impact of internal audit in fraud detection and prevention in power holding company in Nigeria, case study of IBEDEC, Nigeria.

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Abstract:

This study performed a multivariate analysis examining relationships between organizational and internal audit predictors and outcomes relevant for fraud prevention, using survey data from 289 participants. Results showed economic environment and regulatory compliance had small but significant effects on some audit effectiveness outcomes like internal audit performance and employee training. However, many factors were unexamined and effect sizes were small, indicating opportunities to develop more comprehensive, valid models to inform evidence-based fraud risk management.

Keywords:

1. Internal auditing

2. Fraud prevention

3. Multivariate analysis

4. Organizational predictors

5. Audit effectiveness

Introduction

Internal auditing plays a crucial role in fraud detection and prevention for organizations (Verschoor, 2015). However, research on the factors that influence internal audit effectiveness for fraud-related activities has been limited. As DeZoort et al. (2006) point out, there is a need for more empirical analysis on the drivers of internal audit judgments and effects on fraud prevention. Recent studies have started to examine relationships between internal audit quality and fraud incidents (Ege, 2015; Prawitt et al., 2009), but have focused on narrow sets of predictors.

This research aims to conduct a broader empirical investigation of the factors that may impact internal audit effectiveness for fraud detection and prevention. The multivariate analysis includes twelve predictors representing internal audit and organizational characteristics: fraud detection rate, fraud prevention measures, financial loss due to fraud, reputation damage, company size, economic environment, employee turnover, employee demographics, time period, location, perceptions and attitudes, and financial data. The six outcome variables are: internal audit effectiveness, internal controls, ethical culture, employee training, regulatory compliance, and fraud incidents.

Understanding these relationships can inform evidence-based practices for fraud risk management. As Alzeban and Sawan (2015) discuss, implementing internal audit recommendations is critical for financial integrity. However, factors like audit committee characteristics influence implementation levels (Zain et al., 2006). Corporate governance and accountability mechanisms also affect fraud prevention (Khan et al., 2013; Sierra-García et al., 2019). The current study aims to build on such findings with a broad investigation of predictive relationships.

The multivariate analysis provides an initial empirical assessment of the complexity of factors that may impact internal auditing outcomes relevant for fraud prevention. As Coetzee and Lubbe (2014) emphasize, risk-based audit planning requires identifying key risk drivers. This study intends to quantify potential drivers of internal audit effectiveness, controls, ethical environment, training, regulatory compliance, and fraud incidents.

The results are intended to inform audit risk modeling, planning and evidence-based fraud prevention programs. With insights from the analysis, future research can further develop and validate comprehensive models of the drivers of internal audit effectiveness for fraud detection, deterrence and mitigation.

Literature Review

Internal auditing plays a crucial role in fraud prevention for organizations. As Verschoor (2015) discusses, auditing is critical for maintaining corporate integrity and compliance. However, research on the factors that influence internal audit effectiveness for fraud mitigation has been limited.

Prior studies have examined the effects of specific predictors on internal audit judgments and fraud prevention. DeZoort et al. (2006) analyzed the impacts of accountability pressure and found it increased auditor effort and conservatism. Prawitt et al. (2009) looked at internal audit quality and earnings management, finding higher quality deterred manipulation. Ege (2015) showed higher audit function quality reduced misconduct incidents.

Other studies have focused on narrow sets of predictors like corporate governance. Khan et al. (2013) found governance and corporate social responsibility disclosure levels impacted fraud prevention. Sierra-García et al. (2019) showed accountability mechanisms affected fraud levels in government.

Some research has analyzed relationships between audit committees, implementation levels, and fraud. Alzeban and Sawan (2015) found audit committee characteristics influenced internal audit recommendation implementation. Zain et al. (2006) showed links between audit committees, independence, and internal control weaknesses.

A few studies have examined the role of risk assessment in auditing. As Coetzee and Lubbe (2014) discuss, identifying key risk drivers is crucial for effective risk-based audit planning. Boyle et al. (2015) looked at risk models and found impacts on auditor risk judgments.

However, comprehensive empirical research on the range of factors that may predict internal audit effectiveness and fraud prevention has been limited. Sarens and De Beelde (2006) emphasize the need to understand relationships between auditors and management. Zhang et al. (2007) highlight the importance of studying multiple predictors of financial integrity.

This study aims to address these gaps by conducting a broad multivariate analysis of potential drivers of internal audit effectiveness, controls, ethical environment, training, compliance, and fraud incidents. The results are intended to provide an initial quantification of the complexity of factors influencing auditing outcomes relevant for fraud

prevention. Insights from the analysis can inform future research to build more comprehensive models to guide evidence-based fraud risk management practices.

Methodology

This study utilized a multivariate analysis approach to examine relationships between organizational and internal audit predictors and outcome variables relevant for fraud prevention.

The predictors included in the analysis were: fraud detection rate, fraud prevention measures, financial loss due to fraud, reputation damage, company size, economic environment, employee turnover, employee demographics, time period, location, perceptions and attitudes, and financial data.

The outcome variables were: internal audit effectiveness, internal controls, ethical culture, employee training, regulatory compliance, and fraud incidents.

The data for the analysis came from survey responses collected from 289 participants. The surveys measured the predictors and outcome variables using multi-item self-report instruments.

Multivariate tests were conducted including Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root. These examined the overall statistically significant effects of the full model with all predictors on the outcome variables.

Tests of between-subjects effects were performed to analyze the individual relationships between each predictor and each outcome variable. The F-values, degrees of freedom, mean squares, and significance levels of these relationships were examined.

Effect sizes were calculated using R-squared values. These determined the proportion of variance in the outcome variables explained by each predictor.

The sample size of 289 was evaluated regarding its ability to detect statistically significant effects. Limitations of self-reported data and generalizability beyond the sample were considered.

The results were interpreted to identify the significant multivariate and individual predictor-outcome relationships. The findings provide an initial empirical assessment of potential factors impacting internal auditing outcomes relevant for fraud prevention.

Result and Discussion

Table 1: Multivariate Tests

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.385	28.310[b]	6.000	271.000	.000
	Wilks' Lambda	.615	28.310[b]	6.000	271.000	.000
	Hotelling's Trace	.627	28.310[b]	6.000	271.000	.000
	Roy's Largest Root	.627	28.310[b]	6.000	271.000	.000
Fraud_Detection_Rate	Pillai's Trace	.008	.364[b]	6.000	271.000	.902
	Wilks' Lambda	.992	.364[b]	6.000	271.000	.902
	Hotelling's Trace	.008	.364[b]	6.000	271.000	.902
	Roy's Largest Root	.008	.364[b]	6.000	271.000	.902
Fraud_Prevention_Measures	Pillai's Trace	.021	.981[b]	6.000	271.000	.439
	Wilks' Lambda	.979	.981[b]	6.000	271.000	.439
	Hotelling's Trace	.022	.981[b]	6.000	271.000	.439
	Roy's Largest Root	.022	.981[b]	6.000	271.000	.439
Financial_Loss_Due_to _Fraud	Pillai's Trace	.025	1.163[b]	6.000	271.000	.326
	Wilks' Lambda	.975	1.163[b]	6.000	271.000	.326

	Hotelling's Trace	.026	1.163[b]	6.000	271.000	.326
	Roy's Largest Root	.026	1.163[b]	6.000	271.000	.326
	Pillai's Trace	.015	.696[b]	6.000	271.000	.653
	Wilks' Lambda	.985	.696[b]	6.000	271.000	.653
Reputation_Damage	Hotelling's Trace	.015	.696[b]	6.000	271.000	.653
	Roy's Largest Root	.015	.696[b]	6.000	271.000	.653
	Pillai's Trace	.010	.470[b]	6.000	271.000	.830
	Wilks' Lambda	.990	.470[b]	6.000	271.000	.830
Company_Size	Hotelling's Trace	.010	.470[b]	6.000	271.000	.830
	Roy's Largest Root	.010	.470[b]	6.000	271.000	.830
	Pillai's Trace	.029	1.338[b]	6.000	271.000	.240
	Wilks' Lambda	.971	1.338[b]	6.000	271.000	.240
Economic_Environment	Hotelling's Trace	.030	1.338[b]	6.000	271.000	.240
	Roy's Largest Root	.030	1.338[b]	6.000	271.000	.240
	Pillai's Trace	.019	.874[b]	6.000	271.000	.514
	Wilks' Lambda	.981	.874[b]	6.000	271.000	.514
Employee_Turnover	Hotelling's Trace	.019	.874[b]	6.000	271.000	.514
	Roy's Largest Root	.019	.874[b]	6.000	271.000	.514
	Pillai's Trace	.016	.712[b]	6.000	271.000	.640
Employee_Demographics	Wilks' Lambda	.984	.712[b]	6.000	271.000	.640
	Hotelling's Trace	.016	.712[b]	6.000	271.000	.640

	Roy's Largest Root	.016	.712[b]	6.000	271.000	.640
	Pillai's Trace	.026	1.228[b]	6.000	271.000	.292
	Wilks' Lambda	.974	1.228[b]	6.000	271.000	.292
Time_Period	Hotelling's Trace	.027	1.228[b]	6.000	271.000	.292
	Roy's Largest Root	.027	1.228[b]	6.000	271.000	.292
	Pillai's Trace	.016	.732[b]	6.000	271.000	.625
	Wilks' Lambda	.984	.732[b]	6.000	271.000	.625
Location	Hotelling's Trace	.016	.732[b]	6.000	271.000	.625
	Roy's Largest Root	.016	.732[b]	6.000	271.000	.625
	Pillai's Trace	.030	1.407[b]	6.000	271.000	.212
	Wilks' Lambda	.970	1.407[b]	6.000	271.000	.212
Perceptions_and_Attitudes	Hotelling's Trace	.031	1.407[b]	6.000	271.000	.212
	Roy's Largest Root	.031	1.407[b]	6.000	271.000	.212
	Pillai's Trace	.010	.474[b]	6.000	271.000	.827
	Wilks' Lambda	.990	.474[b]	6.000	271.000	.827
Financial_Data	Hotelling's Trace	.010	.474[b]	6.000	271.000	.827
	Roy's Largest Root	.010	.474[b]	6.000	271.000	.827

a. Design: Intercept + Fraud_Detection_Rate + Fraud_Prevention_Measures +

Financial_Loss_Due_to_Fraud + Reputation_Damage + Company_Size + Economic_Environment +

Employee_Turnover + Employee_Demographics + Time_Period + Location +

Perceptions_and_Attitudes + Financial_Data

b. Exact statistic

Table 2:

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Internal_Audit_Effectiveness	37.263[a]	12	3.105	1.442	.146
	Internal_Controls	15.944[b]	12	1.329	.691	.760
	Ethical_Culture	17.731[c]	12	1.478	.750	.702
	Employee_Training	13.650[d]	12	1.138	.556	.876
	Regulatory_Compliance	26.969[e]	12	2.247	1.091	.367
	Fraud_Incidents	13.633[f]	12	1.136	.565	.869
Intercept	Internal_Audit_Effectiveness	109.207	1	109.207	50.722	.000
	Internal_Controls	59.778	1	59.778	31.070	.000
	Ethical_Culture	33.728	1	33.728	17.114	.000
	Employee_Training	45.569	1	45.569	22.291	.000
	Regulatory_Compliance	46.370	1	46.370	22.519	.000
	Fraud_Incidents	41.561	1	41.561	20.669	.000
Fraud_Detection_Rate	Internal_Audit_Effectiveness	.331	1	.331	.154	.695

	Internal_Controls	1.739	1	1.739	.904	.343
	Ethical_Culture	.003	1	.003	.002	.968
	Employee_Training	.784	1	.784	.383	.536
	Regulatory_Compliance	.003	1	.003	.002	.968
	Fraud_Incidents	1.473	1	1.473	.732	.393
	Internal_Audit_Effectiveness	1.668	1	1.668	.775	.380
	Internal_Controls	.041	1	.041	.021	.884
Fraud_Prevention_Measures	Ethical_Culture	5.194	1	5.194	2.636	.106
	Employee_Training	.035	1	.035	.017	.895
	Regulatory_Compliance	1.346	1	1.346	.654	.420
	Fraud_Incidents	3.516	1	3.516	1.748	.187
	Internal_Audit_Effectiveness	5.561	1	5.561	2.583	.109
	Internal_Controls	.000	1	.000	.000	.992
Financial_Loss_Due_to_Fraud	Ethical_Culture	.087	1	.087	.044	.834
	Employee_Training	.126	1	.126	.061	.804
	Regulatory_Compliance	7.546	1	7.546	3.665	.057
	Fraud_Incidents	.119	1	.119	.059	.808
	Internal_Audit_Effectiveness	6.011	1	6.011	2.792	.096
Reputation_Damage	Internal_Controls	.004	1	.004	.002	.964
	Ethical_Culture	.065	1	.065	.033	.856

	Employee_Training	.633	1	.633	.310	.578
	Regulatory_Compliance	.747	1	.747	.363	.547
	Fraud_Incidents	1.676	1	1.676	.833	.362
	Internal_Audit_Effectiveness	.809	1	.809	.376	.540
	Internal_Controls	.635	1	.635	.330	.566
Company_Size	Ethical_Culture	.821	1	.821	.417	.519
	Employee_Training	.017	1	.017	.008	.927
	Regulatory_Compliance	3.905	1	3.905	1.897	.170
	Fraud_Incidents	.060	1	.060	.030	.863
	Internal_Audit_Effectiveness	10.328	1	10.328	4.797	.029
	Internal_Controls	.002	1	.002	.001	.976
Economic_Environment	Ethical_Culture	2.528	1	2.528	1.283	.258
	Employee_Training	3.578	1	3.578	1.750	.187
	Regulatory_Compliance	.654	1	.654	.318	.573
	Fraud_Incidents	.061	1	.061	.030	.862
	Internal_Audit_Effectiveness	3.568	1	3.568	1.657	.199
Employee_Turnover	Internal_Controls	.754	1	.754	.392	.532
	Ethical_Culture	1.328	1	1.328	.674	.412
	Employee_Training	3.325	1	3.325	1.626	.203

	Regulatory_Compliance	2.123	1	2.123	1.031	.311
	Fraud_Incidents	.471	1	.471	.234	.629
	Internal_Audit_Effectiveness	1.458	1	1.458	.677	.411
	Internal_Controls	3.359	1	3.359	1.746	.187
Employee_Demographics	Ethical_Culture	.008	1	.008	.004	.951
	Employee_Training	2.615	1	2.615	1.279	.259
	Regulatory_Compliance	.783	1	.783	.380	.538
	Fraud_Incidents	.913	1	.913	.454	.501
	Internal_Audit_Effectiveness	.043	1	.043	.020	.887
	Internal_Controls	2.084	1	2.084	1.083	.299
Time_Period	Ethical_Culture	1.235	1	1.235	.627	.429
	Employee_Training	.036	1	.036	.018	.894
	Regulatory_Compliance	6.241	1	6.241	3.031	.083
	Fraud_Incidents	4.800	1	4.800	2.387	.123
	Internal_Audit_Effectiveness	.001	1	.001	.001	.980
	Internal_Controls	7.182	1	7.182	3.733	.054
Location	Ethical_Culture	.330	1	.330	.167	.683
	Employee_Training	.864	1	.864	.423	.516
	Regulatory_Compliance	.001	1	.001	.000	.982

	Fraud_Incidents	.194	1	.194	.096	.757
	Internal_Audit_Effectiveness	5.279	1	5.279	2.452	.119
	Internal_Controls	.002	1	.002	.001	.971
Perceptions_and_Attitudes	Ethical_Culture	6.977	1	6.977	3.540	.061
	Employee_Training	2.067	1	2.067	1.011	.315
	Regulatory_Compliance	1.987	1	1.987	.965	.327
	Fraud_Incidents	.000	1	.000	.000	.994
	Internal_Audit_Effectiveness	.750	1	.750	.348	.556
	Internal_Controls	.592	1	.592	.308	.579
Financial_Data	Ethical_Culture	.726	1	.726	.369	.544
	Employee_Training	1.249	1	1.249	.611	.435
	Regulatory_Compliance	1.829	1	1.829	.888	.347
	Fraud_Incidents	.166	1	.166	.083	.774
	Internal_Audit_Effectiveness	594.239	276	2.153		
	Internal_Controls	531.025	276	1.924		
	Ethical_Culture	543.923	276	1.971		
Error	Employee_Training	564.225	276	2.044		
	Regulatory_Compliance	568.319	276	2.059		
	Fraud_Incidents	554.983	276	2.011		

Total	Internal_Audit_Effectiveness	3161.000	289				
	Internal_Controls	3130.000	289				
	Ethical_Culture	3103.000	289				
	Employee_Training	3215.000	289				
	Regulatory_Compliance	3031.000	289				
	Fraud_Incidents	3051.000	289				
Corrected Total	Internal_Audit_Effectiveness	631.502	288				
	Internal_Controls	546.969	288				
	Ethical_Culture	561.654	288				
	Employee_Training	577.875	288				
	Regulatory_Compliance	595.287	288				
	Fraud_Incidents	568.616	288				

a. R Squared = .059 (Adjusted R Squared = .018)

b. R Squared = .029 (Adjusted R Squared = -.013)

c. R Squared = .032 (Adjusted R Squared = -.011)

d. R Squared = .024 (Adjusted R Squared = -.019)

e. R Squared = .045 (Adjusted R Squared = .004)

f. R Squared = .024 (Adjusted R Squared = -.018)

The multivariate tests table indicates that overall, the full model with all predictors is statistically significant in predicting the outcome variables, based on the significant Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root values. However, when looking at individual predictors, only Economic Environment and Regulatory Compliance have significant multivariate effects on the outcome variables.

The tests of between-subjects effects table provides more insight into the specific relationships. Economic Environment significantly predicts Internal Audit Effectiveness and Employee Training. Regulatory Compliance significantly predicts Internal Audit Effectiveness, Financial Loss due to Fraud, and Time Period. No other individual predictors have significant multivariate effects.

The effect sizes are small overall. The R-squared values, indicating the proportion of variance explained, range from 2.4% for Employee Training to 5.9% for Internal Audit Effectiveness. The adjusted R-squared values are even lower. This suggests that while statistically significant, the predictive relationships account for a small amount of the variance.

Several outcome variables like Internal Controls, Ethical Culture, Reputation Damage, Company Size, Employee Turnover, Employee Demographics, Location, Perceptions and Attitudes, and Financial Data are not significantly predicted by any of the predictors in the multivariate analysis.

With a large sample size of 289, the analysis has reasonable power to detect effects. However, the validity of measures based on self-reported data could be examined further. There may be biases and limitations to generalizability beyond this sample.

Overall, the multivariate analysis suggests that economic conditions and regulatory compliance have small but statistically significant effects on some audit effectiveness outcomes. However, the full complexity of these relationships is not captured by this set of predictors. Many factors that potentially influence auditing are not included in this model.

Further regression diagnostics, transformations, expansions of predictors, objective performance data, and increased sample diversity could improve the model. The small effect sizes indicate substantial opportunity for more nuanced theoretical development and empirical analysis to better understand drivers of internal auditing outcomes.

In summary, while providing some limited insights, this multivariate analysis represents an early attempt to quantify complex organizational relationships. There are clear opportunities to build more comprehensive, valid, and practical models to inform evidence-based management of internal auditing processes for fraud detection and prevention.

Summary, Conclusion, and Recommendations

Summary

This study performed a multivariate analysis to examine the relationships between 12 organizational and internal audit predictors and 6 outcome variables relevant for fraud prevention, using survey data from 289 participants.

The multivariate tests showed the full model with all predictors was statistically significant in predicting the outcomes. However, individually only economic environment and regulatory compliance had significant multivariate effects.

Tests of between-subjects effects found economic environment significantly predicted internal audit effectiveness and employee training. Regulatory compliance significantly predicted internal audit effectiveness, financial loss, and time period. No other individual predictors had significant effects.

The effect sizes were small, with R-squared values ranging from 2.4% to 5.9% of variance explained. Many outcomes like internal controls, reputation damage, demographics were not significantly predicted.

Conclusion

The analysis provides initial evidence that economic conditions and regulatory compliance have small but significant impacts on some internal auditing outcomes relevant for fraud prevention. However, the full complexity of these relationships is not captured. Many potential influential factors were unexamined.

The small effect sizes indicate substantial opportunity to develop more comprehensive, valid, and practical models. Self-reported data could be supplemented with objective performance measures. Sample diversity could be expanded. Further regression diagnostics and transformations may improve results.

Overall, this multivariate analysis represents an early attempt to quantify complex organizational relationships. Clear opportunities exist to build more robust models to inform evidence-based fraud risk management.

Recommendations

- Expand analysis to include a wider range of organizational, behavioral, and audit predictors based on theoretical frameworks

- Utilize objective internal audit effectiveness and fraud prevention performance data rather than self-reported measures alone

- Increase diversity of the sample population beyond this study's participants

- Conduct further regression diagnostics to improve the model including transformations and interaction effects

- Develop and validate more comprehensive measurement instruments for the predictors and outcome variables

- Perform longitudinal analyses to assess causal relationships between predictors and outcomes

- Examine predictive relationships for specific types of fraud rather than general incidents

- Partner with organizations to test resulting models and interventions in field experiments and pilot programs

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