings

The findings of the current work confirm that the Risk Assessment, Information and Communication, and Emotional Intelligence are significant in improving the combat against fraud in the Central Bank of Nigeria (CBN). Risk Assessment was the most influential one of them, and this also indicates its relevance in the prevention of vulnerabilities before the fraudulent activity has taken place. This finding aligns with the conclusion made by Almalki (2022) and Atmadaj *et al*. (2024), who reported that the more structured risk evaluation regimes within organisations can make them identify anomalous patterns and respond promptly. Similarly, the positive contribution of Information and Communication puts forth the importance of proper and timely information flow, as far as control is concerned, to different levels of operation. Barros and Ferreira (2022) defend this point of view and mention that a good communication system will not only help in compliance but also enable faster and more efficient response to indicators of potential fraud. Emotional intelligence adds to these technical and structural systems by offering individuals the emotional awareness, empathy, and moral reasoning that they would require to detect deviations and respond ethically.

On the other hand, the paper also found that Control Environment, Control Activities and Monitoring Activities had no significant influence on fraud detection in the CBN environment. They are, nevertheless, essential components of the internal control structure, with the slight significance that the implementation, standardisation or uniformity problems could explain. Control Activities- Authorisations and reconciliations are typically made useless in cases where they become a business of formation box-ticking exercise, which do not constitute any strategic engagement, or actual oversight. This finding is consistent with the findings of Ogwuji and Lasisi (2022) and Setiawan (2018), who warned that structural controls cannot be employed to prevent fraud unless there is a strong ethical culture and enforcement. Likewise, Monitoring Activities, as an element of the institutional control, might not have been functioning well because of the insufficiency of resources or the occasionality of monitoring. These findings indicate that even though a formal control is essential, its performance largely relies on the behavioural and organisational environments in which the control is implemented.

Moreover, mediation analysis revealed that Emotional Intelligence has a substantial boosting effect on both Risk Assessment and Information and Communication on fraud detection. This implies that emotionally intelligent employees will have an increased capacity to decode control signals, cope with pressure in high-risk situations, and improve cross-departmental communication. These results are consistent with the results reported by Dewi *et al*. (2024) and Tram-Nguyen *et al*. (2023), who cited that emotional competencies reinforce ethical judgment and enhance sensitivity to irregularities. The considerable interdependence of Emotional Intelligence and the technical control elements proves that behavioural characteristics can enhance the influence of evaluation and informational systems. Nonetheless, the lack of moderating impact on the Control Environment, Control Activities, and Monitoring is a pointer that not all the internal control elements are impacted by Emotional Intelligence. Rather, it seems to affect most those aspects which need professional judgment, discretion, and interpretation arguments, i.e. risk assessment and communication. This observation supports the argument that internal control system design and development of emotional intelligence could yield more fruitful fraudulent detection results as compared to depending on technical or structural controls.

5 CONCLUSIONS

This paper has explored the role of various elements of the internal control system to detect fraud in the Central Bank of Nigeria, with a special focus on the moderating effect of emotional intelligence. The results indicate that out of the internal control factors, risk assessment, information and communication, as well as emotional intelligence, were the only factors that were statistically significant in fraud detection. Among them, risk assessment turned out to be the most potent predictor, followed by emotional intelligence and information and communication. Though the control environment, control activities, and monitoring activities did not indicate a significant relationship with fraud detection individually, they were included in the model, which increased the overall explanatory power of the model. The mediation analysis also revealed that emotional intelligence enhances the impact of risk assessment, as well as information communication, on detecting fraud positively and significantly, which

underscores its selective but critical role in enhancing the effectiveness of internal control systems.

The study, based on these findings, suggests that the Central Bank of Nigeria and other financial institutions of the exact nature should act proactively to instil behavioural competencies in their internal control systems. The assessments of emotional intelligence should be encompassed in the recruitment and staff development procedures, with the training introducing interpersonal sensitivity and the ability to make ethical decisions in the pressure of the moment. It is also essential to strengthen the effectiveness of information systems and improve the control of human factors during the assessment of the risk. In addition, the management ought to review the ongoing control activities periodically to be able to identify whether these are up to date in relation to the changing nature of operations and the nature of fraud involving activities. In the end, there must be a two-pronged policy that incorporates both forms of organised control and behavioural policies. Fraud detection cannot be a one-dimensional function of the systems and procedures involved, but rather a combination of the knowledge, flexibility and moral judgement of the individuals who work within the systems.

CONFLICT OF INTEREST DECLARATION

The leading author is a staff member of the Central Bank of Nigeria (CBN). However, the research was conducted independently, with no influence from the author's affiliation. The study adhered to ethical research practices, ensuring objectivity, transparency, and unbiased findings, with full disclosure of this potential conflict of interest.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

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