

Internal Control and Fraud Prevention in the Nigerian Public Sector: A Partial Least Square Structural Equation Modeling Approach

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Abstract

Introduction: The Nigerian public sector has long grappled with fraudulent activities, which impede effective governance and socio-economic development. Numerous fraud instances, such as embezzlement, money laundering, and misappropriation of funds, undermine public trust and financial integrity. This study assesses the effectiveness of internal control mechanisms in preventing fraud within Nigerian federal ministries and agencies, focusing on the COSO internal control framework to enhance governance and accountability. **Methodology:** Using a descriptive cross-sectional survey design, structured 5-point Likert scale questionnaires were distributed across 43 federal ministries and agencies involved in governance oversight. A sample of 385 respondents, comprising accounting and finance managers, internal auditors, and forensic accountants, was analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) to understand the relationship between internal control components and fraud prevention. **Results:** Findings revealed that specific elements of the COSO internal control framework, namely risk assessment, information and communication, and monitoring activities, showed significant positive impacts on fraud prevention. Information and communication had the most substantial effect, with a path coefficient of $\beta = 0.416$, highlighting the importance of clear and effective communication. Monitoring activities and risk assessment followed closely, with path coefficients of $\beta = 0.221$ and $\beta = 0.213$, respectively, demonstrating the role of continuous oversight and proactive risk management. However, control activities revealed a significant but negative relationship ($\beta = -0.184$), suggesting possible implementation issues or inefficiencies in existing control measures. The control environment had an insignificant effect ($p = 0.061$), indicating that current policies and procedures

may not adequately address fraud prevention. **Conclusion:** The study concludes that while components like risk assessment, information and communication, and monitoring contribute to reducing fraud, the Nigerian public sector must re-evaluate and strengthen internal control systems, especially control activities. Recommendations include enhancing communication protocols, bolstering control measures, and addressing gaps within the control environment to create a robust framework for sustainable fraud prevention. This study emphasizes the importance of an integrated internal control approach as a multi-faceted strategy for improving governance and reducing fraud within Nigeria's public institutions.

Keywords

Internal Control, Fraud Prevention, Nigerian Public Sector, Pentagon Fraud Model, Partial Least Square-Structural Equation Model (PLS-SEM)

1. Introduction

The Nigerian public sector has undergone significant transformations in recent years, spurred by globalization, technological advancements, and an increased emphasis on accountability and transparency. As the nation strives for economic growth and development, the efficacy of internal control mechanisms within its public sector becomes paramount. One of the critical challenges faced by public institutions worldwide, including those in Nigeria, is the pervasive threat of fraudulent activities, including embezzlement, money laundering, and misappropriation of public funds (Ugbede, Ekpete, & Yahaya, 2021; Ayodele Ojo-Agbodu, 2022; Mukah, 2020). This is further exacerbated by the growing popularity of cryptocurrencies exposing users to unethical actors (Smith, 2018). Fraud weakens the institutional foundation upon which economic growth and development depend, making it onerous to enforce the law. It is considered the most attractive threat to the world economy, particularly when one considers the amount of money lost annually (Abdullahi & Mansor, 2018). Fraudulent activities within the public sector not only compromise the integrity of financial systems but also erode public trust and confidence in government institutions. As Erbuğa (2022) puts it, fraud gives companies and nations headaches, intensely irritates markets and their players on a global scale.

In the Nigerian public sector, fraud has been a persistent and damaging issue, undermining effective governance and hampering socio-economic development (Okpala & Enwefa, 2017; Ogiriki & Appah, 2018). Fraud is almost growing proportionately to economic and financial advancement, and if care is not taken, it can even overthrow the system, thereby destroying the economy. This trend has resulted in diverting resources designated for public welfare and social services, intensifying poverty, inequality, and social challenges. This is further exacerbated by the fact that fraud techniques cannot be completely discovered and eradicated

and that each activity has a specific set of fraud risks. [Akinbowale, Klingelhöfer, & Zerihu \(2020\)](#) alluded that fraud perpetrators change their operational techniques in line with changes in internet technological dynamics and advancement.

Fraud prevention serves as an organization's early warning system ([Akeke & Atah, 2023](#)), involving the anticipation, recognition, and assessment of fraud risk, as well as the implementation of measures to eliminate or reduce that risk ([Oladipo & Olurotimi, 2021](#)). [ACFE \(2022\)](#) asserted that the most cost-effective way to limit fraud losses is to prevent fraud from occurring in the first place because the cost of detecting and eradicating can be quite exorbitant or, as [Erbuğa \(2022\)](#) puts it, "less expensive than dressing the wounds of the fraudulent act". Therefore, fraud prevention is anticipating, recognizing, and assessing fraud risk and implementing measures to eliminate or reduce that risk ([Oladipo & Olurotimi, 2021](#)). Fraud prevention, thus, involves the integration of all efforts that may be used to reduce the opportunities to commit fraud, ensure employees are not under any pressure to meet their needs that would lead to committing fraud, and lastly, ensure that there is no justification by employees to commit fraud ([Nyakarimi, Kariuki, & Kariuki, 2020](#)).

Robust internal control systems have generally been considered a strong public sector governance tool to curb fraudulent activities. Internal control encompasses a set of policies, procedures, and mechanisms designed to ensure the effectiveness and efficiency of operations, reliability of financial reporting, and compliance with applicable laws and regulations. In the context of fraud prevention, a well-structured internal control framework acts as a bulwark against opportunistic and intentional misconduct. However, the efficacy of these controls depends on various factors, including their design, implementation, and continuous monitoring. Considering the public sector's pivotal role in shaping a nation's economic trajectory, the need for robust internal control systems cannot, therefore, be overemphasized in the Nigerian public sector.

Furthermore, internal control is a fundamental aspect of management stewardship responsibility, providing interested parties with reasonable assurance that their organization is being effectively controlled and that the information they receive is accurate and dependable ([Ibrahim, 2017](#)). This means that internal controls are designed to ensure compliance, safeguard assets, and promote effective governance. In other words, internal control systems are designed to provide reasonable assurance regarding the achievement of multiple objectives including operational efficiency, financial reporting, and compliance with laws and regulations. Internal control systems comprise various components, including control environment, risk assessment, control activities, information and communication, and monitoring activities. Each component plays a vital role in ensuring the integrity and reliability of financial and operational processes. Therefore, adequate internal controls are the first line of defense in detecting and preventing material errors or fraud ([Anyanwu & Okafor, 2022](#)). Consequently, it is expected that the management of an organization designs internal controls to ensure

efficiency and effectiveness, reliability of financial reporting as well as compliance with laws and regulations (Oguda, Odhiambo, & Byaruhanga, 2015). Flowerastia, Trisnawati, & Budiono (2021) asserted that fraud occurrence is generally motivated by open opportunities, such as weak or absent internal control systems in the organization.

It should be noted that the nexus between internal control and fraud prevention is a subject of paramount importance, warranting scholarly exploration and in-depth analysis. The two are identified as two critical pairs in organizational risk management because fraud prevention knowledge is required to mitigate the level of risk. Ogwiji & Lasisi (2022) highlighted that fraud prevention focuses on identifying threats and opportunities, while internal control helps counter threats and take advantage of opportunities. Therefore, understanding and fortifying internal control mechanisms can serve as a linchpin in mitigating fraud risks, thereby promoting good governance, financial probity, and sustainable development.

Despite the above-acknowledged importance of internal controls in curbing fraud, the Nigerian public sector grapples with the need to enhance and tailor these mechanisms to suit the country's unique socio-economic landscape. With scanty literature in this area within the Nigerian public sector, this research aims to bridge existing gaps by delving into the intricate interplay between existing internal control frameworks in Nigerian public institutions and their effectiveness in preventing fraud. Adopting the PLS-SEM approach is intended to explore and highlight the fundamental relationship between the internal control elements and fraud prevention in the Nigerian Public Sector. By analyzing the components individually, the study aims to identify which aspects of the internal control framework are most effective in deterring fraudulent activities, thereby evaluating the overall impact of the internal control framework on fraud prevention within the Nigerian public sector.

Furthermore, even though several previous studies on internal control systems and fraud prevention in the public sector in Nigeria exist (for example, Olayode & Ayeni, 2018; Agwor & Akani, 2023 and Awotomilusi et al., 2023), these studies have focused mainly on state governments and public institutions. Olayode & Ayeni (2018) focused on Ondo State, Agwor and Akani (2023) focused on Bayelsa State, while Awotomilusi et al. (2023) focused on Ekiti State. There is obviously a paucity of studies on internal control systems and fraud prevention in public institutions at the federal or central government level in Nigeria. Because the federal government public institutions have more constitutional powers, financial resources, administrative control, judicial authority, and greater control over policy implementation than state government institutions; a study on the internal control systems and fraud prevention in federal or central government institutions, has significant potentials to provide more generalizable insights that can enhance the design and implementation of internal control systems, thereby strengthening fraud prevention mechanisms. The findings could inform policy recommendations and practical strategies for public sector organizations generally in Nigeria,

contributing to improved governance and accountability.

2. Literature Review

2.1. Empirical Review

This empirical review focuses on various studies that examine the impact of internal control systems on fraud prevention and detection across different sectors and regions. A study conducted by [Awotomilusi et al. \(2023\)](#) to evaluate the effect of internal control systems on fraud prevention and detection in public institutions in Ekiti State, Nigeria, used structured questionnaires to collect data from internal audit and finance staff of all public institutions in the state. The sample size was determined using Slovin's formula, and data was analyzed using both descriptive and inferential statistics. The study's findings indicated that the control environment, monitoring, and information and communication had a significant positive effect on fraud prevention and detection. However, risk assessment and control activities showed an insignificant positive relationship. Similarly, [Ibanga & Etim \(2022\)](#) explored the role of internal control systems in preventing fraud and misappropriation of funds in the public sector, using Akwa Ibom State Polytechnic, Nigeria, as a case study. Data was collected by administering questionnaires to a sample size of 92 respondents, which was determined by employing the Taro Yamane formula. The results revealed that the control environment, risk assessments, control activities, and information and communication all contributed to preventing fraud and misappropriation of funds in the public sector. On the other hand, [Oduwole & Akintoye \(2023\)](#) focused on agricultural firms in Abeokuta, Ogun State, Nigeria, to examine how internal control affects fraud prevention using data collected from 30 respondents using a questionnaire. Their study revealed that risk assessment had a positive and significant effect on fraud prevention, while control environment and safeguarding of assets had negative and insignificant effects. Furthermore, [Maaroufi \(2022\)](#) theoretically explored the effect of internal control (COSO) components on the organizational performance of Moroccan public establishments. The study revealed that there is a significantly positive relationship between internal control systems and organizational performance. This relationship was very significant when the focus was placed on Moroccan public organizations that fully applied the elements of the internal control framework. Furthermore, [Kesuma & Fachruzzaman \(2024\)](#) performed an empirical review of 10 national and international articles about the effect of the internal control framework on accounting fraud in the public sector in Indonesia, and found that the application of the components of internal control has a positive effect on the effectiveness of accounting fraud prevention in public sector organizations.

In Kenya, [Osolo & Njeru \(2022\)](#) used a descriptive design to analyze the effectiveness of internal control components on fraud prevention in government parastatals with the case study of Kenya Pipeline Company. The study revealed a strong correlation between internal control and fraud prevention, indicating that it is imperative for state-owned corporations in Kenya to put up strong internal

control systems to deter the occurrence of fraudulent cases and to safeguard public resources. Also, in Ghana, [Oduro & Cromwell \(2018\)](#) investigated the effect of internal control components on fraud prevention in Ghana's Local Government System, with primary data collected through a questionnaire from 35 local government institutions in Ghana and analyzed using multiple regression analysis. The study revealed that risk assessment and information technology positively and significantly deter fraud, while control environment, control activities, monitoring, and information communication had a positive but insignificant influence on fraud prevention.

On the other hand, [Razzouki et al. \(2024\)](#) investigated the impact of internal control on the innovation and performance of public organizations in Morocco using a causal and quantitative methodology on a sample of 187 public organizations. Data was collected through a questionnaire and analyzed using the structural equation modeling approach (PLS-SEM4). The results revealed that strong internal control significantly and positively influences the performance and innovation of public organizations in Morocco.

Meanwhile, [Agwor & Akani \(2023\)](#), using explanatory variables (Safeguarding of Assets and Management Integrity/Ethical Values) and as criterion variables (Asset Misappropriation and Employee Embezzlement), examined internal control systems and fraud prevention in the public service of Bayelsa State, Nigeria. A cross-sectional survey research design was employed with data collected via questionnaire from 48 respondents across the 10 purposively sampled ministries and parastatals. The Spearman Rank Order correlation with the aid of Statistical Package for Social Sciences (SPSS) Version 20, was adopted for data analysis. The study found a strong relationship between internal control and fraud, safeguarding of assets significantly related to asset misappropriation, and there was a significant relationship between management integrity/ethical values and employee embezzlement. The implication is that emphasis should be placed on strong and effective internal control systems in achieving organizational objectives.

To further illustrate the importance of internal control in national economic growth and sustainability, an empirical review by [Qin \(2018\)](#) on internal control studies in and outside China, revealed that most research has focused on larger firms. And because small enterprises drive China's economic growth, Qin emphasized the need for future research on internal controls in small enterprises, suggesting that high-quality controls based on COSO's five elements can enhance management and risk prevention, thereby promoting sustainable development.

Similarly, [Olayode & Ayeni \(2018\)](#) empirically examined the effects of internal control variables of segregation of duty and system authorization on fraud detection and prevention in Nigeria. The ordinary least square model estimation technique was employed to analyze the relationship between the explanatory variables and the dependent variable. Data was collected through questionnaires administered to Internal Audit and Bursary Departments staff of 3 tertiary institutions in Ondo State, Nigeria. Seventy-five (75) questionnaire items were distributed for

the study, and the data collected was analyzed with the aid of the updated ordinary least square regression (OLS) technique, while the data extracted from the copies of the questionnaire was coded to suit the OLS. The findings showed that system authorization exhibits a joint significant relationship with fraud detection and prevention with a coefficient of determination (R^2) of 0.281. The study recommends the implementation of adequate system authorization as a procedure within the internal control system to prevent or detect fraud.

Furthermore, in a study on the impact of internal controls on accounting information quality in China, Luo (2017) found that effective internal controls are essential for preventing distortions in accounting data. These controls ensure reliable financial reporting, operational efficiency, and compliance with laws and regulations, as outlined in the COSO framework. This is crucial because high-quality accounting information significantly affects the efficiency of capital markets and the optimal allocation of social resources. Luo concluded that to achieve these goals, management must strengthen internal control systems to uphold the integrity, authenticity, and legitimacy of accounting information.

In summary, the above empirical studies all found a strong relationship between internal control and fraud prevention. However, some studies found conflicting results about the effectiveness of internal control systems (especially when assessing the individual components of the control environment, risk assessment, control activities, information and communication, and monitoring activities) in preventing fraud, even within similar sectors. Considering that in developing economies notably, the public service is the most vulnerable to fraudulent activities and given the limited literature on this topic within the public sector, the current study seeks to investigate within Nigeria's public sector, the effect of the internal control system on fraud prevention, laying emphasis on federal ministries and parastatals.

2.2. Theoretical Framework

We anchored this study on the COSO internal control framework and the Pentagon fraud model.

2.2.1. COSO Internal Control Framework

The Committee of Sponsoring Organisations of the Treadway Commission (COSO) Internal Control Framework is a widely recognized framework for designing, implementing, and assessing internal control systems. Founded in 1985 to maintain a framework combining enterprise risk management, fraud deterrence, and internal controls (Ghasemi, Marie, & Rokni, 2022). The COSO framework, as illustrated by Figure 1, defines control as having five components of an acceptable system of internal control, namely control environment, risk assessment, control activities, information and communication, and monitoring activities (Ogwiji & Lasisi, 2022; Oguda, Odhiambo, & Byaruhanga, 2015). The study explores how these components impact fraud prevention.



Figure 1. COSO Integrated Framework, showing the relationship between control components, objectives, and organization entities. Source: (COSO, 2012).

From the above diagram, there is a direct relationship that exists between objectives, which are what an entity strives to achieve; the components, which represent what is required to achieve the objectives; and the entity structure, which includes the operating units, legal entities, and other structures (COSO, 2012). The COSO framework has gained broad acceptance around the world as a leading framework for designing, implementing, and conducting internal control and assessing the effectiveness of internal control systems (IFAD, 2015). Therefore, it provides a comprehensive model for evaluating the effectiveness of internal control mechanisms in the Nigerian public sector. The individual components are discussed as follows:

a) Control environment: The control environment encompasses the structure of the organization, the philosophy, style of management, human resources policies, commitment to competence, and the culture of ethical behavior and communication (COSO, 2012). In other words, the control environment describes a set of standards, processes, and structures that provide the basis for carrying out internal control across the organization (Schandl & Foster, 2019). The control environment is the bedrock of the COSO Framework because it serves as a foundation for all other internal control components and influences each of the three internal control objectives and all activities (Frazer, 2021). In other words, the control environment represents the collective attitude, awareness, and actions of the board of directors, management, and other stakeholders concerning the significance of internal controls within the organization. In summary, a robust control environment is characterized by a commitment to ethical behavior at all levels of the organization, clear communication of

values, and a management philosophy that prioritizes the identification and management of risks.

- b) Risk Assessment:** Risk assessment involves the identification, analysis, and management of uncertainties facing an organization from external and internal sources that threaten the achievement of organizational objectives (Abiola & Oyewole, 2013). Nyakarimi, Kariuki, & Kariuki (2020) state that it is meant to identify and analyze relevant risks in the organization, the type of controls required to address the risk, and form a basis for how those risks identified should be managed. In other words, the process encompasses risk identification, risk assessment, and the development of strategies to respond to and mitigate these risks (Riitho & Wanjala, 2020). This, therefore, requires management to consider the impact of possible changes in the internal and external environment with the objective of managing the impact (Schandl & Foster, 2019). COSO (2012) states that risk assessment involves a dynamic and interactive process for identifying, analyzing, and determining the basis for managing organizational risks to achieve the entity's objectives. The risk assessment process is an entity-wide process; therefore, organizations can make informed decisions and allocate resources effectively by understanding and managing risks.
- c) Control Activities:** Control activities are the policies and procedures established by an organization to ensure that management directives are followed. These encompass a variety of actions, such as authorization and approval processes, segregation of duties to prevent conflicts of interest, and measures to ensure accurate and timely information processing. As Mary (2017) puts it, it constitutes all actions geared toward helping management mitigate risks and guarantee the achievement of objectives. Control activities are performed at all levels of the entity, at different stages of business processes, including the technology environment, and may be preventive or detective in nature (Schandl & Foster, 2019). It stipulates the activities needed to prevent fraud and other risks an organization may face (Riitho & Wanjala, 2020). Akinbowale, Klingelhöfer, & Zerihu (2020) highlighted that control activities are the management policies and procedures aimed at detecting fraud cases and the associated risks to minimize the level of fraud when it has occurred. Some control activities include approvals, authorizations, supervisions, verifications, reconciliations, reviews of operating performance, security of assets, and segregation of duties, all geared towards helping management mitigate risks and guarantee the achievement of objectives (Mary, 2017). In summary, a well-designed control activity provides a structured framework for daily operations, reducing the risk of errors and fraud.
- d) Information and Communication:** Information and communication include the identification, capture, and exchange of financial, operational, and compliance-related data in a timeframe that allows individuals to hold out their responsibilities to the attainment of organizational objectives (Abiola & Oyewole,

2013). Information and communication are critical for conducting, managing, and controlling operations; therefore, the quality of information must be over-emphasized. This means that information should be appropriate, timely, reliable, relevant, current, accurate, understandable, and accessible. A robust system ensures that information flows appropriately, internally and externally, supporting informed decision-making and fostering transparency. Nyakarimi, Kariuki, & Kariuki (2020) asserted that communication creates good working relationships within the organization, and for it to be effective, it must flow in all directions effortlessly. As Riitho & Wanjala (2020) put it, an open and effective communication culture in an organization enables the possibility of fraud to be detected in advance, and as a result, fraud preventive measures can be put in place in a timely manner.

- e) **Monitoring Activity:** Monitoring determines whether all internal control components, including their principles, are in place and functioning as intended. It is a process that is used to evaluate and assess the internal control system or organizations to ensure that it is applied consistently over a long period of time (Nyakarimi, Kariuki, & Kariuki, 2020). In other words, monitoring activities are essential for assessing the ongoing effectiveness of the internal control system. By regularly reviewing and assessing control processes, organizations can identify deficiencies, report them promptly, and take corrective action to maintain and enhance the effectiveness of their internal controls. According to Abiola & Oyewole (2013), monitoring activities provide information about potential and actual breakdowns in a control system. Mary (2017) posits that the purpose of monitoring is to periodically or systematically determine whether internal control is adequately designed, properly executed, and effective. In other words, all the five components of internal control function as designed. For monitoring to fully achieve its objective of fraud mitigation, Riitho & Wanjala (2020) indicated that it must be supported by the organization's top management and assigned to competent individuals within the organization, and finally, it must follow a baseline survey.

In summary, each of the COSO components plays a crucial role in creating a comprehensive internal control system, collectively contributing to an organization's ability to achieve its objectives, manage risks, and ensure the reliability of financial reporting. The COSO Framework, therefore, provides a structured approach for organizations to design and assess their internal controls, promoting good governance and sustainable success.

2.2.2. The Fraud Pentagon Model

The Fraud Pentagon Model emerged in response to critiques of earlier fraud theories, notably the White-Collar Crime Theory developed by Edwin Sutherland in 1939. Sutherland argued that prosecutors and judges tend to be more lenient towards white-collar crimes committed by the upper class compared to blue-collar crimes, which are often attributed to psychological, associational, and structural factors. Cressey (1950) criticized this theory and introduced the Fraud Triangle in

1953, positing that fraud occurs when three elements converge: opportunity, pressure, and rationalization. While the Fraud Triangle served its purpose, it was refined by Wolfe & Hermanson (2004), who presented the Fraud Diamond Theory. Wolfe & Hermanson (2004) argued that while perceived pressure or incentive may coexist with opportunity and rationalization, fraud is unlikely to occur without the fourth element: Capability (Ogunode & Dada, 2022).

In 2013, Nigerian researchers Gbegi and Adebisi 2013 proposed the New Fraud Diamond Theory. They examined Wolfe and Hermanson's model, highlighting its relevance and limitations, and suggested that all fraud models should be integrated for a more comprehensive understanding of fraud in Nigeria (Gbegi & Adebisi, 2013). They proposed that integrating motivation, opportunity, personal integrity, capabilities, and corporate governance are key components required to understand the stimulus of fraud. However, this model has been criticized for its complexities of integrating both individual and corporate motivations to commit fraud. In 2016, the Fraud Pentagon Model was developed by another Nigeria researcher, Abayomi (2016), who, after critically examining the fraud diamond theory, proposed that personal ethics should be integrated into the model as a key factor in fraudster's motivation. This perspective is supported by studies such as those by Said et al. (2017), which examined the effects of introducing ethical values into the Fraud Triangle within the Malaysian banking sector, and by Sujeewa et al. (2018), who emphasized the importance of incorporating employee ethics into established theories in Malaysia. In the Nigerian context, where morality is highly valued, personal ethics significantly influence how individuals respond when faced with opportunities for fraud. The Fraud Pentagon model is employed in this study for an in-depth understanding of the factors contributing to Nigerian public sector fraud.

In conclusion, the theoretical framework outlined above provides a comprehensive lens through which to examine the relationship between internal control and fraud prevention in the Nigerian public sector.

2.3. Research Hypotheses

This study is guided by five (5) hypotheses that independently analyze the effect of the independent components of the internal control system on fraud prevention:

H1: Control environment is positively associated with fraud prevention in the Nigerian public sector.

H2: Risk assessment procedures are positively related to fraud prevention in the Nigerian public sector.

H3: Effective control activities positively correlate with Nigerian public sector fraud prevention.

H4: Efficient information and communication systems positively influence fraud prevention in the Nigerian public sector.

H5: Regular monitoring activities are positively associated with fraud prevention in the Nigerian public sector.

3. Methodology

3.1. Research Design

This study utilized a descriptive cross-sectional survey design and a quantitative research approach, employing structured 5-point Likert scale questionnaires to assess the current state of internal control and fraud prevention in Nigeria's public sector. This approach is validated by similar quantitative studies, including those by Andalia, Amiruddin, & Pontoh (2021) and Agang & Njoka (2020) on internal control and fraud prevention, as well as Ogwiji & Lasisi (2022) on financial performance. The positivist research philosophy guided the study, focusing on objective analysis of social phenomena (Ryan, 2018).

3.2. Population, Sampling Technique and Data Collection

The target population included 43 federal ministries, 42 federal agencies—such as the Economic and Financial Crimes Commission (EFCC) and the Independent Corrupt Practices Commission (ICPC)—and professional bodies like the Institute of Chartered Accountants of Nigeria (ICAN) and the Chartered Institute of Forensic and Investigative Professionals of Nigeria (CIFIPN). By involving various government agencies and anti-graft organizations, the study aimed to gather valuable insights from entities responsible for governance and oversight in the public sector, thus contributing to understanding internal controls and their effectiveness in fraud prevention. As a result of the lack of available statistics on civil service workers, the exact population size could not be precisely determined; thus, the minimum sample size was determined using Cochran's formula (Cochran, 1977) for calculating sample size as follows:

$$N = z^2 pq / d^2,$$

Where $z^2 = (1.96)^2$, $p = 50\%$, for a population of unknown proportion (Ashwin et al. (2020), $q = 1 - p$, and $d^2 = (0.05)^2$. The minimum sample size was therefore estimated at 385.

A multi-phase or mixed sampling technique was employed, combining non-probability purposive sampling targeted at individuals with relevant expertise, such as accounting and finance managers, internal auditors, and forensic accountants from government ministries and agencies, while probability or random sampling was applied to the population within the purposively selected samples.

Primary data were collected using a structured questionnaire to assess participants' knowledge, perceptions, and experiences regarding internal control practices and fraud prevention measures. Based on the COSO framework, the questionnaire utilized a five-point Likert scale ranging from "Strongly Agree" to "Strongly Disagree". Data collectors were recruited and trained on ethical data collection practices.

A pilot study was conducted with 25 questionnaires to test the instrument's reliability and validity, using SPSS to assess internal consistency. Two pilot tests were conducted to ensure the questionnaire's effectiveness before the final data collection. The pilot study assessed measurement reliability using Cronbach's

Alpha, revealing high internal consistency among constructs, making them suitable for data collection. **Table 1** presents the details of the constructs tested, the Cronbach's Alpha coefficients obtained, and interpretations.

Table 1. Reliability pretest results.

| Construct | # of Indicators | # of Cases | Cronbach's Alpha | Remark |
|------------------------------------|-----------------|------------|------------------|----------|
| Control Environment (CE) | 5 | 25 | 0.816 | Reliable |
| Risk assessment (RA) | 5 | 25 | 0.875 | Reliable |
| Control Activities (CA) | 5 | 25 | 0.702 | Reliable |
| Information and communication (IC) | 5 | 25 | 0.695 | Reliable |
| Monitoring Activities (MA) | 5 | 25 | 0.906 | Reliable |
| Fraud Prevention and Fraud (FP) | 9 | 25 | 0.707 | Reliable |

From **Table 1**, the study obtained Cronbach's alpha greater than 0.7 for all the constructs except for Information and Communication (IC) with 0.695, hence indicating a good reliability (Henseler, Hubona, & Ray, 2016). The initial Information and Communication instrument, with an Alpha of 0.695, which indicated low reliability, was improved to 0.745 by removing one of the items from the data. This ensured that all constructs were reliable before the main study.

In summary, the pilot study allowed the researchers to refine the research design and evaluate the appropriateness and effectiveness of the data analysis techniques used in the main study, among other things.

3.3. Data Analysis and Model

The collected data was coded and analyzed using SPSS 26, employing descriptive and inferential statistics. Central tendency and dispersion measures were calculated, and partial least squares structural equation modeling (PLS-SEM) via SmartPLS 4.9 was used. SEM accommodates relationships among multiple variables and accounts for measurement error, making it suitable for exploratory research. According to Schumacker & Lomax (2010), SEM better reflects real-life situations by simultaneously accounting for relationships among multiple variables and acknowledging potential measurement errors.

This research utilized a structural model to investigate the influence of internal control elements (Control Environment (CE), Risk Assessment (RA), Control Activities (CA), Information and Communication (IC), and Monitoring Activities (MA) on Fraud Prevention (FP) in Nigeria's public sector. The model was formulated as follows:

$$FP = \beta_0 + \beta_1CE + \beta_2RA + \beta_3CA + \beta_4IC + \beta_5MA + \varepsilon,$$

where FP is fraud prevention (the dependent variable), while CE, RA, CA, IC, and MA are the independent variables:

β_0 is the y-intercept;

$\beta_1, \beta_2, \beta_3, \beta_4,$ and β_5 are the coefficients of the independent variables, and ε is

the error term.

Figure 2 shows the pathways of the relationships between the different dimensions of the independent variables and that of the dependent variable. The model's validation process involved several steps to ensure the robustness and reliability of the findings. First, a reliability analysis was conducted to assess the internal consistency of the constructs using Cronbach's alpha, rho_a, and composite reliability (threshold > 0.70). Second, convergent validity was assessed by computing each construct's Average Variance Extracted (AVE) and ensuring it was above the threshold of 0.5. Third, discriminant validity was assessed using Fornell-Larcker and HTMT criteria (less than 0.85 thresholds) as well as cross-loadings between the construct and all other constructs. Finally, the structural model was evaluated by examining the path coefficients, their significance, and the R-squared value for the dependent variable (Fraud Prevention). The results indicated a good model fit, with significant path coefficients and a reasonably high R-squared value.

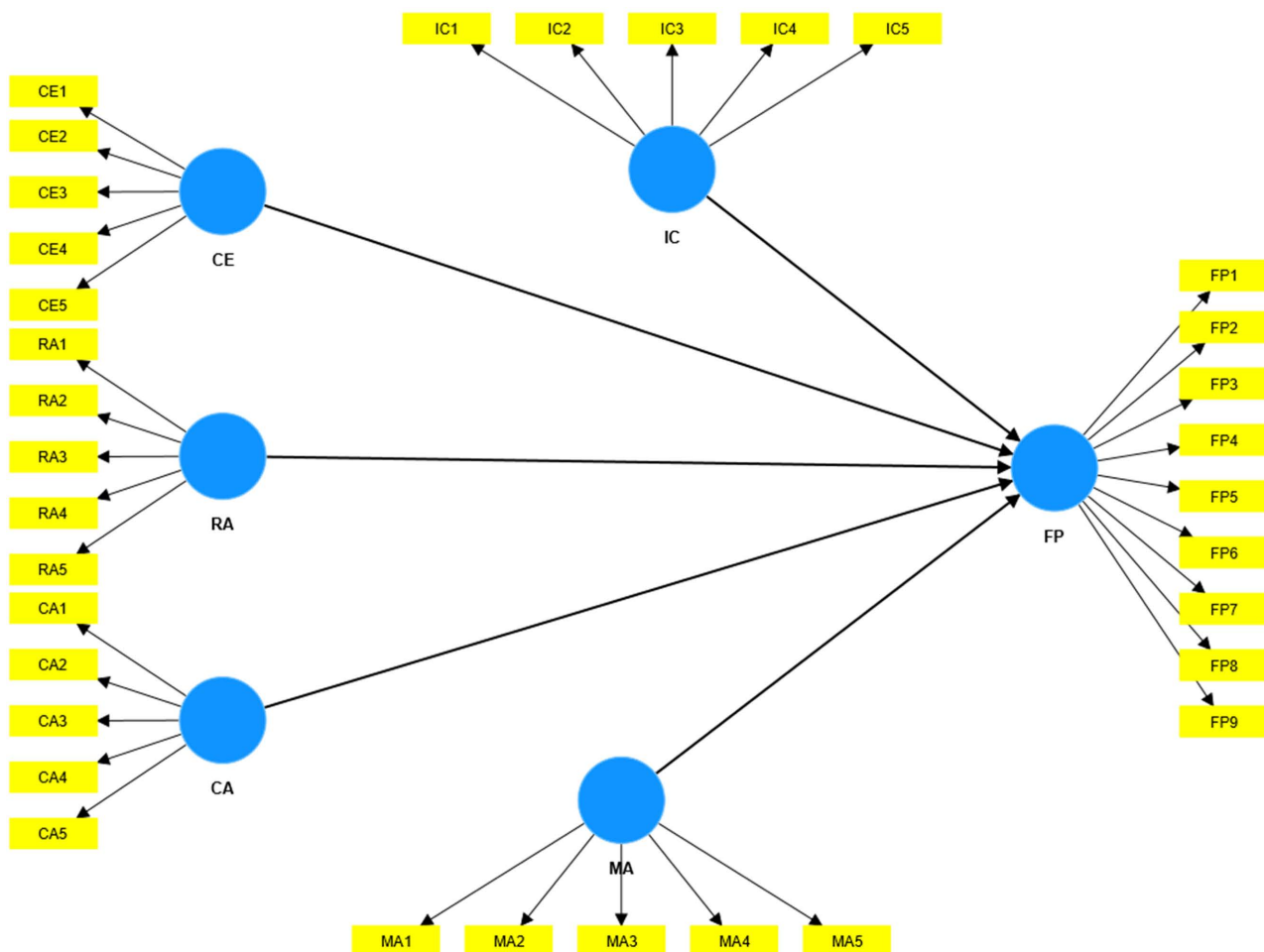


Figure 2. Pathways of the Relationships among internal control Dimensions and fraud prevention.

4. Results

This section reports on the inferential analysis of the study, providing a deeper

understanding of the relationships between internal control and fraud prevention in the Nigerian public Sector.

The inferential analysis is divided into two main parts: i) The assessment of the measurement model; ii) The evaluation of the structural model.

4.1. Assessment of Measurement Model

4.1.1. Reliability and Validity Analysis

The quality of the constructs was assessed for this study using the measurement model. According to Sarstedt, Ringle, & Hair (2017), the objective of a reflective measurement model assessment is to ensure that the constructs used are reliable and valid, providing support for the suitability of their inclusion in the path model. The measurement model was therefore assessed in this study by examining the indicator reliability, composite reliability, convergent validity (AVE), and discriminate validity (Fornell-Larcker and HTMT criteria). The factor loadings were examined for all the constructs, and according to Hair, Black, Babin, & Anderson (2010), the minimum acceptable value for factor loadings to be reliable is 0.50. However, Ringle, Sarstedt, Mitchell, & Guderganb (2018) considered values above the threshold of 0.70 acceptable for factor loading to be reliable. In this study, all the factor loadings were above 0.7, with the lowest indicator being CA3 (0.869) for control activities, and the highest recorded was CE1(0.911) for the control environment, and no indicator was eliminated on account of poor loadings (Table 2 and Figure 3).

Reliability was assessed using Cronbach's alpha rho_a and composite reliability, with recommended acceptable levels being values greater than 0.7, as Sarstedt, Ringle, & Hair (2021) suggested. To assess convergent validity, average variance extracted (AVE) was used. Each construct in this study measured a high AVE (AVE > 0.50), with the lowest recorded for Monitoring Activities (MA) at 0.786 and the highest Control Environment (CE) at 0.813. This showed that convergent validity was attained, indicating that all model constructs were reliably measured.

Table 2. Reliability and validity analysis.

| Construct | Indicators | Loadings | Alpha | Rho_A | CR | AVE |
|--------------------------|------------|----------|-------|-------|-------|-------|
| Control Environment (CE) | CE1 | 0.911 | 0.943 | 0.943 | 0.956 | 0.813 |
| | CE2 | 0.906 | | | | |
| | CE3 | 0.895 | | | | |
| | CE4 | 0.893 | | | | |
| | CE5 | 0.904 | | | | |
| Risk Assessment (RA) | RA1 | 0.889 | 0.935 | 0.936 | 0.951 | 0.795 |
| | RA2 | 0.885 | | | | |
| | RA3 | 0.892 | | | | |
| | RA4 | 0.908 | | | | |
| | RA5 | 0.882 | | | | |

Continued

| | | | | | | |
|------------------------------------|-----|-------|-------|-------|-------|-------|
| | CA1 | 0.889 | 0.934 | 0.936 | 0.950 | 0.792 |
| | CA2 | 0.889 | | | | |
| Control Activities (CA) | CA3 | 0.869 | | | | |
| | CA4 | 0.900 | | | | |
| | CA5 | 0.903 | | | | |
| | IC1 | 0.896 | 0.935 | 0.935 | 0.951 | 0.794 |
| | IC2 | 0.888 | | | | |
| Information and communication (IC) | IC3 | 0.881 | | | | |
| | IC4 | 0.893 | | | | |
| | IC5 | 0.897 | | | | |
| | MA1 | 0.887 | 0.932 | 0.932 | 0.948 | 0.786 |
| | MA2 | 0.885 | | | | |
| Monitoring Activities (MA) | MA3 | 0.885 | | | | |
| | MA4 | 0.885 | | | | |
| | MA5 | 0.890 | | | | |
| | FP1 | 0.886 | 0.970 | 0.970 | 0.974 | 0.805 |
| | FP2 | 0.901 | | | | |
| Fraud Prevention | FP3 | 0.896 | | | | |
| | FP4 | 0.894 | | | | |
| | FP5 | 0.897 | | | | |
| | FP6 | 0.896 | | | | |
| | FP7 | 0.904 | | | | |
| | FP8 | 0.892 | | | | |
| | FP9 | 0.909 | | | | |

Note: CR=composite validity, AVE = Average variance extracted

4.1.2. Discriminant Validity Assessment

Discriminant validity was assessed using Heterotrait-Monotrait ratio (HTMT)—Matrix, Fornell-Larcker criterion, and Cross loadings. The study employed the criteria given by Fornell and Larcker (Farrell & Rudd, 2009) which stated that for discriminant validity to be achieved, the square roots of AVE must all be greater than the values of their corresponding correlation. This was obtained in this study. Similarly, Heterotrait-Monotrait ratio (HTMT) values were all below the acceptable (conservative) threshold of 0.85 (Table 3), indicating that the constructs are distinct. Therefore, suggesting good discriminant validity.

The results of the cross-loading in Table 4 below show how each item loaded highest on its own construct than on other constructs, indicating good discriminant validity.

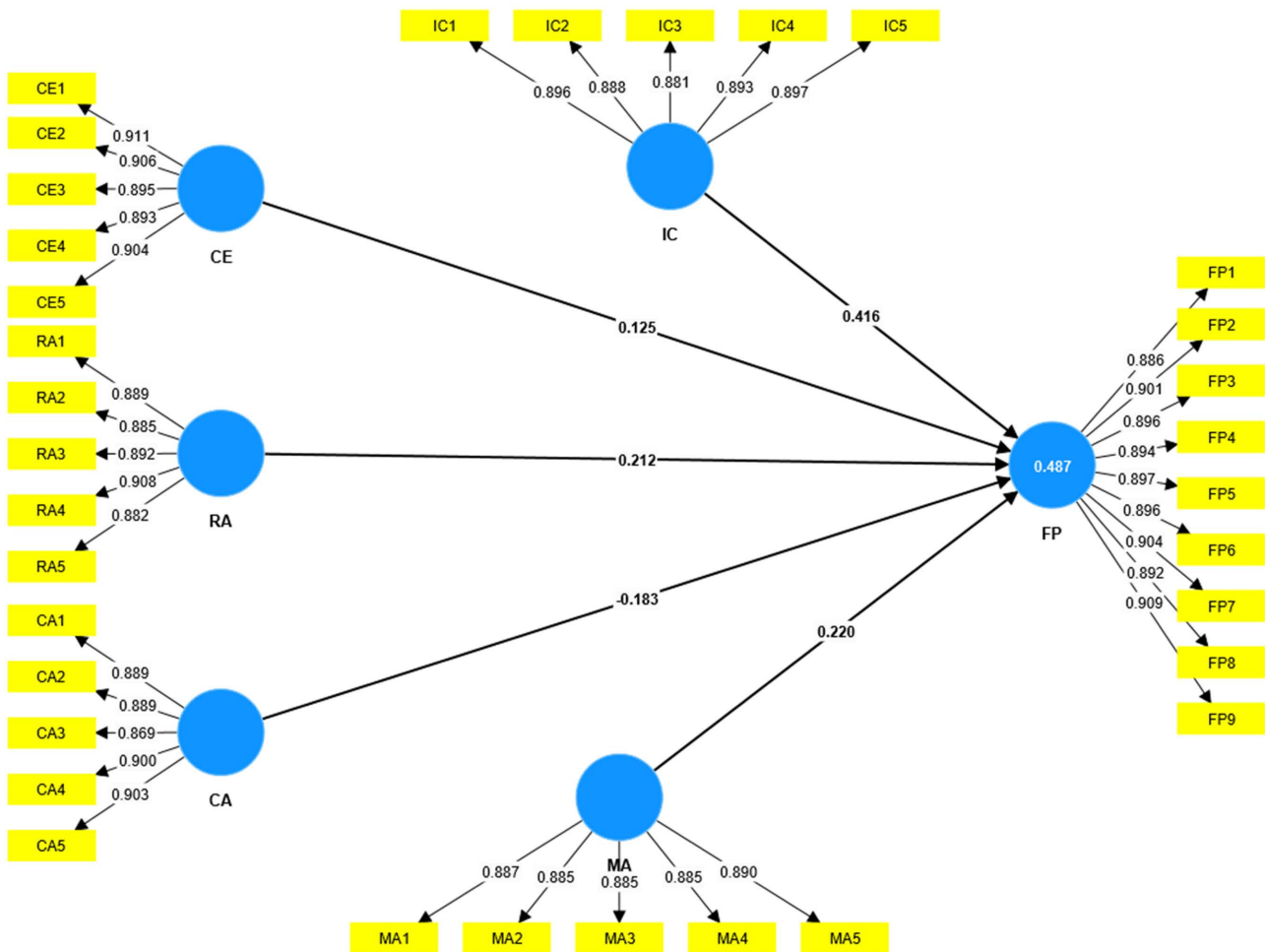


Figure 3. The model factor loadings.

Table 3. Heterotrait-Monotrait ratio (HTMT)—Matrix and Fornell-Larcker criterion.

| Constructs | CA | CE | FP | IC | MA | RA |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|
| CA | 0.890 | 0.618 | 0.482 | 0.661 | 0.677 | 0.882 |
| CE | 0.581 | 0.902 | 0.571 | 0.689 | 0.602 | 0.674 |
| FP | 0.461 | 0.547 | 0.897 | 0.680 | 0.565 | 0.565 |
| IC | 0.617 | 0.647 | 0.649 | 0.891 | 0.616 | 0.695 |
| MA | 0.633 | 0.564 | 0.538 | 0.575 | 0.886 | 0.621 |
| RA | 0.826 | 0.633 | 0.539 | 0.650 | 0.580 | 0.891 |

Note: Diagonal and bold are the square roots of AVE, above the diagonals and in italics are the HTMT values, and below the diagonal are the correlations of the constructs.

Table 4. Cross loadings.

| | CA | CE | FP | IC | MA | RA |
|-----|-------|-------|-------|-------|-------|-------|
| CA1 | 0.889 | 0.488 | 0.386 | 0.539 | 0.536 | 0.696 |
| CA2 | 0.889 | 0.515 | 0.396 | 0.568 | 0.548 | 0.705 |

Continued

| | | | | | | |
|-----|-------|-------|-------|-------|-------|-------|
| CA3 | 0.869 | 0.503 | 0.401 | 0.534 | 0.568 | 0.740 |
| CA4 | 0.900 | 0.531 | 0.431 | 0.548 | 0.568 | 0.772 |
| CA5 | 0.903 | 0.544 | 0.435 | 0.557 | 0.592 | 0.756 |
| CE1 | 0.523 | 0.911 | 0.510 | 0.603 | 0.498 | 0.568 |
| CE2 | 0.533 | 0.906 | 0.491 | 0.590 | 0.523 | 0.574 |
| CE3 | 0.517 | 0.895 | 0.488 | 0.560 | 0.508 | 0.576 |
| CE4 | 0.508 | 0.893 | 0.475 | 0.570 | 0.517 | 0.555 |
| CE5 | 0.538 | 0.904 | 0.500 | 0.594 | 0.498 | 0.581 |
| FP1 | 0.398 | 0.487 | 0.886 | 0.577 | 0.514 | 0.482 |
| FP2 | 0.446 | 0.500 | 0.901 | 0.594 | 0.510 | 0.497 |
| FP3 | 0.408 | 0.480 | 0.896 | 0.585 | 0.466 | 0.488 |
| FP4 | 0.406 | 0.491 | 0.894 | 0.566 | 0.450 | 0.465 |
| FP5 | 0.378 | 0.477 | 0.897 | 0.578 | 0.467 | 0.472 |
| FP6 | 0.385 | 0.447 | 0.896 | 0.551 | 0.487 | 0.458 |
| FP7 | 0.479 | 0.545 | 0.904 | 0.624 | 0.511 | 0.520 |
| FP8 | 0.388 | 0.494 | 0.892 | 0.564 | 0.458 | 0.460 |
| FP9 | 0.428 | 0.486 | 0.909 | 0.592 | 0.473 | 0.501 |
| IC1 | 0.555 | 0.568 | 0.592 | 0.896 | 0.522 | 0.570 |
| IC2 | 0.512 | 0.567 | 0.571 | 0.888 | 0.478 | 0.582 |
| IC3 | 0.529 | 0.565 | 0.587 | 0.881 | 0.512 | 0.573 |
| IC4 | 0.594 | 0.568 | 0.551 | 0.893 | 0.523 | 0.592 |
| IC5 | 0.561 | 0.614 | 0.587 | 0.897 | 0.529 | 0.581 |
| MA1 | 0.531 | 0.508 | 0.474 | 0.492 | 0.887 | 0.478 |
| MA2 | 0.565 | 0.502 | 0.471 | 0.492 | 0.885 | 0.531 |
| MA3 | 0.560 | 0.474 | 0.466 | 0.483 | 0.885 | 0.506 |
| MA4 | 0.581 | 0.510 | 0.500 | 0.553 | 0.885 | 0.539 |
| MA5 | 0.566 | 0.506 | 0.470 | 0.528 | 0.890 | 0.516 |
| RA1 | 0.736 | 0.556 | 0.465 | 0.550 | 0.517 | 0.889 |
| RA2 | 0.727 | 0.583 | 0.472 | 0.582 | 0.487 | 0.885 |
| RA3 | 0.726 | 0.542 | 0.480 | 0.570 | 0.518 | 0.892 |
| RA4 | 0.757 | 0.596 | 0.485 | 0.625 | 0.526 | 0.908 |
| RA5 | 0.734 | 0.544 | 0.498 | 0.570 | 0.536 | 0.882 |

4.2. Evaluation of the Structural Model

Before the hypotheses verification, the common method bias was assessed using the Variance Inflation Factor (VIF). The VIF values for Control Activities (CA), Control Environment (CE), Information and Communication (IC), Monitoring Activities (MA), and Risk Assessment (RA) on Fraud Prevention (FP) are all below 5, indicating the absence of multicollinearity (see **Table 4**). Common method bias refers to the amount of spurious covariance shared among variables due to the measurement method rather than the constructs the measures represent. Lower VIF values (less than 5) indicate less redundancy among the predictor variables, suggesting that the measures capture distinct constructs and that common method bias is unlikely to be a significant issue.

Table 5. Common method assessment using variance inflation factor (VIF).

| | |
|----------|-------|
| CA -> FP | 3.571 |
| CE -> FP | 2.081 |
| IC -> FP | 2.188 |
| MA -> FP | 1.918 |
| RA -> FP | 3.684 |

The model's R-square value for this study was 0.487, and this showed that nearly half (48.7%) of the variability in fraud prevention in the Nigerian Public Sector is accounted for by the predictors in the model (Control environment, Risk Assessment, Control activities, Information and communication as well as Monitoring activities) while 51.3% is accounted for by other factors not included in this model. The significant proportion not captured by this model offers an opportunity to examine further other factors that account for fraud prevention in the Nigerian public sector.

4.3. Hypothesis Testing of the Effect of Internal Control on Fraud Prevention

By applying the PLS-SEM approach, the study explored the impact of various internal control components on fraud prevention within Nigeria's public sector. Hypothesis testing revealed various effects among these components, with notable findings (**Table 6, Figure 4**)

Table 6. The effect of internal control on fraud prevention

| | Coef(β) | T statistics | P values | Conclusion |
|-------------------------------------|-----------------|--------------|----------|---------------|
| Control environment -> FP | 0.125 | 1.875 | 0.061 | insignificant |
| Risk Assessment -> FP | 0.213 | 2.505 | 0.012 | Significant |
| Control activities -> FP | -0.184 | 2.313 | 0.021 | Significant |
| Information and communication -> FP | 0.416 | 5.734 | 0.000 | Significant |
| Monitoring activities-> FP | 0.221 | 3.515 | 0.000 | Significant |

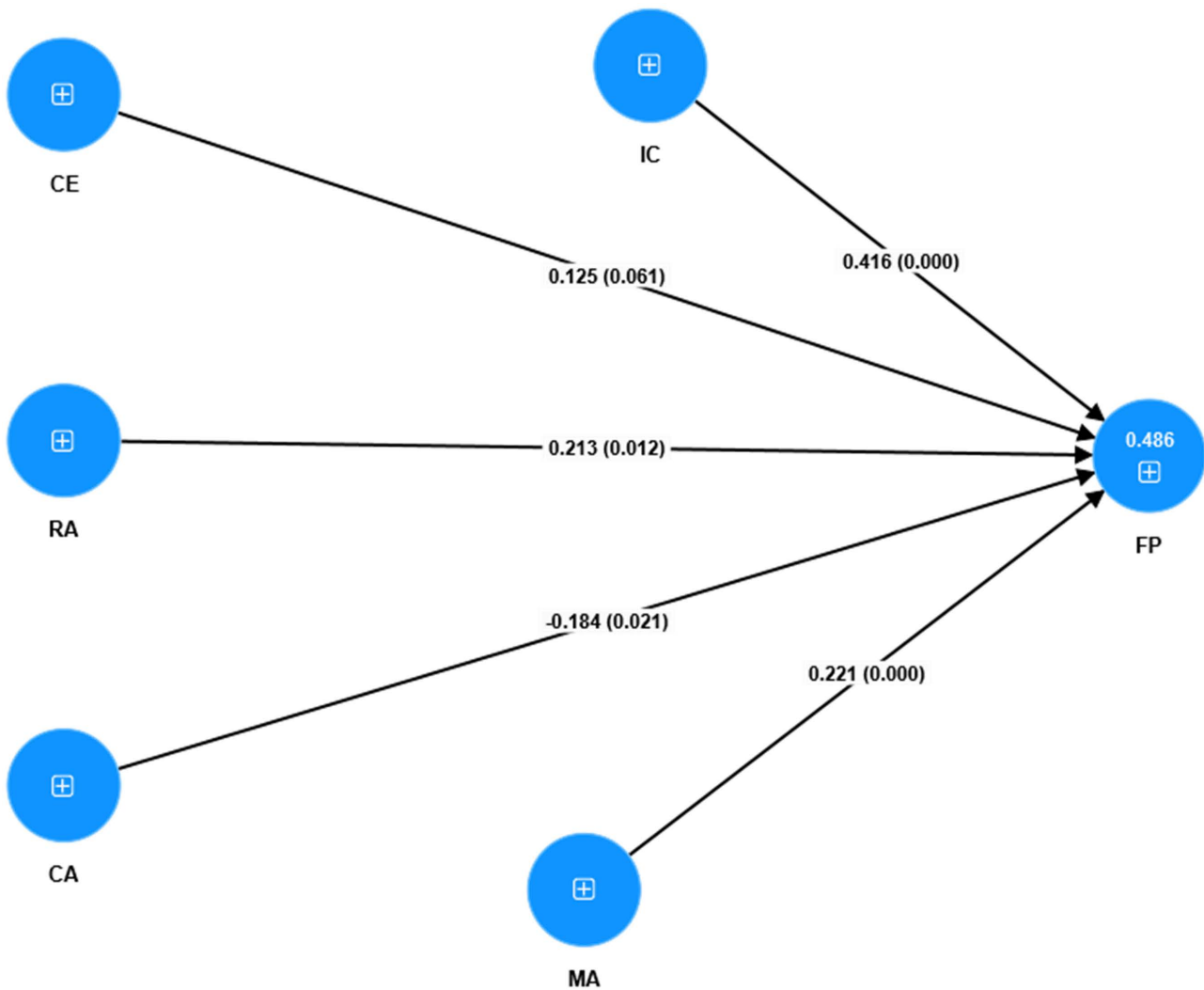


Figure 4. Path analysis.

From the above, H1 suggested a positive relationship between control environment and fraud prevention in the Nigerian public sector. The results showed a path coefficient of ($\beta = 0.125$, $t = 1.875$, $p = 0.061$), indicating an insignificant relationship. This implies that the hypothesis was not supported.

H2 examined whether risk assessment procedures are positively associated with fraud prevention. The findings supported this hypothesis with a significant positive effect ($\beta = 0.213$, $t = 2.505$, $p = 0.012$). This result revealed that effective risk assessment practices are drivers of reducing fraud risk within the Nigerian public sector.

H3, which posited that effective control activities enhance fraud prevention, showed a negative but significant effect ($\beta = -0.184$, $t = 2.313$, $p = 0.021$). This finding showed a contrary expectation, suggesting a need for further examination where certain control activities may negatively impact fraud prevention efforts, possibly due to procedural or implementation issues.

Similarly, H4 assessed the level of influence of information and communication

systems on fraud prevention, with results strongly supporting this hypothesis. Information and communication have a large positive and significant effect ($\beta = 0.416$, $t = 5.734$, $p < 0.001$), underscoring the importance of clear, efficient information sharing and communication channels in deterring fraud.

Finally, H5, which proposed a positive association between monitoring activities and fraud prevention, showed a significant positive impact ($\beta = 0.221$, $t = 3.515$, $p < 0.001$), highlighting the role of continuous oversight in reinforcing anti-fraud measures.

5. Discussions

The above findings revealed that not all COSO elements significantly impact fraud prevention, with the control environment showing a weak or insignificant effect, which aligns with findings from [Oduro & Cromwell \(2018\)](#) that control environment, control activities, monitoring, and information communication had a positive but insignificant influence on fraud prevention in the Local Government System of Ghana. Similarly, [Oduwole & Akintoye \(2023\)](#), who focused on how internal control systems impact fraud prevention in agricultural firms in Abeokuta, Ogun State, Nigeria, found that the control environment had an insignificant but negative effect, and aligns with findings from [Nyakarimi, Kariuki, & Kariuki \(2020\)](#) on the effect on fraud prevention in Kenya's banking sector. This is in contrast to findings by [Awotomilusi et al. \(2023\)](#), who found that control environment, risk assessment, and information and communication had a significant and positive effect on fraud prevention selected public institutions of Ekiti State, Nigeria, also, from [Ibanga & Etim \(2022\)](#) who explored the role of internal control systems in preventing fraud and misappropriation of funds in the public sector in Akwa Ibom State Polytechnic, Nigeria, and by [Iradukunda & Kamande \(2022\)](#) who found a significant positive effect in the Rwandans banking sector. The implication of the outcome of the current study is that significant improvements in the control environment are necessary since it is the bedrock of effective internal control.

Conversely, risk assessment was identified as a positive and significant predictor of fraud prevention, supported by findings from [Oduwole & Akintoye \(2023\)](#) on the effect of internal control components on fraud prevention in agricultural firms in Abeokuta, Ogun State, Nigeria, [Ibanga & Etim \(2022\)](#) on the effect of internal control systems in preventing fraud and misappropriation of funds in the public sector in Akwa Ibom State, Nigeria, and from [Oduro & Cromwel \(2018\)](#) who investigated, the effect on internal control system on fraud prevention in the Local Government System of Ghana. However, [Awotomilusi et al. \(2023\)](#) and [Ogwiji & Lasisi \(2022\)](#) reported an insignificant positive effect. In summary, the findings revealed that regular risk assessments and prompt implementation of risk assessment findings or control measures significantly reduce fraud.

Assessment of Control activities revealed a negative but significant effect on fraud prevention, indicating that existing control measures may be ineffective,

poorly designed, or poorly implemented. This implies that fraud is reduced in public organizations with focused attention on control activities like segregation of duties, prioritization of control activities, robust internal controls, monitoring of control activities, and continuous evaluation of controls as supported by extant literature such as Riitho & Wanjala (2020); Agang & Njoka (2020), Iradukunda & Kamande (2022). However, some studies like Ibanga & Etim (2022), Agwor & Akani (2023), and Olayode & Ayeni (2018) found statistically significant effects.

Information and communication emerged as a very significant predictor of fraud prevention. This is corroborated by previous studies, such as Awotomilusi, Oke, Dada, & Dagunduro (2023) and Ibanga & Etim (2022). Other studies, such as Oduro & Cromwell (2018) and Agang & Njoka (2020), have found an insignificant effect, while others, such as Ogwiji & Lasisi (2022), found statistically negative and significant effects. Therefore, the current study's findings revealed that effective communication of internal control policies fosters accountability and integrity, thereby reducing fraud risks.

Finally, monitoring activities significantly affected fraud prevention, emphasizing the importance of regular monitoring, fraud risk management, and dedicated fraud investigation teams. These findings resonate with studies by Awotomilusi et al. (2023), Ogwiji & Lasisi (2022), and Mary (2017). However, some research, such as Oduro & Cromwell (2018), had a positive but insignificant effect, indicating that monitoring did not reduce fraud.

The overall, prior studies, like Maaroufi (2022) on the effect of internal control components on the organizational performance of Moroccan public establishments, Kesuma & Fachruzzaman (2024) on the effect of internal control framework on accounting fraud in the public sector in Indonesia, Osolo & Njeru (2022) on the analyses of the effectiveness of internal control components on fraud prevention in government parastatals in Kenya, affirm the importance of all COSO internal control components on fraud prevention, highlighting the need for a comprehensive approach to strengthen these elements in public sector organizations.

6. Conclusion

The study found that risk assessment, information and communication, and monitoring activities positively and significantly predict fraud prevention in Nigeria's public sector, with information and communication having the most substantial effect ($\beta = 0.416$). While control activities had a significant and negative effect ($\beta = -0.184$). The control environment showed an insignificant effect, implying that regular risk assessments, effective communication, and continuous monitoring are essential for fraud prevention. However, the negative impact of control activities indicates that fraud cannot be entirely eliminated, highlighting the need for further investigation. The insignificant effect of the control environment suggests potential inadequacies in the design and implementation of control measures in

Nigeria's public sector, implying that existing policies, procedures, and governance frameworks may not effectively combat fraud. This suggests the need for a proactive approach to strengthen and tailor the control environment for more effective fraud prevention.

The study recommends strengthening and implementing comprehensive risk assessment practices and enhancing monitoring mechanisms to enhance fraud prevention. Improving information communication within public sector organizations is crucial for transparency and effective fraud risk management. A thorough re-evaluation of control activities tailored to the Nigerian context is necessary. Finally, reassessing the control environment with a focus on organizational culture and ethical standards will create a better framework for preventing fraud within the Nigerian public sector. Overall, this study accentuated the importance of the COSO framework as a multifaceted approach to fraud prevention within the Nigerian public sector.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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List of Symbols

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| ACFE | Association of Certified Fraud Examiners |
| ACFE | Association of Certified Fraud Examiners |
| AICPA | American Institute of Certified Public Accountants |
| COSO | Committee of Sponsoring Organizations |
| PLS-SEM | Partial Least Square-Structural Equation Model |
| IFAD | International Fund for Agricultural Development |