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FACTORS INFLUENCING THE EFFECTIVENESS OF INTERNAL AUDITING IN STATE-OWNED ENTERPRISES DURING DIGITAL TRANSFORMATION

ABSTRACT

Internal auditing is increasingly recognized as a vital mechanism for fostering transparency and accountability within the public sector, particularly in emerging economies like Vietnam. However, the rapid onset of digital transformation is fundamentally altering organizational data flows and risk landscapes, necessitating a re-evaluation of the determinants that drive audit success. Grounded in Institutional Theory and the Resource-Based View (RBV), this study investigates the critical factors influencing internal audit effectiveness (IAE) within Vietnamese state-owned enterprises (SOEs) during this technological shift. Data were gathered through a structured online survey administered between October and November 2024 to 150 practitioners, including internal auditors, external auditors, and department heads. The analytical framework employed descriptive statistics, Cronbach's alpha for reliability, exploratory factor analysis (EFA) with Varimax rotation, and multivariate OLS regression to test the proposed hypotheses.

The empirical findings identify five significant predictors of IAE: top management support, professional competence, integrity and objectivity, IT capability, and the quality of coordination with external auditors. The regression model demonstrates robust explanatory power, accounting for approximately 74.6% of the variance in audit effectiveness ($USD R^2 \text{ (approx } 0.746, p < USD 0.001)$). Notably, top management support and professional competence emerge as the most profound drivers, confirming that executive sponsorship and specialized expertise remain the bedrock of governance in SOEs. Furthermore, IT capability and collaborative assurance with external auditors contribute significantly to audit quality, highlighting that data-driven approaches, such as continuous auditing and data analytics, are essential in a high-velocity digital environment. The study provides actionable recommendations for SOE leaders to reinforce managerial commitment, accelerate the adoption of automated auditing tools, and establish structured ethical frameworks to navigate the complexities of digitalization. The paper concludes with an improved framework for public sector leaders to navigate digital risks, emphasizing the necessity of integrated technological and ethical safeguards.

Keywords: internal audit, internal audit effectiveness, public sector, digital transformation, Vietnam, top management support, professional competence, IT capability, external auditors

JEL Classification: M42, H83, O33

INTRODUCTION

In the current era of rapid global digitalization, the integration of advanced technologies has fundamentally reshaped public sector operations and elevated the strategic importance of internal auditing. Digital transformation within the public sphere is not merely characterized by the ad-hoc adoption of new software; rather, it represents a comprehensive overhaul of administrative paradigms, organizational processes, and managerial cultures across all levels of government functions. This technological shift introduces a complex new landscape for governance, where achieving successful internal auditing now depends on a sophisticated interplay of variables, including human

capital, executive leadership, and technical infrastructure, that extend well beyond the boundaries of traditional audit procedures.

The Vietnamese economic landscape provides a unique and critical context for examining these dynamics. Between 2023 and 2024, Vietnam's state sector maintained approximately 671 state-owned enterprises (SOEs), comprising 473 wholly state-owned firms and 198 entities with majority state ownership. These enterprises serve as the backbone of the national economy, collectively holding assets valued at nearly VND 4.1 trillion and generating estimated pre-tax profits of approximately 249,000 billion VND. Despite their massive scale and economic significance, many of these entities face persistent challenges, including substantial accumulated losses exceeding VND 104,353 billion. Such figures underscore an urgent and undeniable demand for elevated financial transparency, operational optimization, and rigorous oversight mechanisms.

Vietnamese SOEs typically function under direct governmental supervision and are characterized by intricate hierarchical structures and a complex distribution of power between government agencies and internal departments. This inherent complexity breeds significant obstacles to sound financial governance and transparency. In this environment, establishing a rigorous internal audit framework is no longer an optional compliance task but a critical institutional imperative. Effective internal auditing serves as both a financial safeguard against fraud and a strategic catalyst for successful digital modernization. By strengthening the autonomy and capability of internal auditors, SOEs can better mitigate fraudulent risks, ensure strict adherence to state regulations, and significantly boost enterprise productivity amidst ongoing technological shifts.

Despite the clear necessity for robust auditing functions, there remains a notable research gap. While global literature offers broad insights into audit effectiveness, targeted and updated research that reflects Vietnam's unique institutional context and its specific digital transformation progress is remarkably sparse. Previous foundational studies have demonstrated that internal audit effectiveness (IAE) is contingent upon various factors — ranging from the professional competencies of auditors to the organizational working environment. However, as the public sector migrates toward cloud-based governance and high-velocity data flows, traditional oversight mechanisms must be restructured. The application of specialized information technology and the synergy between internal and external auditors have gained heightened significance, yet these variables are rarely examined through an empirical lens in the Vietnamese public sector (MOF, 2023).

This study seeks to fill this critical void by providing a comprehensive analysis of the determinants influencing internal audit effectiveness within Vietnam's public sector during the digital transformation period. Specifically, it examines how five primary drivers — top management support, professional competence, integrity and objectivity, IT capability, and the relationship with external auditors — impact the performance of audit functions in state-owned enterprises and government bodies. By clarifying these levers, the findings of this research aim to equip policymakers, senior executives, and public sector managers with pragmatic, data-driven strategies to elevate audit quality and fortify risk management practices in an increasingly digitized global economy.

LITERATURE REVIEW

An extensive body of literature establishes that the efficacy of internal auditing is shaped by diverse elements, from workplace culture to the technical prowess of the audit team. However, the advent of digital transformation has amplified the necessity for technological fluency and seamless synergy between internal and independent auditors. While global literature offers broad insights, targeted research reflecting Vietnam's unique institutional context remains sparse.

Hypotheses and Theoretical Background

Prior research on internal audit effectiveness in the public sector

Internal audit effectiveness (IAE) is a multifaceted concept. Historically, an audit function is deemed successful when it provides tangible value, assisting executive boards in refining governance, internal controls, and risk management protocols. The Institute of Internal Auditors portrays this function as an objective, independent advisory activity utilizing disciplined methodologies to elevate organizational performance. Within public administration, successful auditing is heavily reliant on structural support, human capital, and collaborative external relationships. Furthermore, aligning audit goals with rigorous financial oversight mitigates earnings manipulation and fortifies the function's governance mandate. Ultimately, contemporary consensus suggests that IAE is measured by its capacity to enforce public sector accountability and facilitate the achievement of institutional targets (Gramling, Maletta, Schneider, & Church, 2004; Mihret & Yismaw, 2007; IIA, 2017).

In public-sector settings, prior evidence shows that IAE is influenced by organizational arrangements (e.g., management support and mandate), IA resources and competencies, and the quality of coordination with external auditors (Arena & Azzone, 2009; Alzeban & Gwilliam, 2014). The alignment between IA objectives and oversight of financial reporting has also been linked to higher audit quality and constraints on earnings management, underscoring IA's governance role (Prawitt, Smith, & Wood, 2009). Overall, contemporary research converges on the view that IAE reflects the ability of IA to help the organization meet its objectives, particularly by reinforcing accountability and stewardship in the public sector (Al-Twaijry, Brierley, & Gwilliam, 2003; Alzeban & Gwilliam, 2014).

Internal Audit Effectiveness (IAE) is no longer viewed as a static compliance function but as a dynamic capability essential for organizational resilience. Contemporary research between 2021 and 2026 emphasizes that in a digitalized landscape, IAE is defined by the function's ability to provide real-time assurance and proactive risk mitigation. Alqudah et al. (2023) and Volodina et al. (2023) argue that as public sector entities migrate to cloud-based governance, the traditional oversight mechanisms must be restructured to handle high-velocity data flows. In Vietnam, where State-Owned Enterprises (SOEs) operate on a massive scale, IAE serves as the primary safeguard for transparency amidst intricate power dynamics and mandatory digital mandates (Otia & Bracci, 2022).

Factors influencing internal audit effectiveness

Global empirical evidence consistently indicates that IAE is the product of intertwined human and structural components. Auditing adds demonstrable value when it is well-funded, championed by leadership, technologically equipped, and coordinated with external assessments (Marika Arena, Giovanni Azzone, 2009); (Abdulaziz Alzeban, David Gwilliam, 2014); (Dessalegn Getie Mihret, Aderajew Wondim Yismaw, 2007). In parallel, research links higher IA quality to better financial reporting outcomes (e.g., lower earnings management), underscoring that competence and process discipline are central channels through which IA enhances effectiveness (Douglas F. Prawitt, Jason L. Smith; David A. Wood, 2009).

Below, we develop testable hypotheses grounded in those streams of evidence. The first concerns the Professional Competence of internal auditors.

Professional competence

Research confirms that auditor expertise is paramount. Independent auditors base their reliance on the internal team's skill level and objective performance. Teams equipped with superior training and experience execute more impactful evaluations, identify critical operational enhancements, and communicate more effectively with leadership (Marika Arena, Giovanni Azzone, 2009); (Mihret & Yismaw, 2007). Survey work in the Saudi public sector further finds that competence - together with management support and organizational status-significantly explains perceived internal audit effectiveness (Abdulaziz Alzeban, David Gwilliam, 2014). Finally, in financial-reporting contexts, higher-quality internal audit functions (a construct that prominently includes staff competence and training) are associated with lower earnings management, indicating that competence translates into economically meaningful governance outcomes (Douglas F. Prawitt; Jason L. Smith; David A. Wood, 2009).

Recent studies by Lutfi & Alqudah (2023) highlight that "competence" in the digital era has expanded beyond accounting to include "digital fluency" and data literacy. Auditors with superior multidisciplinary training are better equipped to identify critical operational enhancements in complex environments.

H1: The professional competence of internal auditors has a positive effect on internal audit effectiveness.

Integrity and objectivity

Ethical steadfastness is the bedrock of value-added auditing. Professional standards dictate that auditors must remain unbiased and truthful. Studies demonstrate that unrestricted access to organizational data and strong mandates bolster audit outcomes, while compromised independence diminishes them (IIA, 2017; Dessalegn Getie Mihret, Aderajew Wondim Yismaw, 2007). Complementing this, ISA 610 (IAASB, 2013) specifies that external auditors may rely on the work of IA only when the function is sufficiently objective and competent, underscoring objectivity as a precondition for assurance quality.

At the governance interface, objectivity and independence, supported by audit committee oversight, are repeatedly identified as key levers of internal audit's effectiveness (Christopher, Sarens, & Leung, 2009).

Moreover, in financial-reporting contexts, higher-quality internal audit functions (which explicitly embed integrity and objectivity criteria) are associated with lower earnings management, indicating that objectivity operates through discernible improvements in audit quality and governance (Douglas F. Prawitt, Jason L. Smith, and David A. Wood, 2009).

Zhang et al. (2023) emphasize that integrity ensures assessments remain unbiased, which is particularly crucial when navigating the institutional pressures inherent in SOEs

H2: The integrity and objectivity of internal audit have a positive effect on internal audit effectiveness.

Top management support

An audit function cannot thrive without the explicit backing of senior executives. This translates into adequate resource allocation, elevated organizational status, and a genuine commitment to implementing audit recommendations (Gerrit Sarens, Ignace De Beelde, 2007); (Marika Arena, Giovanni Azzone, 2009), (Abdulaziz Alzeban, David Gwilliam, 2014). Furthermore, both public-sector studies and recent large-sample research confirm a positive association between upper management support and internal audit effectiveness, as well as the ability of internal audit to influence governance outcomes. Alqudah et al. (2023) demonstrate that in emerging economies, TMS is the most profound influencer of audit performance, as it validates the function's authority within the corporate hierarchy.

H3: Top management support has a positive effect on internal audit effectiveness.

Relationship with external auditors

Strategic coordination with external audit bodies minimizes redundant efforts and enriches the overall information landscape. First, Information sharing and joint planning streamline the assurance process and compel management to address findings seriously (IAASB, 2013); (William L. Felix, Jr., Audrey A. Gramling, Mario J. Maletta, 2002). Second, stronger coordination and clearer delineation of tasks are associated with lower external audit effort/fees (consistent with reduced duplication) or with fee structures that reflect enhanced audit scope/quality-both outcomes implying more efficient assurance integration (Jenny Goodwin-Stewart, Pamela Kent, 2006); (Sandra Ho, Marion Hutchinson, 2010); review in (Byron J. Pike; Lawrence Chui, Kasey A. Martin, Renee M. Olvera, 2016). Third, recent evidence based on practitioner surveys documents that effective communication and involvement in the IAF's work plan meaningfully increase reliance and perceived audit effectiveness, conditional on the internal audit function's competence and objectivity. Pike et al. (2016), with updated perspectives in 2022, show that collaborative planning and sharing digital audit evidence improve overall assurance efficiency and optimize audit fees.

H4: A stronger working relationship between internal auditors and external auditors has a positive effect on internal audit effectiveness.

IT capability of internal auditors

The primary scientific novelty of this research lies in its empirical validation of Information Technology (IT) Capability as a transformative determinant of IAE. In the wake of digital transformation, proficiency in data analytics and Computer-Assisted Audit Tools (CAATs) is a "force multiplier" (Zhang et al., 2023). This capability allows auditors to move from sample-based testing to Continuous Auditing (CA), detecting anomalies in near-real-time across the data-intensive operations of modern SOEs (Banker et al., 2021). Proficiency in computer-assisted audit tools (CAATs) allows for broader testing scopes, rapid anomaly detection, and the transition toward continuous monitoring (Diane Janvrin, James Bierstaker, D. Jordan Lowe, 2009).

At the technique level, evidence from financial institutions and corporate settings shows that internal auditors deploy generalized audit software to extract, transform, and analyze large transaction populations; however, use is most beneficial when embedded in routine engagements rather than ad-hoc investigations (Roger Debreceeny, Sook-Leng Lee, Willy Neo, Jocelyn Shuling Toh, 2005). As organizations move toward continuous auditing/monitoring, IT-enabled approaches allow near-real-time risk indicators and exception reporting, which strengthens internal audit effectiveness (Michael G. Alles, Alexander Kogan; Miklos A. Vasarhelyi, 2008). The migration of enterprise data and processes to cloud platforms further increases auditability by enabling simultaneous, role-based access to evidence and standardized logs; this improves IA's ability to test controls continuously and to collaborate across locations (Rajiv D. Banker, Xiaorong Li, Steven A. Maex, Wenyun Shi, 2020). Collectively, these streams indicate that IT capability is a first-order enabler of the internal audit's value-adding mandate.

H5: The IT capability of internal auditors has a positive effect on internal audit effectiveness in the public sector.

AIMS AND OBJECTIVES

The primary purpose of this study is to investigate the determinants influencing the effectiveness of internal auditing (IAE) within Vietnamese state-owned enterprises (SOEs) during the era of digital transformation. Specifically, the research aims to assess how organizational, human, and technology-related factors, such as top management support, professional competence, and IT capability, jointly explain perceived audit effectiveness in a transitional economy. By clarifying these levers, the study seeks to provide a scientific basis for enhancing financial transparency, minimizing fraud risks, and improving operational efficiency as SOEs digitize their core operations.

To achieve the aforementioned goal, the following tasks were established and successfully addressed:

- **Task 1: Theoretical Framework Construction**

Review existing global literature on internal audit effectiveness in the public sector to identify research gaps.

Synthesize professional standards (e.g., IIA, ISA 610) and prior empirical evidence to develop a multidimensional construct for IAE.

- **Task 2: Hypothesis Development**

Establish five testable hypotheses (H1–H5) relating professional competence, integrity, top management support, external auditor relationships, and IT capability to audit effectiveness.

- **Task 3: Data Collection and Instrument Design**

Design a structured survey instrument targeting key practitioners, including internal auditors and department heads.

Execute an online survey between October and November 2024 to collect primary data from 150 valid respondents within the Vietnamese public sector.

- **Task 4: Quantitative Data Analysis**

Verify the reliability and validity of measurement scales using Cronbach's Alpha and Exploratory Factor Analysis (EFA).

Perform Pearson correlation and multivariate OLS regression analyses to determine the statistical significance and impact weight of each factor.

- **Task 5: Discussion and Practical Recommendations**

Interpret the findings in the context of Vietnam's specific institutional environment and the ongoing digital transformation.

Formulate actionable strategies for SOE leadership regarding resource allocation, technological investment, and ethical framework reinforcement.

METHODS

Based on the theoretical framework and a comprehensive review of the literature, the research model is proposed as follows (Figure 1).

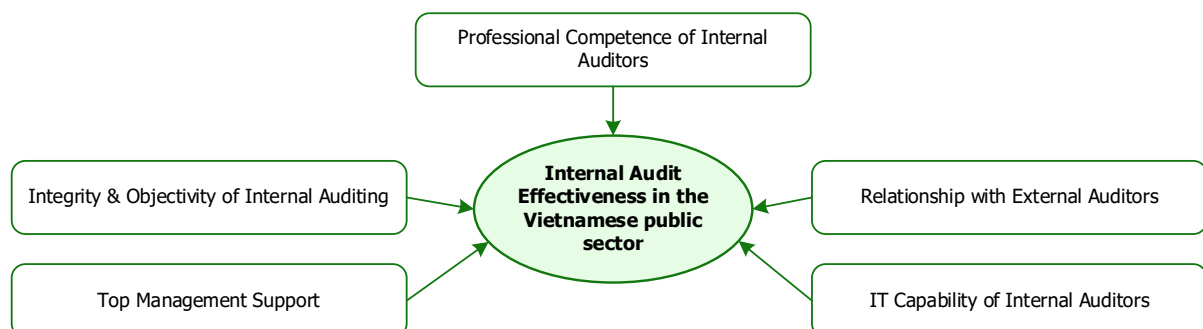


Figure 1. Proposed research model.

With the following multiple regression model:

$$IAE = \beta_0 + \beta_1 PC + \beta_2 IO + \beta_3 TMS + \beta_4 REA + \beta_5 ITC + \varepsilon$$

where $\beta_1, \beta_2, \dots$ are regression coefficients, β_0 is the intercept, and ε is the error term; *IAE*: Internal Audit Effectiveness in the Vietnamese public sector; *PC*: Professional Competence of internal auditors; *IO*: Integrity & Objectivity of internal auditing; *TMS*: Top Management Support; *REA*: Relationship with External Auditors; *ITC*: IT Capability of internal auditors.

Data, procedures, and sampling

We employed convenience sampling via online questionnaires (Google Forms and email) administered in October - November 2024. After screening for completeness and consistency, we retained 150 usable responses for analysis.

All analyses were conducted in SPSS 20.0. We first reported descriptive statistics (mean, median, minimum, maximum, and standard deviation) for all variables. To assess reliability, we computed Cronbach's alpha for each construct. We then performed exploratory factor analysis (EFA) using principal component analysis with Varimax rotation. Factors were retained when loadings ≥ 0.50 , the Kaiser -Meyer - Olkin (KMO) measure indicated adequate sampling adequacy, and Bartlett's test of sphericity was significant ($p < .001$). We proceeded to the multiple regression tests of hypotheses using the factor scores (or composite indices) that met.

RESULTS

1. Descriptive statistics

The sample is balanced by gender (female 54%), with a slight majority holding professional certifications (54%). Most respondents are internal auditors (75%), which is consistent with the study's focus but also means results may reflect an IA-centered perspective (Table 1). To address this, we:

- report results by subgroup in robustness checks (e.g., certified vs. non-certified; IA vs. non-IA);
- control for position in multivariate tests where relevant.

Table 1. Sample profile (n = 150).

Category	Groups	n	%
Gender	Male	69	46
	Female	81	54
Certification	CPA / ACCA / other	81	54
	No certification	69	46
Position	Internal auditor	112	74.67
	External auditor	26	17.33
	Director / Head of Department	12	8

2. Cronbach's Alpha Reliability

All scales meet standard reliability thresholds ($\alpha \geq 0.70$ and corrected item-total ≥ 0.30), supporting their use in subsequent EFA and regression. The dependent variable IAE shows very high internal consistency ($\alpha = 0.94$); if desired, item-redundancy diagnostics (e.g., "alpha if item deleted") can be inspected, but no item failed the minimum criteria (Table 2).

Table 2. Reliability of measurement scales (n = 150).

Code	Construct (EN)	Cronbach's α	Min. corrected item -total corr.	Decision
PC	Professional Competence	0.889	0.66	Acceptable
IO	Integrity & Objectivity	0.906	0.713	Acceptable
ITC	IT Capability	0.866	0.652	Acceptable

TMS	Top Management Support	0.883	0.728	Acceptable
REA	Relationship with External Auditors	0.887	0.729	Acceptable
IAE	Internal Audit Effectiveness (DV)	0.94	0.85	Acceptable

3. Exploratory factor analysis (EFA) and correlations

a. KMO and Bartlett's tests

Using the survey sample ($n = 150$), we conducted an exploratory factor analysis (EFA) on the 21 indicators of the five independent constructs (ITC, IO, PC, REA, TMS). The dependent construct (IAE) was not included in this EFA (Table 3).

Table 3. KMO and Bartlett's test. Note: Kaiser–Meyer–Olkin (KMO) = 0.837; Bartlett's test of sphericity: $\chi^2(210) = 2,495.083$, $p < .001$.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.837
Bartlett's Test of Sphericity	Approx. Chi-Square	2495.083
	df	210
	Sig.	.000

These results indicate sampling adequacy and that the correlation matrix is not an identity matrix, supporting the suitability of the data for factor extraction.

EFA settings: Extraction used Principal Component Analysis (PCA) with Varimax rotation (Kaiser normalization); rotation converged in six iterations.

Using the survey sample ($n = 150$), we conducted an EFA on the 21 indicators of the five independent constructs (ITC, IO, PC, REA, TMS). The dependent construct (IAE) was not included in this EFA. Sampling adequacy and sphericity tests indicate that EFA is appropriate for these data: KMO = 0.837; Bartlett's $\chi^2(210) = 2,495.083$, $p < .001$. Extraction used principal component analysis with Varimax rotation; rotation converged in six iterations.

b. Exploratory factor analysis (EFA) - rotated solution and interpretation

Extraction & rotation: Principal Component Analysis with Varimax rotation (Kaiser normalization); rotation converged in six iterations. The EFA was run on the 21 indicators for the five independent constructs (ITC, IO, PC, REA, TMS). IAE items (IAE1–IAE2) shown in the raw output were excluded from this IV-only EFA because IAE is the dependent construct.

Rotated component structure (cleaned, IVs only): Loadings (all $\geq .50$) form a clear five-factor solution consistent with theory (Table 4).

Table 4. EFA summary for independent constructs ($n = 150$). Notes: Extraction = PCA; Rotation = Varimax (Kaiser). All retained loadings $\geq .50$; no problematic cross-loadings ($\geq .40$). The factor structure aligns with the theorized five-construct model.

Factor	Label	Items (k)	Min. loading
F1	ITC – IT Capability	5	.706
F2	IO – Integrity & Objectivity	4	.775
F3	PC – Professional Competence	3	.741
F4	REA – Relationship with External Auditors	4	.752
F5	TMS – Top Management Support	3	.848

Pearson two-tailed correlations show positive, statistically significant associations between IAE and each predictor (ITC, IO, PC, REA, TMS) at $p < .05$. Accordingly, all five variables are retained for the multiple-regression analyses reported next.

c. Correlation analysis

The dependent variable IAE is positively and significantly correlated with all five predictors - PC (.660), IO (.621), ITC (.618), REA (.494), and TMS (.593) - supporting their inclusion in subsequent regression tests (Table 5).

Table 5. Pearson correlations (two-tailed). Notes: n = 150. All coefficients shown are significant at 1% (two-tailed).

Variable	1	2	3	4	5	6
IAE (DV)	1					
PC	0.66	1				
IO	0.621	0.529	1			
ITC	0.618	0.46	0.407	1		
REA	0.494	0.24	0.271	0.385	1	
TMS	0.593	0.318	0.247	0.367	0.329	1

Inter-predictor correlations are moderate (max = PC - IO = .529), and no pair exceeds .80, suggesting a low risk of severe multicollinearity. We nonetheless verify this formally in the regression via VIF/condition diagnostics.

4. Multiple linear regression

Dependent variable: Internal Audit Effectiveness (IAE). Predictors: Professional Competence (PC), Integrity & Objectivity (IO), IT Capability (ITC), Top Management Support (TMS), Relationship with External Auditors (REA) (Table 6).

Table 6. ANOVA.

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	57.221	5	11.444	84.372	< .001
Residual	19.532	144	0.136		
Total	76.753	149			

The model explains approximately 74.6% of the variation in Internal Audit Effectiveness ($R^2 \approx 0.746$), with an adjusted R^2 of approximately 0.737. The overall model is statistically significant ($F = 84.372$, $p < .001$).

Multicollinearity. All VIFs are low (1.25–1.58), indicating no multicollinearity concern.

Table 7. OLS estimates (dependent variable: IAE).

Predictor	Unstd. B	Std. Error	Std. Beta	t	Sig.	Tolerance	VIF
Constant	-0.852	0.263	-	-3.244	0.001	-	-
PC (Professional Competence)	0.267	0.048	0.291	5.512	< .001	0.635	1.575
IO (Integrity & Objectivity)	0.27	0.052	0.264	5.165	< .001	0.677	1.477
ITC (IT Capability)	0.232	0.061	0.198	3.831	< .001	0.664	1.507
TMS (Top Management Support)	0.332	0.051	0.304	6.474	< .001	0.8	1.25
REA (Relationship w/ External Auditors)	0.175	0.047	0.176	3.749	< .001	0.801	1.249

Standardized regression (beta) equation:

$$IAE = 0.291 PC + 0.264 IO + 0.198 ITC + 0.304 TMS + 0.176 REA$$

Interpretation: All five predictors (Professional Competence, Integrity & Objectivity, IT Capability, Top Management Support, and Relationship with External Auditors) are positive and statistically significant ($p < .001$). Among these, Top Management Support (TMS) has the strongest impact on Internal Audit Effectiveness (IAE), followed by Professional Competence (PC), Integrity & Objectivity (IO), IT Capability (ITC), and Relationship with External Auditors (REA).

The model explains a substantial portion of the variation in internal audit effectiveness, with an R^2 value of approximately 0.746 (adjusted $R^2 \approx 0.737$). This suggests that the model is effective in capturing the key drivers of internal audit effectiveness. These findings support hypotheses H1–H5, emphasizing that top management support and professional competence are the most significant factors, while integrity/objectivity, IT capability, and collaboration with external auditors also play important roles.

DISCUSSION

The empirical findings of this research provide a robust, data-driven foundation for understanding the intricate architecture of internal audit effectiveness (IAE) within the specific institutional and technological landscape of Vietnam's public sector. With a remarkably high explanatory power evidenced by an R^2 of approximately 0.746, the multivariate regression model confirms that IAE is not a product of isolated inputs. Instead, it is the synergistic outcome of a sophisticated cluster of organizational, human, and technological determinants.

Comprehensive Analysis of Predictors and Theoretical Integration

The regression analysis highlights that Top Management Support (TMS) exerts the most profound influence on audit success ($\beta = 0.304$, $p < .001$). This finding is deeply rooted in Institutional Theory, which suggests that in the hierarchical and power-concentrated structure of Vietnamese SOEs, the internal audit function requires explicit executive endorsement to establish its legitimacy. Without visible commitment from senior leadership, manifested through adequate resource allocation, clear mandates, and a genuine willingness to act upon audit recommendations, the internal audit function remains a marginalized compliance unit, regardless of its technical quality. In the Vietnamese context, where "tone at the top" dictates organizational behavior, TMS is the essential bridge between audit findings and actual governance improvements.

Similarly, the high impact of Professional Competence (PC) ($\beta = 0.291$) reinforces the Resource-Based View (RBV), emphasizing that human capital is the primary strategic asset for organizational oversight. In the wake of digitalization, "competence" has evolved from basic accounting knowledge to a multidisciplinary skill set encompassing digital fluency, data literacy, and risk-based thinking. Our results align with the foundational work of Arena and Azzone (2009) and Alzeban and Gwilliam (2014), confirming that the ability of auditors to plan and execute high-quality engagements in complex, data-heavy environments is a prerequisite for adding tangible organizational value.

Furthermore, the significant role of IT Capability (ITC) ($\beta = 0.198$) serves as a "force multiplier" in the modern era. As SOEs migrate core operations to cloud platforms and handle massive data volumes, traditional manual sampling becomes obsolete. Proficiency in Computer-Assisted Audit Tools (CAATs) and data analytics enables auditors to detect anomalies in near-real time, transitioning the function from a reactive investigator to a proactive risk-mitigation partner. However, the fact that ITC's impact is statistically lower than TMS and PC suggests that technology is an enabler that still relies heavily on managerial will and human ethical interpretation to be effective.

Finally, the positive impact of Integrity and Objectivity (IO) ($\beta = 0.264$) and the Relationship with External Auditors (REA) ($\beta = 0.176$) creates a holistic assurance environment. Strategic coordination between internal and external auditors reduces audit redundancy, optimizes external audit fees, and enhances the overall transparency of financial reporting in a transitional economy.

Critical Limitations and Application Constraints

Despite the robust statistical evidence, several critical limitations must be acknowledged to ensure an intellectually honest interpretation:

1. **Sampling Methodology and Generalizability:** The study utilized a convenience sampling approach with 150 practitioners. While sufficient for regression, this may not fully capture the vast diversity and varying digital maturity levels across the 671 SOEs in Vietnam.
2. **Perceptual and Self-Reporting Bias:** Since 75% of respondents are internal auditors, the data reflects an internal-centric perspective. This may lead to "social desirability bias," where participants overestimate their own skills or the impact of their department compared to the views of external regulators.
3. **Temporal and Dynamic Factors:** The data represent a snapshot of the digital landscape in late 2024. Given the exponential pace of technological change, the relative importance of factors like Artificial Intelligence (AI) or Blockchain may evolve rapidly, potentially altering the model's weights in a short period.
4. **Omission of Qualitative and Cultural Variables:** The current model focuses on structural and technical drivers but does not explicitly account for informal power dynamics, organizational culture, or traditional "red tape" that may impede audit independence in public agencies.

CONCLUSIONS

This study explored the factors influencing the effectiveness of internal auditing (IAE) in the context of digital transformation in Vietnam's public sector. Our findings highlight the significant roles of top management support, professional competence, integrity and objectivity, IT capability, and the relationship with external auditors in enhancing internal audit effectiveness.

The results confirm that top management support (TMS) and professional competence (PC) are the most influential drivers of internal audit effectiveness, followed by integrity and objectivity (IO), IT capability (ITC), and coordination with external auditors (REA). These factors are essential for creating a robust internal audit environment capable of addressing the challenges posed by digital transformation in the public sector. The model explained approximately 74.6% of the variation in internal audit effectiveness, underscoring the importance of these factors in shaping effective internal auditing practices.

Our research aligns with existing literature, reinforcing the conclusion that internal audit effectiveness is not determined by a single factor but is the result of a combination of organizational, technical, and interpersonal elements. Furthermore, the results contribute to the body of knowledge by providing updated insights into the context of digitalization in Vietnam's public sector, an area that has been relatively underexplored in the literature.

Recommendations

Based on our findings, the following recommendations are proposed to improve the effectiveness of internal auditing in the public sector during the digital transformation:

Enhance Top Management Support: As top management support plays a crucial role in internal audit effectiveness; it is vital for senior leaders to actively endorse internal audit functions. This includes allocating sufficient resources, providing clear mandates, and demonstrating a commitment to act upon audit recommendations.

Invest in Professional Competence: Strengthening the professional competence of internal auditors through continuous training and certification will ensure they possess the necessary skills to effectively evaluate risk management and control systems, especially in a digitally evolving environment.

Leverage Technology: The integration of advanced IT tools, such as data analytics, continuous auditing systems, and automated audit techniques, should be prioritized. These technologies enable internal auditors to expand their coverage, detect anomalies early, and enhance the overall efficiency and effectiveness of audits.

Foster Collaboration with External Auditors: Improved cooperation between internal and external auditors can enhance the quality of audits and reduce redundancy. Clear coordination and shared access to audit evidence can improve overall audit efficiency and effectiveness.

Strengthen Integrity and Objectivity: Internal auditors must maintain high standards of integrity and objectivity to ensure their work adds value to the organization. This can be supported by establishing a strong ethical framework and providing independence to internal audit functions.

Future Research Directions

While this study provides valuable insights into the factors influencing internal audit effectiveness in the context of digital transformation, future research can explore additional variables or factors, such as the role of organizational culture, regulatory frameworks, or the influence of external factors like public perception. Comparative studies across different countries or regions could also offer a broader understanding of the generalizability of these findings in different cultural and institutional settings.

Moreover, given the rapid pace of digital transformation, future research could examine the long-term impacts of emerging technologies on the internal audit profession, especially in the public sector. Such studies could provide a forward-looking perspective on the evolving role of internal audit in governance and accountability.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ФАКТОРИ, ЩО ВПЛИВАЮТЬ НА ЕФЕКТИВНІСТЬ ВНУТРІШНЬОГО АУДИТУ В ДЕРЖАВНИХ ПІДПРИЄМСТВАХ ПІД ЧАС ЦИФРОВОЇ ТРАНСФОРМАЦІЇ

Внутрішній аудит дедалі більше визнають важливим механізмом для сприяння прозорості й підзвітності в державному секторі, особливо в країнах, що розвиваються, таких як В'єтнам. Однак стрімкий початок цифрової трансформації фундаментально змінює організаційні потоки даних і ландшафт ризиків, що вимагає переоцінки чинників, які визначають успіх аудиту. Засноване на інституційній теорії та ресурсно орієнтованому погляді (RBV), це дослідження досліджує критичні чинники, що впливають на ефективність внутрішнього аудиту (IAE) у в'єтнамських державних підприємствах (ДП) під час цієї технологічної зміни. Дані були зібрані через структуроване онлайн-опитування, проведене з жовтня по листопад 2024 року для 150 практиків, включаючи внутрішніх аудиторів, зовнішніх аудиторів і керівників відділів. Аналітична основа використовувала описову статистику, альфу Кронбаха для надійності, дослідницький факторний аналіз (EFA) з обертанням Varimax і багатовимірну регресію OLS для перевірки запропонованих гіпотез.

Емпіричні результати визначають п'ять значущих предикторів IAE: підтримку вищого керівництва, професійну компетентність, доброчесність і об'єктивність, ІТ-можливості та якість координації з зовнішніми аудиторами. Регресійна модель демонструє надійну пояснювальну силу, що становить приблизно 74,6% дисперсії ефективності аудиту ($USD R^2 \approx 0,746$, $p < USD 0,001$). Зокрема підтримка вищого керівництва та професійна компетентність є найглибшими чинниками, що підтверджує, що спонсорство керівників і спеціалізована експертиза залишаються основою управління в державних підприємствах. Крім того, ІТ-можливості й забезпечення співпраці з зовнішніми аудиторами суттєво сприяють якості аудиту, підкреслюючи, що підходи, засновані на даних, такі як безперервний аудит і аналітика даних, є необхідними в високошвидкісному цифровому середовищі. Дослідження надає практичні рекомендації для керівників державних підприємств щодо посилення управлінської відданості, прискорення впровадження автоматизованих інструментів аудиту й створення структурованих етичних рамок для подолання труднощів цифровізації. Стаття завершується покращеною структурою для керівників державного сектора для орієнтування в цифрових ризиках, підкреслюючи необхідність інтегрованих технологічних та етичних гарантій.

Ключові слова: внутрішній аудит, ефективність внутрішнього аудиту, державний сектор, цифрова трансформація, В'єтнам, підтримка топ-менеджменту, професійна компетентність, ІТ-можливості, зовнішні аудитори

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