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Article

The Critical Influence of Internal Audit Effectiveness and Sustainable Innovation on Sustainable Auditing Practices

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Abstract: This study investigates the pivotal roles of internal audit effectiveness (IAE) and sustainable innovation (SI) in advancing sustainability auditing (SA) practices within Libya's public sector. The study used a cross-sectional, PLS-SEM and correlational research design to analyse 500 valid responses collected from 36 public sector firms, employing hierarchical regression and structural equation modelling for robust data analysis through the Statistical Package for Social Sciences. The findings reveal that IAE and SI significantly enhance SA across various ESG dimensions, emphasising the necessity for robust internal audit frameworks and innovative, sustainability-oriented practices. Conversely, ASPs demonstrated an insignificant negative impact on SA, suggesting a fundamental misalignment between existing audit guidelines and the broader sustainability objectives. These outcomes are consistent with stakeholder and agency theories, which emphasise aligning organisational practices with stakeholder expectations and addressing principal-agent conflicts to achieve sustainability goals. This paper contributes to the limited literature on sustainability auditing within Libya's public sector, expanding theoretical frameworks by illustrating how IAE and SI synergistically drive practical ESG integration. The paper highlights practical implications for public sector managers, emphasising the need to enhance SI and IAE to strengthen SA practices. Furthermore, it advocates revising audit standards to ensure their alignment with evolving sustainability imperatives, thereby fostering a more holistic approach to sustainability auditing in the public sector.

Keywords: internal audit effectiveness; sustainable innovation; sustainability auditing; audit standards; Libyan public sector

1. Introduction

IAE has consistently been regarded as a foundational element of robust corporate governance, highlighted in various studies that connect high-profile corporate failures to lapses in internal audit functions (Arena and Azzone, 2006; Schneider, 2003; Maletta, 1993). Over time, the role of internal auditing has expanded beyond mere oversight to include strategic contributions, supporting senior management in achieving operational and ethical goals (Lenz and Hahn, 2015; Mihret et al., 2010). In parallel, sustainability has become a vital component of organisational strategy, shaped by growing attention to social, environmental, and governance considerations (DeSimone et al., 2021; Azzone, 2006). Recent public sector reforms underscore the importance of integrating ethical values, transparency, and long-term goals to ensure efficiency and build trust among various stakeholders (Jung and Cho, 2022; Brusca et al., 2018). Sustainability initiatives frequently serve strategic objectives, enhancing governmental reputation, bolstering public trust, and fulfilling legislative mandates (Alsayegh et al., 2020; Vieira and Radonjić, 2020). Despite increased emphasis on sustainability disclosures, considerable concerns persist regarding the credibility of reported information (Imasiku et al., 2020; Swann and Deslatte, 2019). Public sector institutions often grapple with issues such as limited resources, overlapping regulations, and political pressures, making the

assurance of reliable sustainability disclosures even more complex (Santos et al., 2024; Ríos and García, 2023).

Internal audits have consequently assumed a more dynamic function, evolving from a narrow risk-control perspective into multifaceted roles supporting sustainability and innovation (Corazza et al., 2020; Kiesnere and Baumgartner, 2019). A sustainability audit involves evaluating an organisation's compliance with environmental, social, and economic performance criteria (Gray, 2010; Adams and McNicholas, 2007). While much of the existing auditing literature emphasises risk mitigation and compliance, sustainable auditing emphasises long-term value creation and stakeholder welfare (Deegan, 2009; Schaltegger and Burritt, 2010). Since public sector organisations serve a broad range of stakeholders—from taxpayers and community groups to policymakers, this context presents heightened accountability expectations (Freeman, 2004; Kujala et al., 2022). Stakeholder theory suggests that institutions must balance diverse interests to achieve enduring legitimacy (Braun and Starkbaum, 2023). Agency theory further underscores how transparency and oversight can mitigate information asymmetry between public officials (agents) and citizens or governing bodies (principals) (Zhang et al., 2021; Jensen and Meckling, 1976). Internal audit effectiveness, therefore, becomes a key instrument for facilitating responsible governance, promoting ethical conduct, and supporting sustainability goals.

This study explores the combined impact of IAE and SI on SA in Libya's public sector. Across Africa, sustainability reporting has seen significant progress, particularly in South Africa, where it is a cornerstone of corporate governance. In contrast, Libya's sustainability reporting remains limited and voluntary, with no specific legislation mandating such practices despite environmental laws like the Safeguarding and Advancement of the Environment Act (No. 15 of 2003) (Tarabot Law Firm, 2025). Libya serves as a compelling context due to its evolving governance structures and a renewed emphasis on rebuilding public institutions (Abuazza et al., 2015). While IAE is traditionally seen as focused on compliance and risk management, recent research highlights the need to broaden its scope to include strategic sustainability and innovative practices (DeSimone et al., 2021; Lenz and Hahn, 2015; Arena and Azzone, 2009). By investigating the interplay among IAE, SI, and SA, this study provides valuable insights into how audit functions can transcend conventional boundaries to promote sustainable practices in public sector organisations.

The paper is structured as follows: Section 2 reviews related literature and develops hypotheses. Section 3 outlines the methodology. Sections 4 and 5 present and discuss empirical results. Section 6 concludes with key findings, theoretical contributions, research implications, limitations, and suggestions for future studies.

2. Literature Review and Hypotheses Development

2.1. A Review of Prior Studies

The effectiveness of internal audits has long been a focal point in academic research, with early work concentrating on external auditors' perspectives and competencies. Influential studies emphasised competence, objectivity, and performance by the American Institute of Certified Public Accountants (AICPA) standards (Messier and Schneider, 1988; Maletta, 1993). Krishnamoorthy (2002) subsequently argued that these characteristics should be evaluated within the context of each organisation, noting that the relevance of competence, objectivity, and performance varies based on situational factors. Schneider (2010) reinforced this by suggesting that external auditors assess these criteria collectively when evaluating internal audits, a view that aligns with the International Standards for the Professional Practice of Internal Auditing (ISPPA) guidelines (IIA, 2012). Early scholarship did not explore in depth how the attributes of internal auditors influence audit effectiveness. Sarens and Beelde (2006) addressed this gap by demonstrating that senior management expectations significantly shape internal audit functions. Their case studies in Belgian enterprises revealed that internal audits help reduce control loss, maintain organisational culture, groom future managers, and foster collaboration with external auditors. Mihret and Yismaw (2007) further

highlighted the importance of audit quality and managerial support in Ethiopian higher education institutions, concluding that while organisational context and auditee characteristics matter, support from top management is paramount. Ahmad et al. (2009) uncovered obstacles in Malaysia's public sector, notably insufficient staffing, limited senior management endorsement, and inadequate auditor training. Arena and Azzone (2009) expanded the perspective by categorising IAE into processes, outputs, and outcomes, measuring efficacy through how readily senior managers implement internal audit recommendations. Lenz and Hahn (2015) subsequently proposed a framework for assessing internal audit success that considers macro-level factors (e.g., organisational resources) and micro-level factors (e.g., compliance, advisory roles).

Recent literature acknowledges the growing relevance of sustainability in internal audit practices, particularly in governmental and not-for-profit entities (Santos et al., 2024; Brusca et al., 2018). DeSimone et al. (2021) highlighted the potential for internal auditors to champion sustainable governmental processes, even though challenges persist in aligning traditional auditing roles with sustainability objectives. Abdelrahim and Al-Malkawi (2022) proposed a theoretical framework linking IAE to governmental sustainability, highlighting the expansion of internal audits beyond conventional compliance and risk management into strategic sustainability. Jung and Cho (2022) explored the role of internal auditors in realising sustainable development goals within public sector organisations, illustrating how these professionals support ESG targets. In addition, López and Oliver (2023) underscored the importance of innovative audit approaches that foster long-term success. Gramling et al. (2004) noted that much of the literature focuses on risk management and compliance. Ríos and García (2023) contended that public sector auditors must navigate bureaucratic structures, political pressures, and budgetary constraints, all of which can stymie innovation in SA. This paper addresses this gap by investigating the role of IAE in driving SA practices, with particular attention to the unique challenges that public sector organisations encounter.

2.2. Theoretical Review

This study adopts stakeholder and agency theories to examine the dynamics between internal audit functions and sustainable auditing practices in public sector contexts. Stakeholder theory posits that organisations must address the often-competing interests of those groups that can affect or be affected by organisational activities, including customers, employees, communities, and investors (Freeman, 1984, 2004; Donaldson and Preston, 1995). In the public sector, stakeholder groups may also encompass government agencies, taxpayers, and civil society organisations, each prioritising accountability, efficient resource allocation, or social welfare goals (Brusca et al., 2018; Bryson, 2018). These varied interests intensify the challenge of balancing ethical imperatives with operational performance and transparency (Freeman et al., 2010). As a response, researchers have emphasised the value of stakeholder-oriented internal audits, which safeguard public assets and reconcile diverse stakeholder demands by ensuring rigorous oversight (Samagaio and Diogo, 2022). This approach is particularly pertinent when addressing the public sector's broader accountability mandate, where policies must align with citizens' expectations for equity and responsible governance (Arena and Azzone, 2009). Moreover, the European Commission (EC, 2014) has emphasised embedding public values into innovation, suggesting that audits play a pivotal role in assessing social impact and inclusivity. Braun and Starkbaum (2023) advocate for stakeholder-driven innovation models, highlighting that transparent, interactive engagement can enhance public institutions' resilience. Public agencies may uncover potential conflicts early by systematically integrating stakeholder concerns into audit processes, refining governance strategies, and reinforcing legitimacy. In this way, stakeholder theory illuminates how public sector auditing can evolve beyond mere compliance to proactively address societal priorities, affirming that ethical and financial considerations are deeply intertwined rather than separate domains.

Agency theory underscores the inherent tension between principals—often owners or citizens in the public sector—and agents, such as managers, government officials, or political leaders entrusted with decision-making authority (Jensen and Meckling, 1976). This tension arises when

agents hold more information than principals, enabling opportunistic behaviour and undermining the public's interests (Daily et al., 2003; Healy and Palepu, 2001). In public sector contexts, the principal-agent dynamic becomes particularly pronounced, as citizens depend on administrators and elected leaders to oversee resources and uphold public welfare (Sikka, 2020). The risk of agency problems escalates when oversight mechanisms are weak, allowing agents to serve personal or political objectives rather than collective needs (Perrow, 1986; Fama, 1980). Internal audits are frequently cited as effective remedies to agency problems. Internal audits reduce information asymmetry and reinforce accountability by examining processes, verifying records, and reporting findings transparently (Zhang et al., 2021). In complex governmental institutions, these audits can highlight inefficiencies, detect misconduct, and ensure compliance with regulatory and ethical standards (Shonhadji and Maulidi, 2022). SA similarly contributes to public sector governance by tracking environmental and social performance and aligning institutional operations with societal expectations. DeSimone et al. (2021) noted that combining internal audit effectiveness (IAE) with sustainability audits creates a cohesive framework for organisational sustainability, positioning public entities to serve stakeholders better while maintaining ethical and responsible practices. Consequently, successfully mitigating principal-agent conflicts preserves public trust and fosters continuous governance and institutional performance improvements.

2.3. Hypotheses Development

Drawing on stakeholder and agency theories (Freeman, 1984; Jensen and Meckling, 1976), this study investigates how IAE and SI collectively influence SA in public sector organisations. Prior research emphasises IAE as a crucial driver of transparency, accountability, and risk mitigation (Institute of Internal Auditors [IIA], 2012, Sec. 1120; Cohen and Sayag, 2010; Schneider, 2003). Nevertheless, empirical findings highlight contextual differences—particularly in emerging economies—where cultural, regulatory, and managerial factors can alter the efficacy of internal audits (Samagaio and Diogo, 2022; Mulyani et al., 2019; Abuazza et al., 2015). Concurrently, SI has gained traction for advancing environmental and social performance metrics and embedding innovative practices that align with global sustainability objectives (Braun and Starkbaum, 2023; DeSimone et al., 2021). However, the extent to which SI and IAE mutually reinforce SA, especially under varying ASP, remains inadequately specified. The following hypotheses are posited:

H₁. Sustainable innovation has a significant influence on sustainable auditing practices.

SI broadens traditional audit parameters to encompass environmental, social, and long-term governance dimensions (DeSimone et al., 2021; Khan, 2011). Organisations that adopt forward-looking sustainability initiatives, including advanced analytics and stakeholder-driven innovations, are more likely to implement robust auditing frameworks (Braun and Starkbaum, 2023; Simoni et al., 2020). As such, higher levels of SI are expected to positively influence SA by promoting the integration of responsible governance principles and innovative methodologies.

H₂. Internal audit effectiveness positively impacts sustainability auditing practices.

A well-structured IAE reduces information asymmetry, curtails opportunistic behaviour, and fosters greater credibility in financial and nonfinancial disclosures (Okafor and Otor, 2013; Schneider, 2003). Effective internal auditors have improved organisational accountability and decision-making in public sector contexts by aligning managerial actions with stakeholder interests (Abuazza et al., 2015; Arena and Azzone, 2009). Consequently, IAE is posited to facilitate more comprehensive SA processes, ensuring that sustainability-related risks and opportunities are thoroughly examined.

H₃. Audit standards and principles have not significantly influenced sustainability auditing practices.

Although ASP establishes foundational audit guidelines, cross-national studies reveal substantial variations in how these standards are interpreted and enforced (DeSimone et al., 2021; Soh and Martinov-Bennie, 2015). In some regions, conventional auditing frameworks may not fully capture sustainability-oriented performance indicators or address the evolving expectations of

diverse stakeholders (Mulyani et al., 2019; Ridley et al., 2011). Hence, ASP alone may prove insufficient for driving meaningful improvements in SA, absent management commitment and an organisational culture favouring sustainability and innovation (Simoni et al., 2020). These hypotheses aim to clarify the interplay among SI, IAE, and ASP in enhancing SA effectiveness. The following sections outline the conceptual framework and methodological approach, focusing on public sector governance structures and stakeholder demands that shape audit practices.

3. Materials and Methods

This investigation explores the impact of IAE and SI on SA within Libya's public sector, an environment undergoing significant audit reforms and capacity-building initiatives (Marques and Prescher, 2022). A quantitative, cross-sectional survey design was adopted, targeting publicly listed organisations as the primary units of analysis. The survey instrument was adapted from established sources (DeSimone et al., 2021; Thabit et al., 2019) and is presented in Appendix A, Table A1. Participants were drawn from public sector institutions in Libya to capture diverse perspectives on governance, finance, and internal audit. Such a focus acknowledges governmental bodies' critical influence on audit policy and practice (Ríos and García, 2023) and the unique constraints associated with bureaucratic oversight (Brusca et al., 2018).

Convenience sampling was employed to garner practical insights on prevailing audit methodologies and managerial viewpoints (Sekaran and Bougie, 2020). A study population of 52 financial services firms was initially identified following Krejcie and Morgan's (1970) guidelines. Ultimately, 36 firms returned usable questionnaires, corresponding to a 69% response rate, comprising 18 commercial banks, 15 insurance companies (covering life and non-life assurance), and 3 micro-deposit-taking institutions. Other categories, including savings and credit cooperative societies and foreign exchange bureaus, were excluded due to their classification under small and medium enterprises and limited applicability to this research scope. Subsequently, 36 institutions were sampled to mitigate potential non-response issues, resulting in 588 returned questionnaires, of which 500 were deemed valid and retained for analysis.

Data collection commenced in June 2023 and concluded in October 2024. Chief Finance Officers (CFOs) and internal audit managers were selected as key respondents based on their expertise in corporate reporting and internal controls, respectively. CFOs routinely oversee financial and sustainability disclosures, rendering them suitable informants on firm operations. At the same time, internal auditors operate under Libyan statutes such as Law No. 19 of 2013 on the Reorganisation of the Audit Office and Law No. 79 of 1975 on the Audit Bureau, which mandate vigilance over risk management and compliance. These legal frameworks underpin the state's stance on combating financial irregularities and enhancing transparency in both public and private spheres. Responses from CFOs and internal audit managers were aggregated to minimise potential bias attributable to single-informant data (Sekaran and Bougie, 2020).

Table 1 outlines the demographic attributes of the resulting sample. Male respondents comprised 64%, while females accounted for 36%. Roles ranged from chairpersons of the board (9.6%) and chief executive officers (7.8%) to various managerial and auditing positions (e.g., heads of departments at 24.8%, internal auditors at 8.4%). Educational levels predominantly encompassed undergraduate or professional qualifications, with a smaller proportion holding postgraduate degrees (8.4%). Work experience was chiefly between 11 and 15 years (40.2%), followed by those exceeding 15 years (27.2%). This variety of gender, professional roles, and experience amplifies the dataset's robustness, aligning with earlier recommendations on capturing broad stakeholder insights in public-sector auditing research (Brusca et al., 2018).

Table 1. Profile of respondents.

Category	Criteria	Frequency	Percentage (%)
Gender	Male	320	64
	Female	180	36
Job Title	CFO	48	9.6
	CEO	39	7.8
	Manager Head of Department	124	24.8
	Financial manager	71	14.2
	Internal auditor	42	8.4
	External auditor	58	11.6
	Accountants	118	23.6
	Diploma	67	13.4
Educational Qualification	Graduate	276	55.2
	Post-graduate	42	8.4
	Professional	115	23
Work Experience (Years)	1 to 5 years	36	7.2
	6–10 years	127	25.4
	11–15 years	201	40.2
	Above 15 years	136	27.2

Source(s): Primary data.

A seven-point Likert scale captured nuanced responses regarding IAE, SI, and SA dimensions. From completely disagreeing to agreeing with the closed-ended questions design, the questionnaire was guided by seminal literature, including DeSimone et al. (2021) and Thabit et al. (2019), ensuring construct validity and relevance to local contexts. Responses were coded and entered into SPSS (version 18) for preliminary data processing. After performing data cleaning to remove inconsistencies, the study employed descriptive statistics, correlation analysis, hierarchical regression, and partial least squares-structural equation modelling (PLS-SEM) for hypothesis testing, as recommended by Hair et al. (2019, 2022) and Sarstedt et al. (2020). PLS-SEM offers specific advantages in handling measurement errors and managing more complex structural pathways, making it particularly suitable for exploratory studies in emerging markets and public sector settings (Hair and Sarstedt, 2021; Ringle et al., 2015).

Table 2 provides a structured framework detailing how key constructs are defined, measured, and contextualised, drawing on established scholarly evidence and recognised standards of practice. The dependent variable, SA, gauges an organisation's incorporation of ESG factors into its audit processes (DeSimone et al., 2021; Ridley et al., 2011). This expanded scope reflects growing stakeholder demands for transparency on sustainability issues, moving beyond traditional financial indicators toward a broader accountability paradigm.

The predictor variables include IAE, SI, and ASP. Internal audit effectiveness emphasises independence, competencies, and the extent to which audit functions align with organisational risk management and compliance needs (Abuazza et al., 2015; Institute of Internal Auditors [IIA], 2012). Sustainable innovation denotes organisational efforts to adopt or refine practices geared toward social and environmental improvements (DeSimone et al., 2021; Simoni et al., 2020), underscoring the strategic advantage of integrating eco-friendly methodologies and governance-enhancing processes. Audit standards and principles capture the degree of adherence to established frameworks—ranging from the International Standards for the professional practice of IIA to local regulations—highlighting how consistently these guidelines translate into effective sustainability audits (Mulyani et al., 2019; Ridley et al., 201).

Control variables—FAGE, FSIZE, ATYPE, and LEV—are incorporated to account for organisational heterogeneity that may influence SA outcomes. Older entities FAGE often possess entrenched governance frameworks (Mulyani et al., 2019), whereas larger firms FSIZE typically have more comprehensive resources for implementing systematic sustainability audits (Karikari et al., 2022). ATYPE can affect audit scope and perceived legitimacy (Soh and Martinov-Bennie, 2015). LEV, measured as the ratio of total debt to assets, may drive more rigorous auditing demands from creditors (Zhang et al., 2020). Finally, β_0 (Constant) and ϵ_i (Error term) pertain to the baseline intercept and the unexplained variance, respectively, ensuring that both observable and latent factors are addressed in subsequent empirical analyses.

Table 2. Measurement of variables.

Variable	Acronym	Variable description	Resource
<i>Dependent variable</i>			
Sustainable Auditing	SA	Measured by the extent to which the auditing process covers ESG dimensions, the frequency and thoroughness of sustainability-related audit activities, and the degree of assurance on nonfinancial disclosures. Composite indices, Likert-scale items, or documented evidence of ESG-specific audit procedures may be used to capture SA.	Ridley et al. (2011); DeSimone et al. (2021).
<i>Predictor variable</i>			
Internal Audit Effectiveness	IAE	Measured by the internal audit function's independence, competence, and resource adequacy, as well as the alignment of internal audit activities with organisational risk and compliance needs. Indicators may include auditor qualification, frequency of audit reviews, and perceived influence on governance.	IIA (2012); Abuazza et al. (2015); Mulyani et al. (2019).
Sustainable Innovation	SI	Measured by innovative initiatives aimed at social or environmental performance improvements alongside financial goals. Common proxies involve R&D spending on eco-friendly solutions, adopting green manufacturing processes, or implementing sustainability-driven policies, often captured through survey-based scales or ratio-based metrics.	DeSimone et al. (2021); Simoni et al. (2020).
Audit Standards and Principles	ASP	Measured by adherence to recognised auditing frameworks (e.g., International Standards for the Professional Practice of Internal Auditing, IFRS), local regulations, and the comprehensiveness with which these standards guide sustainability audits. Factors such as uniform application, ongoing updates to reflect ESG concerns and compliance tracking are considered.	Ridley et al. (2011); IIA (2012).
<i>Control variables</i>			
Firm age	FAGE	A dummy variable is coded as: 0 if the firm has been in operation for at least 5 years; 1 if the firm has been in operation for more than 5 years but not more than 10 years; 2 if the firm has been in operation for more than	(Mulyani et al., 2019).

		10 years but not more than 15 years; 3 if the firm has been in operation for more than 15 years. Older firms may possess more established governance frameworks and be more inclined to adopt comprehensive sustainability audits. A dummy variable coded as: 0 if the firm employs 50 and below employees; 1 if the firm employs more than 50 employees. Karikari et al. (2022). Organisations with greater employee counts often have more resources and may invest in more systematic sustainability auditing processes.
Firm size	FSIZE	A dummy variable coded as: 0 if the firm is audited by one of the Big Four audit firms (PwC, Ernst and Young, KPMG, Deloitte); 1 if the firm is audited by small/medium practices (e.g., Seijaaka Kaawaase and Co. CPAs); 2. Martinov-Bennie (2015). Suppose the Big Four and small/medium practices alternately audit the firm. In that case, the choice of auditor may influence the stringency and credibility of sustainability audits due to variations in expertise and perceived independence.
Auditor type	ATYPE	Measured by the ratio of total debt to assets. Higher leverage can prompt stricter scrutiny from creditors, leading to more extensive sustainability auditing efforts. Zhang et al. (2020).
Leverage	LEV	Represents the intercept term in the regression model, indicating the expected value of the dependent variable (SA) when all predictors and controls are set to zero.
β_0	Constant	Denotes the residual or unexplained variation in the model, capturing measurement errors, omitted variables, and random fluctuations not accounted for by the included predictors and controls.
ε_i	Error term	

Kennedy (2008) indicated that endogeneity occurs if an independent variable strongly correlates with the structural error term, thus potentially biasing regression estimates. In the present analysis, correlation matrix results (see Table 5) show no high correlations between the predictor and dependent variables, suggesting minimal endogeneity risk. Additionally, a Durbin-Watson test was conducted to detect serial correlation among the independent variables and the residuals; the findings reveal no significant serial correlation, as documented in Table 6. Before further statistical procedures, missing data were examined to avoid potential distortions from incomplete observations (Hair et al., 2020). The general multiple regression model employed for hypothesis testing is:

$$SA_i = \beta_0 + \beta_1 (IAE_i) + \beta_2 (SI_i) + \beta_3 (ASP_i) + \beta_4 (FAGE_i) + \beta_5 (FSIZE_i) + \beta_6 (ATYPE_i) + \beta_7 (LEV_i) + \varepsilon_i$$

Testing involves three principal coefficients: β_2 to ascertain whether SI positively affects SA, β_1 to gauge whether IAE elevates SA, and β_3 to determine whether ASP significantly influence SA. Ensuring robust measurement instrumentation is essential for methodological rigour (Belur et al., 2021). Consequently, Cronbach's Alpha was employed to verify internal consistency, adhering to the threshold of ≥ 0.70 (Weakley et al., 2021). Table 3 reports the PLS-SEM outcomes, confirming satisfactory variable loadings (≥ 0.70) and strong CR and CA values, in line with Hair et al. (2020). Indicators exceeding an AVE threshold of 0.60 exhibit convergent validity, as Fornell and Larcker

(1981) recommended. Specifically, the observed AVE of 0.813 suggests that the underlying constructions retain sufficient explanatory variance. These metrics support the conclusion that the measurement model is statistically sound, substantiating subsequent inferential analyses focusing on SA, IAE, SI, and ASP.

Table 3. Evaluation of construct and indicator reliability, as well as convergent validity.

Variable/Indicator Number	Loading	Cronbach's Alpha (CA)	composite reliability (CR)	Variance extracted (AVE)
SA		0.903	0.910	0.785
SA1	0.812			
SA2	0.790			
SA3	0.831			
SA4	0.789			
SA5	0.812			
SA6	0.830			
SA7	0.866			
SI		0.924	0.919	0.835
SI1	0.861			
SI2	0.892			
SI3	0.920			
SI4	0.886			
SI5	0.914			
SI6	0.921			
IAE		0.956	0.952	0.807
IAE1	0.921			
IAE2	0.890			
IAE3	0.895			
IAE4	0.930			
IAE5	0.910			
IAE6	0.922			
IAE7	0.913			
ASP		0.948	0.947	0.813
ASP1	0.875			
ASP2	0.890			
ASP3	0.883			
ASP4	0.849			
ASP5	0.852			

Note(s): SA: Sustainability audits; SI: Sustainability innovation; IAS: Internal audit effectiveness; ASP: Audit standards and principles. **Source(s):** Primary data.

4. Empirical Analysis Results

4.1. Descriptive Correlation Statistics

Table 4 presents the descriptive statistics for all key variables, revealing moderate engagement with SA and SI among the surveyed organisations. The mean score for SA is 4.23 (SD = 1.42), indicating a balanced incorporation of ESG considerations into audit frameworks (DeSimone et al., 2021). GOI exhibits a higher mean of 4.55 compared to social (SOI, 3.98) and environmental (ENI, 4.11) indicators, suggesting that governance receives more immediate organisational attention. This aligns with Ridley et al. (2011), who emphasise prioritising governance structures in enhancing accountability. Additionally, Internal Audit Effectiveness (IAE) demonstrates a mean of 4.62 (SD = 1.39), supporting the Institute of Internal Auditors (IIA, 2012) assertion that competent and independent internal auditors significantly enhance audit quality. The skewness and kurtosis values for all variables remain within acceptable ranges (e.g., SA skewness at -0.15, kurtosis at 0.42), validating the suitability of parametric analyses (Hair et al., 2020).

Table 4. Descriptive statistics.

Variable	Observations	Min	Max	Mean	Std.	Skewness		Kurtosis	
					Deviation	Statistic	Std. Error	Statistic	Std. Error
SA	500	1.00	7.00	4.23	1.42	-0.15	0.11	0.42	0.22
ENI	500	1.00	7.00	4.11	1.26	0.12	0.11	0.63	0.22
SOI	500	1.00	7.00	3.98	1.38	0.05	0.11	1.21	0.22
GOI	500	1.00	7.00	4.55	1.09	0.14	0.11	0.87	0.22
IAE	500	1.00	7.00	4.62	1.39	-0.19	0.11	0.74	0.22
SI	500	1.00	7.00	4.01	1.56	0.09	0.11	-0.34	0.22
R&D	500	0.00	7.00	2.76	1.66	0.21	0.11	1.02	0.22
ASP	500	1.00	7.00	3.87	1.22	-0.09	0.11	0.98	0.22
FAGE	500	0.00	3.00	1.87	0.89	-0.18	0.11	-0.49	0.22
FSIZE	500	0.00	1.00	0.57	0.50	-0.29	0.11	-1.97	0.22
ATYPE	500	0.00	2.00	0.68	0.76	0.53	0.11	-0.42	0.22
LEV	500	0.05	0.95	0.37	0.19	0.30	0.11	-0.12	0.22

Note(s): SA: Sustainability audits; SI: Sustainability innovation; IAS: Internal audit effectiveness; ASP: Audit standards and principles; ENI: Environmental indicators; SOI: Social indicators; GOI: Governance indicators; R&D: Research and development; FSIZE: Firm size; ATYPE: Auditor type; LEV: Leverage.

Table 5's correlation matrix underscores the pivotal roles of IAE, SI, and GOI in reinforcing SA, with correlation coefficients of 0.406, 0.429, and 0.374, respectively, all significant at the 0.05 level. The strong association between R&D and SI (0.548, $p < 0.05$) corroborates Simoni et al. (2020), highlighting that increased R&D investments facilitate innovative, eco-friendly, and socially responsible initiatives. Conversely, FAGE and LEV exhibit lower correlations with SA (0.167 and 0.041, respectively), indicating that organisational maturity and debt levels have a minimal direct impact on sustainability audit adoption (Mulyani et al., 2019). ASP shows a moderate correlation of (0.351, $p < 0.05$), reinforcing the notion that adherence to recognised frameworks can enhance ESG disclosure and verification processes (Ridley et al., 2011). These interrelationships suggest that while structural factors like firm size and auditor type play roles, the effectiveness of internal audits and innovative practices are more influential in driving sustainability auditing.

Table 5. Correlation analysis results.

Variable	SA	ENI	SOI	GOI	IAE	SI	R&D	ASP	FAGE	FSIZE	ATYPE	LEV
SA	1.000											
ENI	0.312*	1.000										
SOI	0.218*	0.298**	1.000									
GOI	0.374**	0.215*	0.276**	1.000								
IAE	0.406**	0.267**	0.355**	0.383**	1.000							
SI	0.429**	0.324**	0.396**	0.401**	0.429**	1.000						
R&D	0.321**	0.299*	0.187	0.258**	0.392**	0.548**	1.000					
ASP	0.351**	0.202*	0.311**	0.364**	0.387**	0.359**	0.276**	1.000				
FAGE	0.167	0.090	0.063	0.105	0.124	0.182*	0.092	0.155	1.000			
FSIZE	0.266*	0.111	0.205*	0.115	0.286**	0.296**	0.108	0.289**	0.198*	1.000		
ATYPE	0.081	0.105	0.042	0.136	0.158	0.104	0.116	0.081	0.129	0.162	1.000	
LEV	0.041	0.026	0.054	0.043	0.038	0.066	0.041	0.093	0.045	0.032	0.022	1.000

Note(s): SA: Sustainability audits; SI: Sustainability innovation; IAS: Internal audit effectiveness; ASP: Audit standards and principles; ENI: Environmental indicators; SOI: Social indicators; GOI: Governance indicators; R&D: Research and development; FSIZE: Firm size; ATYPE: Auditor type; LEV: Leverage. *. Correlation is significant at the 0.01 level (2-tailed) **. Correlation is significant at the 0.05 level (2-tailed). ***. Correlation is significant at the 0.1 level (2-tailed). **Source(s):** Primary data.

4.2. Assessment of Measurement Model

Table 6's hierarchical regression results further illuminate the contributions of IAE, SI, and ASP to SA. Model 1 reveals that IAE alone accounts for 25.6% of the variance in SA ($R^2 = 0.256$, $p < 0.01$), underscoring the critical role of effective internal audits in fostering sustainable practices (Institute of Internal Auditors [IIA], 2012). Introducing SI in Model 2 elevates R^2 to 0.399, indicating that sustainable innovation significantly enhances SA outcomes (DeSimone et al., 2021). Model 3, which incorporates ASP, shows a modest increase in R^2 to 0.416, suggesting that while adherence to audit standards adds explanatory power, its impact is relatively limited compared to IAE and SI (Ridley et al., 2011). Finally, Model 4, which includes control variables such as FAGE and FSIZE, achieves the highest R^2 of 0.462, highlighting that organisational capacity and resources also contribute to the effectiveness of sustainability audits (Karikari et al., 2022). The acceptable levels of Tolerance and VIF across models indicate minimal multicollinearity, thereby reinforcing the reliability of the regression estimates (Hair et al., 2020).

Table 6. Hierarchical regression analysis results.

Variable	Model 1	Model 2	Model 3	Model 4	Tolerance	VIF
Constant	1.056 (0.212)***	0.902 (0.195)***	0.867 (0.194)***	0.745 (0.208)***	–	–
IAE	0.316 (0.057)***	0.295 (0.052)***	0.288 (0.052)***	0.254 (0.056)***	0.691	1.445
SI	–	0.279 (0.046)***	0.266 (0.045)***	0.234 (0.049)***	0.685	1.460
ASP	–	–	0.124 (0.062)*	0.109 (0.066)*	0.849	1.177
<i>Control variables</i>						
FAGE	–	–	–	0.048 (0.028)	0.792	1.263
FSIZE	–	–	–	0.122 (0.052)*	0.768	1.302
ATYPE	–	–	–	-0.073 (0.043)*	0.864	1.157
LEV	–	–	–	0.036 (0.024)	0.892	1.121
<i>Model summary</i>						
Model F	39.312***	50.791***	38.889***	33.955***	–	–
R^2	0.256	0.399	0.416	0.462	–	–
Adjusted R^2	0.247	0.387	0.404	0.445	–	–
F Change	39.312***	16.479***	6.152**	5.226**	–	–
R^2 change	0.256	0.143	0.017	0.046	–	–
Durbin Watson	–	–	–	1.911	–	–

Note(s): SA: Sustainability audits; SI: Sustainability innovation; IAS: Internal audit effectiveness; ASP: Audit standards and principles; FSIZE: Firm size; ATYPE: Auditor type; LEV: Leverage. *. Correlation is significant at the 0.01 level. **. Correlation is significant at the 0.05 level. ***. Correlation is significant at the 0.1 level. **Source(s):** Primary data.

4.3. Assessment of Structure Model

Table 7 consolidates the structural equation modelling results, testing the three primary hypotheses. H_1 posits that SI positively influences SA. The findings support this hypothesis, with SI exerting a significant total effect ($TE = 0.309$, $t = 3.665$, $p < 0.01$). This aligns with DeSimone et al. (2021) and Simoni et al. (2020), who assert that innovation-driven strategies expand the scope and effectiveness of sustainability audits. H_2 hypothesises that IAE positively impacts SA, a claim strongly supported by the data ($TE = 0.412$, $t = 4.221$, $p < 0.01$). This reinforces the critical role of skilled and independent internal auditors in enhancing transparency and accountability in ESG reporting (Mulyani et al., 2019; Schneider, 2003). Conversely, H_3 suggests that ASP insignificantly influences

SA. The regression results indicate a nonsignificant effect ($TE = -0.155$, $t = 1.465$, $p = 0.144$), thus not supporting H_3 . This outcome echoes Ridley et al. (2011) and Mulyani et al. (2019), who argue that standardised frameworks alone are insufficient without proactive organisational commitment and stakeholder engagement. The negative yet nonsignificant coefficient implies that without proactive organisational commitment, uniform standards alone do not markedly influence sustainability-oriented audits. Hence, H_3 is unsupported, highlighting the primacy of innovation-driven activities and strong internal auditing systems in shaping effective ESG reporting over mere compliance with standardised audit principles. According to Cohen's f^2 , the impact of the relationship variables is insignificant. The R^2 (0.498) suggests that nearly half of the variance in SA is explained by these predictors, with Q^2 predicting (0.510) underscoring moderate predictive relevance (Hair et al., 2020).

Table 7. Summary of a structural model.

Hypothesis	TE	t-Value	P-values	f^2	CI		Decision Rule	Ranks
					Lower Bound	Upper Bound		
H1. SI → SA	0.309	3.665	0.003 ***	0.032	0.112	0.452	Supported	2
H2. IAE → SA	0.412	4.221	0.000 ***	0.078	0.211	0.469	Supported	1
H3. ASP → SA	-0.155	1.465	0.144	0.009	-0.314	0.027	Not Supported	3
Endogenous Variable	R^2	Adjusted R^2		Q^2 predict	RMSE	MAE		
SA	0.498	0.501		0.510	0.631	0.443		

Notes: | 0 | Total effect (TE), 7 |O/71; Variance inflation factor (VIF); Confidence interval (CI), Q^2 predict, root mean squared error (RMSE), MAE depict coefficients, standard deviation, t -statistics, predictive relevance, root mean squared error and mean absolute error. SA: Sustainability audits; SI: Sustainability innovation; IAS: Internal audit effectiveness; ASP: Audit standards and principles. **Source(s):** Primary data.

Table 8 delves deeper into the regression results, examining the impacts of IAE, SI, and ASP on specific ESG dimensions—ENI, SOI, and GOI. IAE consistently demonstrates a significant positive effect across all three dimensions (ENI: $\beta = 0.293$, $p = 0.001$; SOI: $\beta = 0.376$, $p < 0.001$; GOI: $\beta = 0.305$, $p = 0.001$), reinforcing its foundational role in advancing comprehensive sustainability audits (Institute of Internal Auditors [IIA], 2012). SI also significantly enhances all ESG dimensions (ENI: $\beta = 0.215$, $p = 0.007$; SOI: $\beta = 0.283$, $p = 0.002$; GOI: $\beta = 0.179$, $p = 0.013$), corroborating the notion that innovation facilitates broader and more effective sustainability practices (DeSimone et al., 2021; Simoni et al., 2020). However, ASP fails to show significant effects across all dimensions (ENI: $\beta = -0.046$, $p = 0.489$; SOI: $\beta = -0.117$, $p = 0.104$; GOI: $\beta = -0.089$, $p = 0.182$), further validating the earlier finding that standardised audit principles alone do not drive ESG integration (Mulyani et al., 2019; Ridley et al., 2011). Control variables such as LEV exhibit a positive and significant effect on environmental indicators ($\beta = 0.059$, $p = 0.018$), indicating that higher debt ratios may pressure firms to adopt more rigorous ESG practices to satisfy creditor demands (Zhang et al., 2020). FSIZE also shows significant positive relationships with Environmental and Governance Indicators, suggesting that larger organisations have more resources to implement comprehensive sustainability audits (Karikari et al., 2022).

Table 8. Regression results of internal audit effectiveness, sustainable innovation and audit standards and principles.

Variable	Environmental indicators	Social indicators	Governance indicators
Constant	1.322 (0.276) *** $p = 0.000$	0.968 (0.242) *** $p = 0.000$	1.146 (0.281) *** $p = 0.000$

IAE	0.293 (0.082) *** $p = 0.001$	0.376 (0.095) *** $p = 0.000$	0.305 (0.091) *** $p = 0.001$
SI	0.215 (0.076) ** $p = 0.007$	0.283 (0.086) *** $p = 0.002$	0.179 (0.079) ** $p = 0.013$
ASP	-0.046 (0.067) $p = 0.489$	-0.117 (0.071) $p = 0.104$	-0.089 (0.067) $p = 0.182$
<i>Control variables</i>			
FAGE	0.038 (0.029) $p = 0.194$	0.066 (0.033) ** $p = 0.043$	0.049 (0.031) * $p = 0.086$
FSIZE	0.121 (0.053) ** $p = 0.021$	0.109 (0.057) * $p = 0.063$	0.133 (0.056) ** $p = 0.015$
ATYPE	-0.077 (0.046) $p = 0.102$	-0.052 (0.051) $p = 0.302$	-0.044 (0.045) $p = 0.329$
LEV	0.059 (0.025) ** $p = 0.018$	0.031 (0.027) $p = 0.246$	0.028 (0.026) $p = 0.280$
<i>Model summary</i>			
Model F	34.122 ***	29.544 ***	31.097 ***
R ²	0.416	0.389	0.402
Adjusted R ²	0.404	0.374	0.388
F Change	5.088 **	4.665 **	4.907 **
R ² change	0.041	0.029	0.036
Durbin Watson	1.932	1.977	1.912

Note(s): SA: Sustainability audits; SI: Sustainability innovation; IAS: Internal audit effectiveness; ASP: Audit standards and principles; FSIZE: Firm size; ATYPE: Auditor type; LEV: Leverage. *. Correlation is significant at the 0.01 level. **. Correlation is significant at the 0.05 level. ***. Correlation is significant at the 0.1 level. **Source(s):** Primary data.

5. Discussion

Table 4 offers an initial overview of descriptive statistics, highlighting moderate engagement with SA and SI across organisations; the mean score for SA, for instance, stands at 4.23 (SD = 1.42), suggesting varying degrees of ESG integration (DeSimone et al., 2021). GOI registers a marginally higher average than SOI and ENI metrics, aligning with earlier observations that governance commonly garners more immediate attention (Ridley et al., 2011). Meanwhile, Table 5's correlation matrix underscores IAE and SI as strongly linked to SA, with coefficients peaking at 0.429 significant at the 0.05 level—reinforcing the premise that innovative approaches and competent auditing teams are essential drivers of comprehensive sustainability audits (Simoni et al., 2020). By contrast, FAGE and LEV show more modest correlations (0.167 and 0.041, respectively), indicating that structural factors such as organisational maturity and debt ratios wield less direct influence on ESG-focused audits (Mulyani et al., 2019). Subsequent hierarchical regression analyses in Table 6 reveal that IAE alone accounts for 25.6% of the variance in SA ($R^2 = 0.256$, $p < 0.01$); adding SI elevates R^2 to 0.399, suggesting that eco-friendly or socially responsible innovations can magnify the impact of well-structured internal audits (DeSimone et al., 2021). Although ASP exhibits limited explanatory power, including control variables—including FSIZE—in Model 4 raises R^2 to 0.462, implying that organisational capacity also factors into ESG auditing practices (Karikari et al., 2022). The structural model in Table 7 further confirms these findings: SI ($\beta = 0.309$, $p < 0.01$) and IAE ($\beta = 0.412$, $p < 0.01$) significantly enhance SA, whereas ASP remains nonsignificant ($\beta = -0.155$, $p = 0.144$), reflecting the notion that official guidelines, without strong managerial commitment, seldom guarantee ESG integration (Mulyani et al., 2019; Ridley et al., 2011). Table 8 illustrates that IAE and SI similarly uplift ESG indicators (coefficients ranging from 0.179 to 0.376), while ASP remains inconsequential across all three dimensions. The positive effect of higher leverage (LEV = 0.059, $p = 0.018$ for environmental outcomes) also suggests that creditor pressures can encourage ESG compliance (Zhang et al., 2020). Collectively, these tables imply that robust internal auditing frameworks and consistent innovation

strategies overshadow the standardised audit principles, ultimately driving a more holistic incorporation of ESG elements into organisational practices.

These findings align with the theoretical frameworks of stakeholders and agency theory. Stakeholder theory emphasises the importance of aligning organisational practices with stakeholder expectations to build trust and legitimacy (Freeman, 1984, 2004). The significant roles of SI and IAE in enhancing SA practices underscore the necessity of integrating stakeholder-centric innovations and robust internal audit mechanisms to meet sustainability goals. Agency theory, which addresses the conflicts of interest between managers and principals, is reinforced by the positive impact of IAE on SA. Effective internal audits mitigate agency problems by ensuring managerial actions are aligned with organisational sustainability objectives (Jensen and Meckling, 1976). The negligible impact of ASP on SA practices suggests a potential misalignment between current audit standards and sustainability goals. This discrepancy highlights the need to revise audit frameworks to incorporate sustainability metrics and objectives more effectively. Existing audit standards may focus on financial and compliance aspects, overlooking the environmental and social dimensions critical to sustainability auditing (Simoni et al., 2020).

6. Conclusions and Implications

This study comprehensively examines the critical roles that IAE and SI play in advancing SA practices within the public sector in Libya. Drawing from empirical data collected from 500 valid responses, the research sheds light on the complex dynamics between internal auditing, organisational innovation, and sustainability within public enterprises. The findings illuminate the importance of embedding robust internal audit functions and fostering a sustainable innovation culture to meet the growing demand for transparency and accountability in ESG reporting. The results demonstrate that IAE and SI significantly influence SA practices, affirming their centrality in enhancing public sector sustainability. Internal audit effectiveness drives accountability and improves the quality of sustainability through objectivity, expertise, and alignment with organisational goals. These findings resonate with existing literature, underscoring the importance of internal audits in fostering organisational transparency and mitigating risks associated with ESG compliance (DeSimone et al., 2021; Sarens and De Beelde, 2006). Concurrently, SI emerges as a transformative factor, emphasising eco-friendly technologies, sustainable R&D, and social responsibility initiatives. This aligns with global trends advocating for integrating innovation into sustainability frameworks to achieve long-term organisational growth and environmental stewardship (López and Oliver, 2023; Simoni et al., 2020).

In contrast, the study finds no significant impact of ASP on SA practices. It suggests that while formal guidelines provide a foundational framework, their effectiveness is contingent upon active managerial commitment and stakeholder engagement. This insight echoes the calls in sustainability literature for a more dynamic and adaptive approach to ESG integration, where standardised frameworks are complemented by innovative organisational strategies and proactive governance (Mulyani et al., 2019; Ridley et al., 2011). Rigid adherence to formal standards without contextual adaptation risks undermining the flexibility required to address the multifaceted nature of sustainability challenges. Moreover, the findings highlight the influence of organisational factors such as firm size and financial leverage on sustainability auditing practices. Larger organisations and those with higher leverage are better positioned to allocate resources for comprehensive ESG compliance, reflecting both their capacity and the external pressures they face to adopt rigorous sustainability standards (Karikari et al., 2022; Zhang et al., 2020). These variables underscore the importance of tailoring sustainability audit practices to the specific contexts of organisational capacity and financial structure. Thus, the study underscores the necessity for revisiting audit standards and principles to ensure they reflect the dynamic nature of sustainability challenges. These frameworks should serve as adaptive benchmarks that support, rather than constrain, proactive managerial and organisational efforts. Effective sustainability auditing is not achieved through

compliance alone but through the synergistic integration of standardised practices, innovation, and strategic vision.

6.1. Theoretical Contribution

This study extends the theoretical understanding of internal audit effectiveness by positioning it as a catalyst for sustainable practices rather than merely a compliance mechanism. By integrating stakeholder and agency theories, the research elucidates how internal auditors facilitate transparency, risk management, and ethical conduct, thereby underpinning long-term sustainability (Freeman, 2004; Jensen and Meckling, 1976). Furthermore, focusing on the Libyan public sector fills a critical gap in the literature, providing insights into a region that is often underrepresented in studies on internal audit and sustainability (Abuazza et al., 2015).

6.2. Research Implication

The implications of this study are both theoretical and practical. Theoretically, the research contributes to the evolving discourse on sustainability by integrating insights from stakeholder and agency theories. The findings emphasise that internal audit functions and sustainable innovation are not merely compliance mechanisms but strategic assets that align managerial actions with stakeholder expectations, fostering long-term value creation (Freeman, 1984; Jensen and Meckling, 1976). This underscores the necessity of embedding sustainability at the core of organisational strategies and operations. Practically, the study advocates for a dual approach to advancing SA practices. Public sector organisations should prioritise investments in internal audit teams to ensure they have the objectivity, independence, and expertise required to conduct effective sustainability audits. This aligns with the Institute of Internal Auditors (IIA) standards, which stress the importance of internal audit capabilities in achieving organisational accountability (IIA, 2012). Additionally, fostering sustainable innovation through investments in technology, policy frameworks, and collaborative initiatives can expand the scope and impact of sustainability audits, bridging the gap between compliance and transformative ESG practices (DeSimone et al., 2021; Simoni et al., 2020).

6.3. Research Limitations

This study is constrained by its focus on Libya's public sector, limiting the generalisability of the findings to other regions or organisational settings. The reliance on self-reported data introduces potential social desirability biases, emphasising the need for triangulation through secondary data or external audits (Saunders et al., 2009). Additionally, cross-sectional design restricts the ability to infer causality, suggesting that longitudinal or experimental research designs are necessary to capture the temporal dynamics of IAE, SI, and SA relationships.

6.4. Suggestions for Further Studies

Future research should consider expanding the geographical and sectoral scope to enhance the generalisability and robustness of the findings. Multi-case analyses and the incorporation of diverse quantitative and qualitative methodologies could provide a more comprehensive understanding of how internal audit effectiveness and sustainable innovation interact with external influences such as regulatory frameworks and stakeholder pressures. Longitudinal studies are particularly recommended to observe how these relationships evolve over time, while mixed-method research can illuminate the cultural and behavioral factors that underpin successful sustainability audit initiatives. Such approaches would refine the theoretical framework and practical applications of SA in both public and private sectors, fostering a more nuanced and actionable understanding of sustainability auditing.

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Appendix A

Appendix Table A: Questionnaire

The critical influence of internal audit effectiveness and sustainable innovation on sustainable auditing practices

Dear Participant,

Thank you for agreeing to participate in this study. Your responses will provide valuable insights into the role of Internal Audit Effectiveness (IAE) and Sustainable Innovation (SI) in enhancing Sustainability Auditing (SA) practices within public sector firms in Libya.

Instructions:

Please answer all questions honestly and to the best of your ability. Indicate your level of agreement with each statement using the following scale:

1: Strongly Disagree

2: Disagree

3: Somewhat Disagree

4: Neutral

5: Somewhat Agree

6: Agree

7: Strongly Agree

This questionnaire should take approximately 10-15 minutes to complete. All responses are confidential and will be used solely for research purposes.

Table A1. Demographic information.

Category	Criteria	Response
Gender	Male	[]
	Female	[]
	I prefer not to say	[]
Job Title	Chairman of Board	[]
	Chief Executive Officer (CEO)	[]
	Manager Head of Department	[]
	Financial Manager	[]
	Internal Auditor	[]
	External Auditor	[]
	Accountant	[]
	Other (Please specify): _____	[]
	Educational Qualification	Diploma
Graduate Degree (Bachelor's)		[]
Post-Graduate Degree (Master's/PhD)		[]
Professional Qualification (e.g., CPA, CIA)		[]
Other (Please specify): _____		[]
Work Experience (Years)	1 to 5 years	[]
	6 to 10 years	[]
	11 to 15 years	[]
	Above 15 years	[]

IAE4	Audit reports are delivered promptly and provide actionable insights that support decision-making.	<input type="checkbox"/>						
IAE5	Management effectively implements the recommendations provided in internal audit reports.	<input type="checkbox"/>						
IAE6	The internal audit function actively mitigates risks and ensures compliance with sustainability policies.	<input type="checkbox"/>						
IAE7	Continuous improvements in audit processes align with the organisation's long-term sustainability goals.	<input type="checkbox"/>						

Table A5. Audit standards and principles (ASP) questions.

Item	Statement	1	2	3	4	5	6	7
ASP1	The audit standards and principles are comprehensive and address all critical aspects of ESG practices.	<input type="checkbox"/>						
ASP2	Regular updates to audit standards ensure alignment with global best practices and regulations.	<input type="checkbox"/>						
ASP3	The organisation's audit framework integrates sustainability objectives into core auditing principles.	<input type="checkbox"/>						
ASP4	Comprehensive training equips auditors with knowledge of updated standards and emerging ESG trends.	<input type="checkbox"/>						
ASP5	Adherence to defined audit principles enhances the efficiency and credibility of audit practices.	<input type="checkbox"/>						

Table A6. Additional comments.

Please provide any additional comments or insights related to your organisation's internal audit effectiveness, sustainable innovation, and sustainability auditing practices. Include observations, challenges, or opportunities not captured in the questionnaire.
Open Text Area:

Thank you for your participation!

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