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RISK MANAGEMENT PRACTICES AND COST-EFFECTIVENESS OF MOBILE NETWORK OPERATORS IN NIGERIA: DOES DOCUMENTATION AND REPORTING MATTER?

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Abstract

This study examined the effect of risk management practices on the cost-effectiveness of Mobile Network Operators in the Nigerian telecommunication industry, with emphasis on the moderating role of documentation and reporting. The study was anchored on Enterprise Risk Management (ERM) Theory and adopted a descriptive survey research design. Data were collected from employees of selected Mobile Network Operators, including MTN Nigeria, Globacom, Airtel Nigeria, and 9mobile using a structured questionnaire. Structural Equation Modelling (SEM) with SmartPLS 4 was employed for data analysis. The findings revealed that documentation and reporting significantly improved cost-effectiveness ($\beta = 0.589$, $t = 16.107$, $p < 0.001$). However, monitoring activities ($\beta = -0.004$, $p = 0.955$), risk assessment ($\beta = -0.057$, $p = 0.330$), risk monitoring ($\beta = 0.012$, $p = 0.906$), and risk mitigation ($\beta = -0.004$, $p = 0.954$) showed insignificant effects on cost-effectiveness. Furthermore, documentation and reporting negatively moderated the relationship between risk evaluation and cost-effectiveness ($\beta = -0.281$, $t = 4.263$, $p < 0.001$). The study concluded that effective documentation and reporting systems significantly enhance operational efficiency and cost optimization in the Nigerian telecommunication industry.

Keywords: Risk Management Practices; Cost-Effectiveness; Documentation and Reporting; Mobile Network Operators; Nigerian Telecommunication Industry; Structural Equation Modelling (SEM).

1. INTRODUCTION

The Nigerian telecommunication industry has experienced remarkable expansion over the past two decades due to rapid advancements in information and communication technology (ICT), increasing mobile penetration, digital financial services, broadband expansion, and rising demand for data-driven communication services. Mobile Network Operators (MNOs) such as MTN Nigeria, Globacom, Airtel Nigeria, 9mobile, NATCOM Development & Investment Ltd., and Mafab Communications Limited play significant roles in promoting digital connectivity, financial inclusion, employment generation, and economic development in Nigeria. However, despite the rapid growth of the sector, MNOs continue to face numerous operational and strategic risks, including cyber threats, network failures, fraud, regulatory uncertainties, infrastructure vandalism, data security breaches, technological disruptions, and rising operational costs. These challenges have increased the need for effective risk management practices capable of improving operational efficiency and cost-effectiveness. According to Fraser and Simkins (2016), enterprise risk management enhances organizational resilience and supports strategic decision-making through coordinated risk identification and mitigation mechanisms. Similarly, Lam (2014) maintained that integrated risk management systems strengthen operational efficiency, organizational sustainability, and corporate performance.

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Empirical studies by Oko-Odion and Angela (2025), Horvey and Odei-Mensah (2025), and Aloulou and Alshohail (2026) further established that robust risk management frameworks significantly improve organizational performance and operational efficiency across technology-driven industries.

Despite increasing investment in digital infrastructure and operational systems, many mobile network operators in Nigeria continue to experience high operational costs, service delivery inefficiencies, customer dissatisfaction, network congestion, and financial losses arising from inadequate risk management mechanisms. Existing studies have largely focused on financial institutions, manufacturing firms, sustainability management, and governance systems, with limited empirical attention devoted to the telecommunication sector in Nigeria. Furthermore, while prior studies examined the direct relationship between enterprise risk management and organizational performance, limited attention has been given to the moderating role of documentation and reporting systems in strengthening cost-effectiveness among MNOs. Documentation and reporting are critical components of risk governance because they improve transparency, accountability, monitoring, compliance, and strategic coordination within organizations. Darsono et al. (2025) found that reporting and independent assurance mechanisms strengthen organizational performance and accountability, while Soi et al. (2026) reported that governance and reporting structures significantly improve risk management effectiveness. Similarly, Nguyen et al. (2026) established that information technology governance moderates the relationship between sustainable risk management and organizational performance. Consequently, the absence of adequate empirical evidence on how documentation and reporting moderate the relationship between risk management practices and cost-effectiveness among Nigerian MNOs creates a significant research gap that this study seeks to address.

The main objective of this study is to examine the effect of risk management practices on the cost-effectiveness of mobile network operators in the Nigerian telecommunication industry, with emphasis on the moderating role of documentation and reporting. Specifically, the study seeks to examine the influence of risk identification, risk assessment, internal control systems, compliance mechanisms, monitoring practices, and operational risk management on organizational cost-effectiveness among MNOs in Nigeria. The study also intends to determine whether documentation and reporting strengthen or weaken the relationship between risk management practices and cost-effectiveness within the telecommunication sector. The scope of the study covers selected mobile network operators operating in Nigeria, including MTN Nigeria Plc, Globacom Ltd, Airtel Nigeria, Emerging Markets Telecommunications Services Ltd. (9mobile), NATCOM Development & Investment Ltd., and Mafab Communications Limited. The study focuses on operational and organizational risk management practices within the Nigerian telecommunication industry and adopts a quantitative research approach using survey data obtained from management and operational staff of the selected firms. The study is also geographically limited to Nigeria and conceptually restricted to enterprise risk management, documentation and reporting, and organizational cost-effectiveness.

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The justification for this study is anchored on the growing importance of risk management within technology-driven industries characterized by rapid innovation, operational uncertainties, and intense competition. The Nigerian telecommunication industry remains one of the largest contributors to national economic growth, digital transformation, and technological innovation; therefore, improving operational efficiency and cost-effectiveness is essential for sustaining competitiveness and service quality. Effective risk management practices can reduce operational losses, improve regulatory compliance, strengthen internal controls, and enhance resource optimization among MNOs. According to Shah et al. (2025), enterprise risk management significantly improves organizational sustainability and operational performance. Oreshile et al. (2026) also established that high-quality ERM systems reduce financial distress and improve organizational stability. Furthermore, Yahaya (2026) reported that risk management structures enhance financial reporting quality and organizational governance among Nigerian firms. This study is therefore justified because it provides empirical evidence capable of assisting telecommunication firms, regulators, policymakers, and investors in designing effective risk governance strategies that improve operational performance and cost-effectiveness within the industry.

The study contributes to knowledge in several important ways. First, it extends existing literature on enterprise risk management by focusing specifically on the Nigerian telecommunication industry, which has received relatively limited empirical attention in risk management research. Second, the study introduces documentation and reporting as a moderating variable, thereby expanding understanding of how governance and reporting mechanisms influence the effectiveness of risk management practices. Third, the study contributes methodologically by applying empirical quantitative analysis to examine the interaction between risk management practices and organizational cost-effectiveness within a developing economy context. The findings of the study will provide practical insights for managers of mobile network operators on the importance of integrating robust documentation and reporting systems into organizational risk governance frameworks. In addition, the study will assist policymakers and regulatory institutions in developing industry standards and compliance mechanisms that strengthen operational resilience within Nigeria's telecommunications sector. Finally, the study contributes theoretically to the application of Enterprise Risk Management (ERM) Theory in explaining the relationship between risk management practices, governance mechanisms, and organizational cost-effectiveness in technology-driven firms.

2. LITERATURE REVIEW

2.1 Conceptual Framework

The conceptual framework for this study explains the relationship between risk management practices and cost-effectiveness among Mobile Network Operators (MNOs) in the Nigerian telecommunication industry, while incorporating documentation and reporting as a moderating variable. The framework is anchored on the assumption that effective risk management practices improve operational efficiency, reduce unnecessary losses, strengthen internal

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controls, and enhance organizational sustainability. Risk management practices in this study are conceptualized through five major dimensions: risk identification, risk assessment, risk mitigation, risk monitoring, and risk evaluation. Risk identification involves recognizing potential operational, financial, technological, and regulatory risks that may affect organizational performance. Risk assessment focuses on analyzing the likelihood and potential impact of identified risks on organizational operations. Risk mitigation refers to the implementation of strategies designed to minimize or control identified risks, while risk monitoring involves continuous tracking and supervision of organizational risks to ensure effective compliance and operational stability. Risk evaluation focuses on reviewing and measuring the effectiveness of existing risk management mechanisms in achieving organizational objectives. According to Fraser and Simkins (2016), effective enterprise risk management systems enhance organizational resilience, operational efficiency, and strategic decision-making. Similarly, Lam (2014) argued that integrated risk management practices improve resource optimization and reduce operational inefficiencies within organizations. Empirical studies by Horvey and Odei-Mensah (2025), Oreshile et al. (2026), and Aloulou and Alshohail (2026) further support the argument that robust risk management frameworks significantly improve organizational performance and operational outcomes.

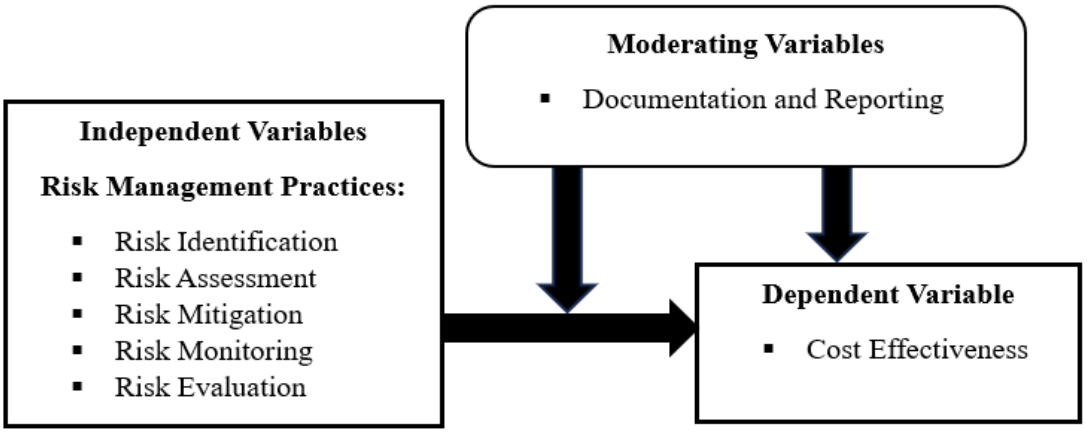

Figure 2.1: Conceptual Framework

Source: Authors' Compilation 2026

The dependent variable in the conceptual framework is cost-effectiveness, which reflects the ability of mobile network operators to optimize operational resources, reduce avoidable costs, improve service efficiency, and achieve organizational objectives with minimal waste. The framework proposes that effective implementation of risk management practices positively influences cost-effectiveness among telecommunications firms. However, the relationship between risk management practices and cost-effectiveness is expected to be moderated by documentation and reporting systems. Documentation and reporting represent the organizational processes for recording, communicating, monitoring, and evaluating risk-related information for effective decision-making and accountability. Effective documentation and reporting systems improve transparency, strengthen compliance, enhance communication,

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and facilitate continuous monitoring of organizational risks. Darsono et al. (2025) found that reporting and assurance mechanisms strengthen organizational performance and accountability, while Soi et al. (2026) established that governance and reporting systems significantly improve risk management effectiveness. Nguyen et al. (2026) also reported that information technology governance moderates the relationship between sustainable risk management and organizational performance. Therefore, the conceptual framework posits that documentation and reporting strengthen the relationship between risk management practices and cost-effectiveness among MNOs such as MTN Nigeria, Globacom, Airtel Nigeria, 9mobile, NATCOM Development & Investment Ltd., and Mafab Communications Limited in Nigeria.

2.2 Theoretical Background

The study is anchored on the Enterprise Risk Management (ERM) Theory, which originated from the broader principles of corporate risk management and was formally developed through the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in 2004. The COSO Enterprise Risk Management Framework expanded traditional risk management beyond isolated financial risks to include strategic, operational, technological, compliance, and reputational risks within an integrated organizational framework. The theory emphasizes that organizations should systematically identify, assess, monitor, and respond to risks in a coordinated manner to achieve strategic objectives and improve organizational performance. ERM theory emerged in response to increasing corporate failures, financial crises, technological uncertainties, and governance weaknesses that exposed the limitations of fragmented risk management systems. According to COSO (2004), ERM is a process effected by an entity's board of directors, management, and personnel, applied in strategy-setting and across the enterprise to identify potential events that may affect the organization and manage risks within acceptable limits. In the telecommunications industry, where firms face operational disruptions, cybersecurity threats, fraud, regulatory risks, and technological changes, ERM provides a strategic framework for minimizing uncertainties and improving operational efficiency. Fraser and Simkins (2016) argued that ERM strengthens organizational resilience and decision-making, while Lam (2014) maintained that effective ERM systems improve governance, operational efficiency, and long-term value creation.

The relevance of ERM theory to this study lies in its explanation of how risk management practices influence the cost-effectiveness of mobile network operators in Nigeria. The theory posits that organizations with effective risk identification, internal control systems, monitoring mechanisms, compliance structures, and reporting frameworks are better positioned to reduce operational losses, optimize resource utilization, and improve organizational efficiency. Documentation and reporting are critical components of ERM because they enhance accountability, transparency, communication, and continuous evaluation of organizational risks. Within mobile network operators such as MTN Nigeria, Airtel Nigeria, Globacom, and 9mobile, effective documentation and reporting systems can improve operational coordination, reduce network-related losses, strengthen compliance, and support cost-effective service delivery. Empirical evidence also supports the assumptions of ERM theory. Horvey and Odei-

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Mensah (2025) found that enterprise risk management systems significantly influence organizational risk-taking behaviour and operational performance among insurers in South Africa. Similarly, Oreshile et al. (2026) established that high-quality ERM systems reduce financial distress and improve firm stability among Sub-Saharan African firms. Aloulou and Alshohail (2026) further reported that governance, risk management, and compliance practices significantly improve operational efficiency in technology-driven firms. Therefore, ERM theory provides an appropriate theoretical foundation for explaining how risk management practices, moderated by documentation and reporting, influence the cost-effectiveness of mobile network operators in the Nigerian telecommunication industry.

2.3 Empirical Review

Empirical studies have increasingly emphasized the importance of risk management practices in improving organizational efficiency, sustainability, and operational performance across industries. Baltas and Liñares-Zegarra (2025) found that effective cost-efficiency practices significantly improve solvency and asset quality in microfinance institutions, thereby reducing financial vulnerabilities. Similarly, Oko-Odion and Angela (2025) observed that robust risk management frameworks enhance operational efficiency and organizational resilience in rapidly changing economic environments. Shah et al. (2025) further reported that enterprise risk management (ERM) positively influences green growth and sustainability outcomes among Malaysian oil and gas firms. Horvey and Odei-Mensah (2025) also established that ERM systems significantly affect insurers' risk-taking behaviour in South Africa, while Malik et al. (2025) demonstrated that regulatory quality and diversification strategies improve financial performance and reduce operational uncertainties in Pakistani banks. These findings suggest that effective risk management practices are essential for enhancing organisational efficiency and long-term sustainability.

Several empirical studies have examined the role of digitalization and technological innovation in strengthening risk management systems and operational efficiency. Shi et al. (2025) developed a Hybrid Financial Risk Predictor using deep learning techniques and found that artificial intelligence significantly improves risk prediction accuracy and financial stability. Chew et al. (2025) similarly revealed that AI-driven accounting data integration enhances financial risk assessment and decision-making efficiency among e-commerce platforms. Yue (2025) proposed a time-series nested reinforcement learning model and demonstrated that dynamic risk control systems improve organizational adaptability and profitability in volatile markets. Zhou et al. (2025) also found that supply chain digitalization improves supply chain resilience, responsiveness, and restoration capabilities, thereby enhancing organizational performance. Nguyen et al. (2026) further established that business intelligence and sustainable risk management significantly improve sustainability performance, especially where information technology governance moderates the relationship. These studies collectively indicate that technological integration strengthens risk management effectiveness and operational efficiency in modern organizations. Empirical evidence also suggests that governance structures and compliance mechanisms significantly influence organizational risk management effectiveness. Yahaya (2026) found that credit risk management practices

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negatively affect short-term profitability but significantly improve long-term firm valuation among Nigerian deposit money banks. Similarly, Yahaya (2026) reported that the presence of risk management committees significantly enhances earnings quality among publicly listed Nigerian firms by reducing discretionary accruals and strengthening financial reporting integrity. Al-Hajaya (2026) further established that risk management committees positively moderate the relationship between ESG performance and corporate corruption risk management among GCC firms. Toumeh and Ghazalat (2026) also revealed that governance and risk management committees positively affect accounting and market performance among Jordanian firms. In Tanzania, Soi et al. (2026) found that audit committee expertise and frequent meetings significantly improve risk management effectiveness in public statutory corporations. These findings underscore the importance of governance oversight, compliance, and reporting systems in enhancing organizational performance and accountability.

Studies on enterprise risk management quality and organizational performance further reveal strong relationships between risk governance and operational outcomes. Oreshile et al. (2026) found that firms with high-quality ERM systems experience lower financial distress and greater financial stability among Sub-Saharan African firms. Aloulou and Alshohail (2026) similarly established that governance, risk management, and compliance practices significantly improve operational efficiency and corporate reputation in Saudi technology-driven firms. Nguyen (2026) also reported that effective risk management planning positively influences innovation creation among Vietnamese construction firms, while risk perception negatively affects innovation orientation. Arnaudova et al. (2025) revealed that risk management implementation significantly increased among Scottish SMEs after the COVID-19 pandemic, although most firms still adopted reactive approaches to risk management. Kouloukoui et al. (2025) further identified that climate risk management practices are strongly influenced by regulatory pressure, firm size, profitability, and stakeholder expectations among multinational companies. These findings indicate that robust risk governance frameworks enhance organizational resilience, innovation, and operational effectiveness.

The moderating role of documentation, reporting, and assurance mechanisms has also attracted growing empirical attention in recent literature. Darsono et al. (2025) found that independent assurance significantly strengthens the relationship between ESG disclosure and financial performance among Indonesian firms. Zhang (2025) similarly reported that ESG performance positively affects financial performance, while financing constraints and innovation focus moderate the relationship among Chinese listed firms. Shah et al. (2025) further emphasized that structured reporting and compliance with COSO and WBCSD guidelines improve organizational legitimacy and sustainability outcomes. Oko-Odion and Angela (2025) highlighted that advanced reporting frameworks and governance mechanisms improve regulatory compliance and operational agility in financial institutions. Likewise, Soi et al. (2026) established that organizational size moderates the relationship between audit committee characteristics and effective risk management practices in Tanzanian public corporations. These studies imply that documentation and reporting mechanisms strengthen transparency, accountability, and the effectiveness of organizational risk management systems.

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In the telecommunications and technology-driven sectors, risk management practices have been linked to operational efficiency, cost reduction, and organizational sustainability. Aloulou and Alshohail (2026) observed that governance, compliance, and risk management practices improve operational efficiency and organizational reputation in Saudi technology firms. Zhou et al. (2025) also found that digitalization enhances supply chain resilience and restoration capabilities, leading to improved supply chain performance during crises. Chew et al. (2025) established that AI-based risk assessment systems significantly improve financial management efficiency and risk mitigation in e-commerce platforms. Shi et al. (2025) similarly reported that deep learning models improve the accuracy of financial risk prediction and reduce operational risk exposure. Furthermore, Nguyen et al. (2026) found that sustainable risk management positively influences organizational sustainability performance, especially in technologically advanced environments. These findings suggest that telecommunications firms can improve cost-effectiveness through the integration of risk management, digital technologies, and structured reporting systems.

Despite the growing body of empirical literature on enterprise risk management, governance, and organizational performance, there remains limited evidence focusing specifically on mobile network operators in Nigeria's telecommunication industry. Most existing studies concentrated on financial institutions, manufacturing firms, SMEs, or sustainability-related sectors outside telecommunications. For instance, Baltas and Liñares-Zegarra (2025) focused on microfinance institutions, while Horvey and Odei-Mensah (2025) examined insurers in South Africa. Similarly, Toumeh and Ghazalat (2026) investigated governance reforms in Jordanian firms, whereas Oreshile et al. (2026) focused on financial distress among Sub-Saharan African firms. Although Aloulou and Alshohail (2026) examined operational efficiency in technology-driven firms, their study did not specifically address cost-effectiveness within telecommunications operations. Consequently, there is still insufficient empirical evidence on how risk management practices influence cost-effectiveness among mobile network operators in Nigeria, particularly regarding the moderating role of documentation and reporting systems. This study therefore seeks to fill this identified gap in the literature.

3. METHODOLOGY

This study adopted a descriptive survey research design to investigate the effect of risk management practices on the cost-effectiveness of Mobile Network Operators (MNOs) in Nigeria. The descriptive survey design was considered appropriate because it enables the collection of quantitative data from respondents regarding organizational risk management practices and operational performance. The choice of this design is consistent with previous empirical studies that employed questionnaire-based quantitative approaches in examining risk management and organizational outcomes, including Soi et al. (2026), and Nguyen et al. (2026). Data for the study were obtained from employees of selected Mobile Network Operators in Nigeria, including MTN Nigeria, Globacom, Airtel Nigeria, 9mobile, NATCOM Development & Investment Ltd., and Mafab Communications Limited. A structured four-point Likert scale questionnaire was utilized to gather responses on key dimensions of risk

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management practices, including risk identification, risk analysis, risk evaluation, risk mitigation, risk monitoring, communication and consultation, as well as cost-effectiveness. The instrument provided empirical evidence on the effectiveness of risk management practices within the Nigerian telecommunication industry..

3.1 Population, Sample and Sampling Technique

The sample size is the part of the population that was selected for the study. Krejcie & Morgan's (1970) sample size determination is handy since the population is above 10,000. The formula is presented as follows:

$$\frac{x^2\ N\ P\ (1-P)}{e^2(N-1)+x^2P(1-P)} \quad (1)$$

x^2 is the Chi-Square; e represents the Margin of error; N stands for the Population, while P represent the Proportion of the Population. Where N=95,720, P=0.5 and e=0.05. At 95% confidence level with a degree of freedom 1, the chi-square x^2=3.841

$$\frac{3.841 * 95{,}720 * 0.6 * 0.4}{0.05^2 * (95{,}720 - 1) + (3.841 * 0.6 * 0.4)}$$

$$= \frac{88{,}238.5248}{0.0025 * 95{,}719 + 0.92184} = \frac{88{,}238.5248}{239.2975 + 0.92184}$$

$$\frac{88{,}238.5248}{240.21934} = 367.32 = 368\ approx$$

To increase the response rate, 30% of the respondent is included to make the total sample size to be 479. The designated organisations were properly represented using the proportionality formula.

Table 3.2: Sample Distribution

S/No	Companies	Population	Sample
1	MTN Nigeria Plc	26,779	$\frac{26{,}779}{95{,}720} * 479 = 134$
2	Globacom Ltd	29,518	$\frac{29{,}518}{95{,}720} * 479 = 148$
3	Airtel Nigeria	13,302	$\frac{13{,}302}{95{,}720} * 479 = 67$
4	Emerging Markets Telecommunications Services Ltd (9 Mobile),	10,947	$\frac{10{,}947}{95{,}720} * 479 = 55$
5	NATCOM Development & Investment Ltd	9,920	$\frac{9{,}920}{95{,}720} * 479 = 50$
6	Mafab Communications Limited.	5,254	$\frac{5{,}254}{95{,}720} * 479 = 27$
	Total	95,720	479

Source: Researcher Computation (2026)

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This study adopts a multistage sampling technique involving purposive and stratified sampling. Purposive sampling is used to select six Nigerian Mobile Network Operators: MTN Nigeria Plc, Globacom Ltd, Airtel Nigeria, 9mobile, NATCOM Development & Investment Ltd, and Mafab Communications Limited. Stratified sampling is then applied across key departments such as risk management, finance, audit, operations, IT, and legal units. Respondents are randomly selected within each stratum to ensure representativeness, reduce bias, and support reliable analysis of risk management practices.

3.2 Estimation Technique

Structural Equation Modelling (SEM) was adopted because it enables the simultaneous analysis of relationships among multiple independent, dependent, and moderating variables. The origin of SEM is traced to Wright's (1921) development of path analysis and causal modelling. SEM later evolved through the integration of path analysis, factor analysis, and simultaneous equation modelling, making it suitable for analysing latent and observed variables (Jöreskog, 1970; Kline, 2016). The technique is appropriate because risk management practices are multidimensional, comprising risk identification, assessment, evaluation, mitigation, and monitoring. Empirical studies by Nguyen et al. (2026), Soi et al. (2026), and Darsono et al. (2025) also adopted PLS-SEM frameworks.

SEM is also appropriate because this study utilized a structured four-point Likert scale questionnaire to measure latent constructs such as risk management practices, documentation and reporting, monitoring activities, and cost-effectiveness. The technique allows for the assessment of reliability, convergent validity, and discriminant validity before estimating structural relationships, thereby minimizing measurement errors and improving result robustness (Kline, 2016). SEM is further suitable for testing moderating effects, particularly the moderating role of documentation and reporting. This aligns with Nguyen (2026), Nguyen et al. (2026), and Soi et al. (2026), who employed PLS-SEM to examine moderated relationships involving risk management and organizational performance.

4. RESULTS AND DISCUSSIONS

Table 2 shows that 479 copies of the questionnaire were distributed, while 450 were completed and returned, giving a response rate of 93.95%. This high response rate indicates that the data collected were adequate and reliable for analysis. The gender distribution shows that 240 respondents, representing 53.33%, were male, while 210 respondents, representing 46.67%, were female. This implies that both male and female employees were fairly represented, although male respondents were slightly higher.

In terms of age, 170 respondents, representing 37.78%, were within 18–30 years, while 155 respondents, representing 34.44%, were within 31–40 years. Also, 80 respondents, representing 17.78%, were aged 41–50 years, 30 respondents, representing 6.67%, were aged 51–60 years, and 15 respondents, representing 3.33%, were 60 years and above. This indicates that most respondents were within the active working-age categories.

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Table 2: Questionnaire Distribution and Demographic Analysis

1	Distribution	Distributed	Percentage	Received		Percentage
		479	100%	450		93.95%
2	**Gender**		**Male**	**%**	**Female**	**%**
			240	53.33	210	46.67
3	**Age**	**18-30**	**31-40**	**41-50**	**51-60**	**60 & above**
		170	155	80	30	15
4	**Education**	**O'level**	**ND/NCE**	**HND/BSc**	**MA/MSc**	**Ph.D.**
		30	45	245	115	15
5		**< 1 year**	**1-5 years**	**6-10 years**	**11-15 years**	**16 & above**
		90	180	90	60	30
Source: Author's Compilation						

The educational distribution shows that 30 respondents, representing 6.67%, had O'level qualifications, 45 respondents, representing 10.00%, had ND/NCE, 245 respondents, representing 54.44%, had HND/BSc, 115 respondents, representing 25.56%, had MA/MSc, while 15 respondents, representing 3.33%, had Ph.D. qualifications. This suggests that most respondents were well educated and capable of providing informed responses on risk management practices and cost-effectiveness. In terms of work experience, 90 respondents, representing 20.00%, had less than one year of experience, 180 respondents, representing 40.00%, had 1–5 years, 90 respondents, representing 20.00%, had 6–10 years, 60 respondents, representing 13.33%, had 11–15 years, and 30 respondents, representing 6.67%, had 16 years and above. This shows that the study captured both new and experienced employees.

4.1 Descriptive and Correlation Analyses

Table 3 presents the descriptive statistics for the study variables, including Cost Effectiveness (CE), Documentation and Reporting (DR), Monitoring Activities (MA), Risk Assessment (RA), Risk Evaluation (RE), Risk Identification (RI), Risk Monitoring (RM), and Risk Mitigation (RT).

The results show that all variables have standardized means and standard deviations of 0 and 1 respectively, indicating that the data were normalized prior to analysis. The median values are predominantly negative, suggesting that responses were slightly concentrated below the standardized mean across the variables. The observed minimum and maximum values further indicate moderate dispersion within the dataset.

The skewness statistics reveal that most variables are moderately symmetrical, as the values fall within the acceptable range of ±1, although CE and DR exhibit slight positive skewness while RI, RM, and RT display mild negative skewness. The excess kurtosis values also indicate that most variables approximate normal distribution, with some variables exhibiting slightly platykurtic or leptokurtic tendencies. Furthermore, the Cramér-von Mises test results produced p-values of 0.000 for all variables, indicating significant departures from strict normality. However, given the relatively large sample size of 450 observations, the data remain suitable for multivariate analysis and Structural Equation Modelling (SEM), as SEM techniques are generally robust to minor violations of normality assumptions.

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Table 3: Descriptive Statistics

Statistics	CE	DR	MA	RA	RE	RI	RM	RT
Mean	0	0	0	0	0	0	0	0
Median	-0.331	-0.375	-0.196	-0.236	-0.254	-0.135	-0.371	-0.107
Observed min	-2.216	-1.836	-3.375	-3.226	-4.717	-4.022	-4.847	-4.198
Observed max	1.633	1.705	1.796	1.774	1.83	1.566	1.85	1.779
Standard deviation	1	1	1	1	1	1	1	1
Excess kurtosis	-1.076	-1.117	-0.006	-0.277	0.641	-0.194	0.448	0.728
Skewness	0.483	0.586	0.157	0.199	0.203	-0.231	-0.158	-0.082
Number of observations	450	450	450	450	450	450	450	450
Cramér-von Mises test statistic	5.171	4.681	2.391	2.102	3.301	0.92	3.192	1.566
Cramér-von Mises p-value	0	0	0	0	0	0	0	0
Note: CE-Cost Effectiveness, RA-Risk assessment, RE-Risk Evaluation, RI-Risk identification, RM-Risk monitoring and RT-Risk mitigation, DR-Documentation and Reporting, MA-Monitoring Activities Sources: Author's Computation using SmartPLS 4								

Table 4 presents the correlation matrix showing the relationships among Cost Effectiveness (CE), Documentation and Reporting (DR), Monitoring Activities (MA), Risk Assessment (RA), Risk Evaluation (RE), Risk Identification (RI), Risk Monitoring (RM), and Risk Mitigation (RT). The results indicate that all variables are positively correlated, suggesting that improvements in risk management practices and governance mechanisms are associated with higher cost-effectiveness among Mobile Network Operators. Cost Effectiveness (CE) exhibits the strongest positive relationship with Documentation and Reporting (DR) (r = 0.603), implying that effective reporting and documentation systems significantly enhance operational efficiency and cost optimization. Moderate positive correlations also exist among the independent variables, particularly between Monitoring Activities and Risk Mitigation (r = 0.663), Risk Monitoring and Risk Mitigation (r = 0.645), and Risk Evaluation and Risk Mitigation (r = 0.627), indicating strong interrelationships among organizational risk management components. However, none of the correlation coefficients exceed the threshold of 0.80, suggesting the absence of severe multicollinearity problems among the variables. Overall, the findings imply that effective implementation of risk management practices, supported by adequate documentation and reporting systems, contributes positively to organizational cost-effectiveness within the Nigerian telecommunication industry.

Table 4: Correlation Matrix

Variables	CE	DR	MA	RA	RE	RI	RM	RT
CE	1	0.603	0.151	0.158	0.165	0.186	0.146	0.149
DR	0.603	1	0.166	0.209	0.117	0.174	0.14	0.138
MA	0.151	0.166	1	0.545	0.489	0.46	0.5	0.663
RA	0.158	0.209	0.545	1	0.508	0.508	0.48	0.518
RE	0.165	0.117	0.489	0.508	1	0.318	0.538	0.627
RI	0.186	0.174	0.46	0.508	0.318	1	0.383	0.439
RM	0.146	0.14	0.5	0.48	0.538	0.383	1	0.645
RT	0.149	0.138	0.663	0.518	0.627	0.439	0.645	1
Sources: Author's Computation using SmartPLS 4								

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4.2 Hypotheses Testing

4.2.1 Construct Reliability and Validity

Table 5: Construct reliability and validity

Variable	Cronbach's alpha	Composite reliability		Average variance extracted (AVE)
		rho_a	rho_c	
Cost Effectiveness	0.86	0.865	0.9	0.643
Documentation and Reporting	0.813	0.838	0.867	0.568
Risk Mitigation	0.74	1.025	0.805	0.459
Risk Assessment	0.773	0.807	0.839	0.513
Risk Evaluation	0.752	0.795	0.821	0.484
Risk Identification	0.664	0.73	0.768	0.420
Monitoring Activities	0.802	0.58	0.762	0.418
Risk Mitigation	0.789	0.798	0.854	0.539
Sources: Author's Computation using SmartPLS 4				

Table 5 presents the construct reliability and validity results for the study variables using SmartPLS 4. The findings indicate that most constructs achieved acceptable levels of internal consistency reliability, as the Cronbach's alpha and composite reliability values generally exceeded the recommended threshold of 0.70. Specifically, Cost Effectiveness (CE), Documentation and Reporting (DR), Risk Assessment (RA), and Risk Mitigation (RT) demonstrated strong reliability, while Monitoring Activities (MA), Risk Evaluation (RE), and Risk Identification (RI) showed moderate but acceptable reliability levels. The composite reliability values (rho_c) further confirm the consistency of the measurement model across the constructs. Regarding convergent validity, the Average Variance Extracted (AVE) values for CE, DR, RA, and RT exceeded the recommended benchmark of 0.50, indicating satisfactory convergent validity. Although MA, RE, RI, and RM recorded AVE values slightly below 0.50, the constructs may still be retained because their composite reliability values remained acceptable, suggesting adequate construct validity for exploratory research. Overall, the results imply that the measurement model possesses acceptable reliability and validity for subsequent structural model estimation.

4.2.2 Risk Management and Cost Effectiveness

Table 6 presents the structural model results showing the effect of risk management practices on Cost Effectiveness (CE) among Mobile Network Operators in Nigeria. The findings reveal that Documentation and Reporting (DR) has a strong positive and statistically significant effect on Cost Effectiveness ($\beta = 0.589$, $t = 16.107$, $p < 0.001$). This indicates that effective documentation and reporting systems significantly improve operational efficiency and cost optimization within the telecommunication industry. The result suggests that organizations with stronger reporting structures, communication systems, and documentation practices are more likely to achieve better cost-effectiveness. The confidence interval for DR (0.515 – 0.658) further confirms the robustness and stability of the relationship. Consequently, the study establishes that documentation and reporting constitute a critical determinant of organizational cost-effectiveness among Mobile Network Operators in Nigeria.

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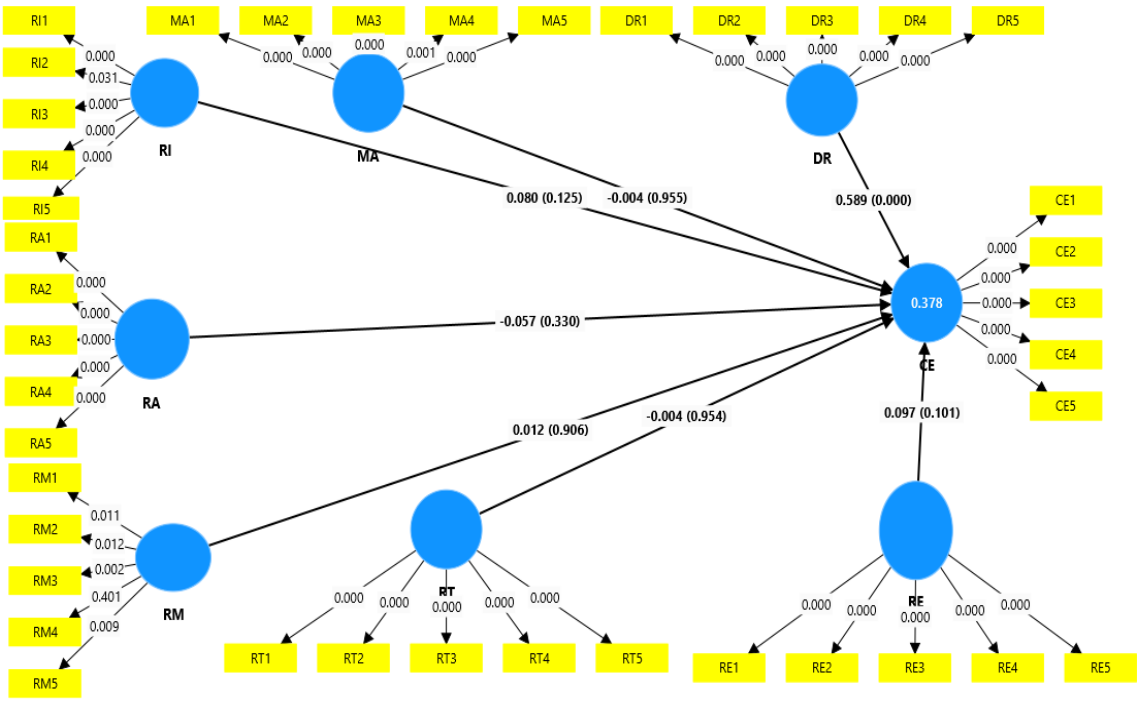

However, the results further indicate that Monitoring Activities (MA), Risk Assessment (RA), Risk Evaluation (RE), Risk Identification (RI), Risk Monitoring (RM), and Risk Mitigation (RT) did not exert statistically significant effects on Cost Effectiveness, as their p-values exceeded the 0.05 significance threshold. Specifically, MA (β = -0.004, p = 0.955), RA (β = -0.057, p = 0.330), RM (β = 0.012, p = 0.906), and RT (β = -0.004, p = 0.954) demonstrated very weak and insignificant relationships with cost-effectiveness. Although Risk Evaluation (RE) (β = 0.097, p = 0.101) and Risk Identification (RI) (β = 0.080, p = 0.125) showed positive relationships, their effects were not statistically significant. These findings imply that while risk management practices may contribute to organizational operations, their direct influence on cost-effectiveness remains limited unless supported by effective documentation and reporting systems. The results therefore highlight the strategic importance of governance, information management, and reporting mechanisms in enhancing operational efficiency within the Nigerian telecommunication industry.

Table 6: Risk Management Practices and Cost Effectiveness

Variables	Original sample	Sample mean	Confidence intervals		Standard deviation	T statistics	P values
			2.50%	97.50%			
DR -> CE	0.589	0.589	0.515	0.658	0.037	16.107	0
MA -> CE	-0.004	0.014	-0.118	0.137	0.064	0.056	0.955
RA -> CE	-0.057	-0.049	-0.165	0.063	0.059	0.973	0.33
RE -> CE	0.097	0.095	-0.024	0.208	0.059	1.639	0.101
RI -> CE	0.08	0.083	-0.022	0.187	0.052	1.533	0.125
RM -> CE	0.012	-0.008	-0.24	0.16	0.105	0.118	0.906
RT -> CE	-0.004	0.012	-0.13	0.173	0.077	0.058	0.954
Sources: Author's Computation using SmartPLS 4							

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4.2.3 Documentation and Reporting as a Moderation of Risk Management

The results in Table 7 present the moderating effect of Documentation and Reporting (DR) on the relationship between risk management practices and Cost Effectiveness (CE) among Mobile Network Operators in Nigeria. The findings indicate that Documentation and Reporting maintains a strong positive and statistically significant direct effect on Cost Effectiveness (β = 0.587, t = 15.361, p < 0.001). This implies that effective documentation, reporting structures, and information management systems significantly improve operational efficiency and cost optimization within the telecommunications industry. Conversely, the direct effects of Monitoring Activities (MA), Risk Assessment (RA), Risk Evaluation (RE), Risk Identification (RI), Risk Monitoring (RM), and Risk Mitigation (RT) on Cost Effectiveness remained statistically insignificant, as their respective p-values exceeded the 0.05 significance threshold. These results suggest that the individual dimensions of risk management practices do not independently exert substantial influence on cost-effectiveness without supportive governance and reporting mechanisms.

The moderation results further reveal that Documentation and Reporting does not significantly moderate the relationships between Monitoring Activities and Cost Effectiveness (β = 0.122, p = 0.096), Risk Identification and Cost Effectiveness (β = 0.039, p = 0.455), Risk Assessment and Cost Effectiveness (β = -0.001, p = 0.982), Risk Monitoring and Cost Effectiveness (β = 0.100, p = 0.115), and Risk Mitigation and Cost Effectiveness (β = 0.120, p = 0.119). Although some interaction terms such as DR × MA and DR × RT showed positive coefficients, their effects were not statistically significant. This indicates that documentation and reporting systems were unable to significantly strengthen the influence of these specific risk management dimensions on organizational cost-effectiveness. The insignificant moderation effects imply that improvements in documentation and reporting alone may not sufficiently enhance the operational impact of risk assessment, monitoring, mitigation, or identification practices within the selected Mobile Network Operators.

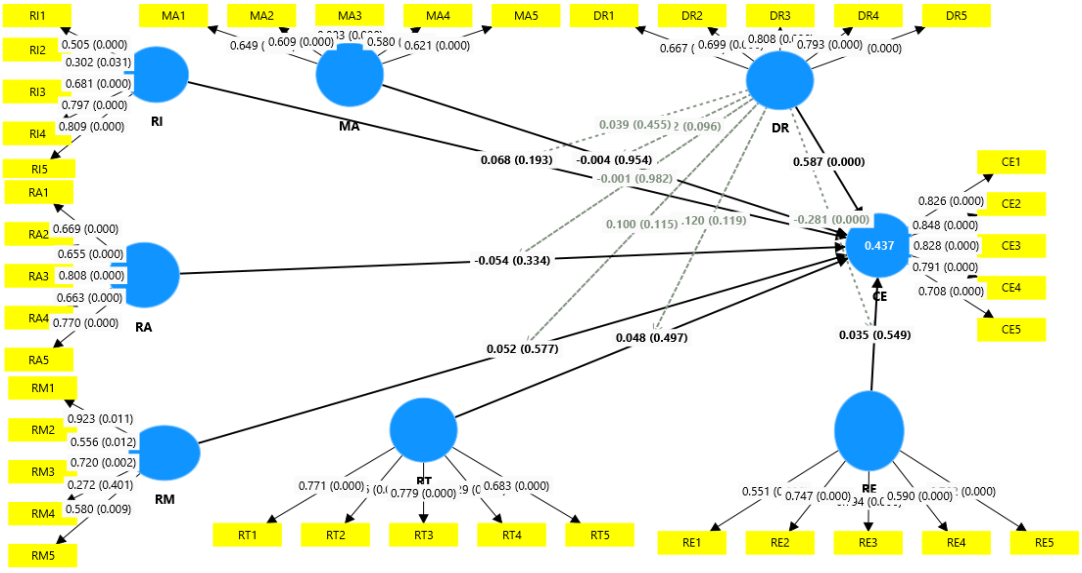

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Table 7: Risk Management Practices and Cost Effectiveness Moderate by Documentation and Reporting

Variables	Original sample	Sample mean	Confidence intervals		Standard deviation	T statistics	P values
			2.50%	97.50%			
DR -> CE	0.587	0.585	0.506	0.656	0.038	15.361	0.000
MA -> CE	-0.004	0.013	-0.12	0.136	0.065	0.058	0.954
RA -> CE	-0.054	-0.044	-0.152	0.063	0.055	0.967	0.334
RE -> CE	0.035	0.041	-0.076	0.158	0.059	0.599	0.549
RI -> CE	0.068	0.073	-0.029	0.175	0.052	1.301	0.193
RM -> CE	0.052	0.026	-0.2	0.162	0.093	0.558	0.577
RT -> CE	0.048	0.054	-0.077	0.196	0.071	0.679	0.497
DR x MA -> CE	0.122	0.108	-0.035	0.251	0.073	1.667	0.096
DR x RI -> CE	0.039	0.049	-0.049	0.154	0.053	0.747	0.455
DR x RA -> CE	-0.001	-0.004	-0.122	0.114	0.06	0.023	0.982
DR x RM -> CE	0.100	0.078	-0.042	0.205	0.064	1.576	0.115
DR x RT -> CE	0.120	0.11	-0.048	0.258	0.077	1.557	0.119
DR x RE -> CE	-0.281	-0.247	-0.371	-0.113	0.066	4.263	0,000
Sources: Author's Computation using SmartPLS 4							

However, the interaction effect between Documentation and Reporting and Risk Evaluation (DR × RE → CE) was found to be negative and statistically significant ($\beta = -0.281$, $t = 4.263$, $p < 0.001$). This suggests that Documentation and Reporting significantly moderates the relationship between Risk Evaluation and Cost Effectiveness, although the moderation effect is negative. The finding implies that excessive or highly rigid documentation and reporting requirements may weaken the positive influence of risk evaluation on organizational cost-effectiveness, possibly due to bureaucratic delays, reporting complexities, compliance burdens, or administrative inefficiencies. In practical terms, while risk evaluation remains important for operational decision-making, overly complex documentation and reporting structures may reduce organizational flexibility and increase operational costs within Mobile Network Operators. Overall, the results highlight the critical role of documentation and reporting in organizational governance while also emphasizing the need for balanced and efficient reporting systems that support rather than constrain effective risk evaluation processes in the Nigerian telecommunication industry.

4.2.4 Stability Tests

Table 8 presents the stability and model fit statistics for the Structural Equation Modelling (SEM) estimated using SmartPLS 4. The Standardized Root Mean Square Residual (SRMR) value of 0.092 for both the saturated and estimated models indicates an acceptable model fit, as the value is close to the recommended threshold of 0.08–0.10 for PLS-SEM models. The discrepancy measures, including d_ULS (6.999) and d_G (1.317), further provide evidence regarding the difference between the empirical covariance matrix and the model-implied covariance matrix. The Chi-square statistic of 3346.363 reflects the overall discrepancy between the observed and estimated covariance structures. Additionally, the Normed Fit Index (NFI) value of 0.603 suggests a moderate level of model fitness, indicating that the model explains a reasonable proportion of the covariance among the study variables.

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Table 8: Stability Tests

Statistics	SRMR	d_ULS	d_G	Chi-square	NFI
Saturated model	0.092	6.999	1.317	3346.363	0.603
Estimated model	0.092	6.999	1.317	3346.363	0.603
R-square		0.437	R-square adjusted		0.42
Sources: Author's Computation using SmartPLS 4					

The coefficient of determination (R-square) value of 0.437 indicates that approximately 43.7% of the variation in Cost Effectiveness is jointly explained by the independent and moderating variables included in the model. Similarly, the adjusted R-square value of 0.420 implies that after adjusting for model complexity and the number of predictors, about 42.0% of the variation in Cost Effectiveness remains explained by the model. These values suggest a moderate explanatory power of the structural model, indicating that risk management practices and documentation and reporting contribute substantially to explaining organizational cost-effectiveness among Mobile Network Operators in Nigeria. Overall, the stability and goodness-of-fit statistics indicate that the estimated SEM model is statistically acceptable and suitable for explaining the relationships among the study variables.

4.3 Discussion of Findings

The findings of this study revealed that Documentation and Reporting (DR) exerts a strong positive and statistically significant effect on Cost Effectiveness (CE) among Mobile Network Operators in Nigeria. This result is consistent with the empirical findings of Darsono et al. (2025), who established that reporting and assurance mechanisms significantly improve organizational performance and accountability. The result also aligns with Oko-Odion and Angela (2025), who reported that effective reporting frameworks and governance systems enhance operational efficiency and regulatory compliance in organizations operating within dynamic environments. Similarly, Aloulou and Alshohail (2026) found that governance, risk management, and compliance practices significantly improve operational efficiency and organizational reputation in technology-driven firms. The implication of this finding is that effective documentation and reporting systems enhance transparency, communication flow, monitoring efficiency, and operational coordination, thereby improving cost-effectiveness within the Nigerian telecommunication industry.

However, the study further found that Monitoring Activities (MA), Risk Assessment (RA), Risk Evaluation (RE), Risk Identification (RI), Risk Monitoring (RM), and Risk Mitigation (RT) did not exert statistically significant direct effects on Cost Effectiveness. This finding partially contradicts the empirical evidence reported by Oreshile et al. (2026), who found that high-quality enterprise risk management systems significantly reduce financial distress and improve organizational stability among African firms. The result also differs from Horvey and Odei-Mensah (2025), who established that enterprise risk management practices significantly influence organizational performance and risk-taking behaviour. Furthermore, Shah et al. (2025) reported that enterprise risk management positively contributes to organizational sustainability and operational performance. The divergence in findings may be attributed to sectoral differences, operational complexities within Nigerian Mobile Network Operators, or

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the possibility that risk management practices may not independently influence cost-effectiveness unless supported by effective governance and information management systems. The findings therefore suggest that risk management practices alone may be insufficient to improve cost-effectiveness without strong institutional reporting and coordination mechanisms.

The moderation analysis revealed that Documentation and Reporting did not significantly moderate the relationships between most dimensions of risk management practices and Cost Effectiveness, except for Risk Evaluation, where the moderation effect was negative and statistically significant. This finding implies that excessive documentation and reporting requirements may weaken the positive influence of risk evaluation on organizational cost-effectiveness through bureaucratic delays and administrative complexities. The result partially aligns with Nguyen et al. (2026), who found that governance mechanisms significantly moderate the relationship between sustainable risk management and organizational performance. Similarly, Soi et al. (2026) established that governance and reporting structures influence the effectiveness of risk management practices in public corporations. However, the negative moderation effect contrasts with Darsono et al. (2025), who found that reporting and assurance mechanisms strengthen organizational performance relationships. The implication is that while documentation and reporting remain essential for governance and accountability, overly rigid reporting systems may constrain operational flexibility and increase organizational costs within Nigerian telecommunication firms.

The findings of this study provide partial support for the assumptions of Enterprise Risk Management (ERM) Theory. The significant positive effect of Documentation and Reporting on Cost Effectiveness supports the ERM proposition that integrated governance, communication, monitoring, and reporting systems enhance organizational efficiency, accountability, and operational performance. The result confirms the argument of COSO (2004), Fraser and Simkins (2016), and Lam (2014) that effective enterprise-wide coordination of risk information strengthens organizational resilience and improves resource optimization. The findings also suggest that documentation and reporting constitute critical governance mechanisms within Mobile Network Operators such as MTN Nigeria, Airtel Nigeria, Globacom, and 9mobile. However, the insignificant direct effects of most risk management dimensions on cost-effectiveness partially contradict the broader assumptions of ERM theory, which posit that integrated risk identification, assessment, mitigation, monitoring, and evaluation should independently improve organizational performance. The negative moderation effect of documentation and reporting on risk evaluation further indicates that excessive reporting requirements may create bureaucratic inefficiencies that weaken operational flexibility and cost optimization. Consequently, the findings extend ERM theory by demonstrating that while governance and reporting structures remain essential for organizational effectiveness, overly rigid reporting systems may reduce the efficiency gains expected from enterprise risk management practices within the Nigerian telecommunication industry.

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5. CONCLUSIONS

The study concluded that risk management practices play an important role in enhancing operational efficiency within the Nigerian telecommunication industry, although their effectiveness largely depends on the quality of organizational governance and reporting systems. The findings revealed that Documentation and Reporting significantly improve cost-effectiveness among Mobile Network Operators, indicating that strong reporting frameworks, information management systems, and governance structures contribute substantially to operational coordination, accountability, compliance, and resource optimization. However, the study also found that most individual dimensions of risk management practices, including risk assessment, risk identification, risk monitoring, and risk mitigation, did not independently exert significant effects on cost-effectiveness. Furthermore, the negative moderation effect of documentation and reporting on risk evaluation suggests that excessive reporting procedures and bureaucratic controls may weaken operational flexibility and increase administrative costs within Mobile Network Operators such as MTN Nigeria, Airtel Nigeria, Globacom, and 9mobile. Based on these findings, the study recommends that Mobile Network Operators should strengthen their documentation and reporting systems to improve transparency, operational coordination, and cost optimization while avoiding excessive bureaucratic procedures that may reduce organizational flexibility. Telecommunication firms should also integrate enterprise risk management practices into their strategic and operational activities through improved governance frameworks, continuous monitoring systems, and technology-driven reporting mechanisms. In addition, management should simplify reporting structures and adopt digital reporting platforms capable of improving real-time risk communication and operational decision-making. Regulatory agencies and policymakers should further develop industry standards that encourage balanced risk governance frameworks capable of promoting efficiency without imposing excessive compliance burdens on telecommunication firms. Finally, future studies should explore additional moderating variables and sector-specific factors that may influence the relationship between risk management practices and organizational performance within the telecommunications industry.

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