From Transparency to Performance: Digital Transformation, Top Management Support, and The Effectiveness of Internal Audit in Indonesian Legally-Autonomous State Universities (PTN-BH)

A Sequential Explanatory Mixed-Methods Study

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Abstract. Internal audit is a cornerstone of governance in Indonesia's legally autonomous public universities (PTN-BH), yet the effectiveness of internal audit units remains uneven. This study examines how digital audit utilization and top management support influence internal audit effectiveness and investigates the inconsistent roles of auditor professionalism, role conflict, inter-auditor synergy, and collaboration. A sequential explanatory mixed-methods design was employed. In the quantitative phase, survey data from internal auditors across five Indonesian PTN-BH were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM), including a parsimonious mediation model and an extended six-construct exploratory model. The qualitative phase involved thematic analysis of semi-structured interviews with the heads of internal audit units from three participating universities to explain the quantitative findings. The parsimonious model revealed that digital audit utilization significantly influenced top management support ($\beta = 0.456$, $p = 0.001$) and internal audit effectiveness ($\beta = 0.398$, $p = 0.007$), while top management support emerged as the strongest predictor of effectiveness ($\beta = 0.561$, $p < 0.001$) and significantly mediated the relationship between digital audit utilization and audit effectiveness (indirect effect = 0.256, $p = 0.004$). In the extended model, only top management support remained significant, whereas professionalism, role conflict, synergy, collaboration, and the direct effect of digital audit were not. Qualitative findings attribute these differences to variations in leadership commitment, staffing adequacy, and digital maturity across institutions. The study highlights top management support as the key enabling condition through which digital and professional capabilities translate into effective internal auditing in Indonesian PTN-BH.

Keywords: Internal Audit Effectiveness, Top Management Support, Digital Audit, Auditor Professionalism, Role Conflict, PLS-SEM, Mixed Methods, PTN-BH.

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1 Introduction

The enactment of Law No. 12 of 2012 on Higher Education granted a subset of Indonesian public universities the status of Perguruan Tinggi Negeri Badan Hukum (PTN-BH), a legally-autonomous entity empowered to manage its own academic, financial, and administrative affairs. This autonomy was intended to accelerate institutional competitiveness, yet it simultaneously transferred a substantial share of oversight responsibility away from central government control and onto each university's internal governance apparatus. Within this apparatus, the Satuan Pengawasan Internal (SPI), namely the internal audit unit, occupies a pivotal position: it is the mechanism through which academic leadership assures itself, its governing board (Majelis Wali Amanat), and external stakeholders that autonomy is being exercised responsibly [1].

Despite this pivotal role, the effectiveness of SPI units across Indonesian PTN-BH remains uneven. Evaluations of university governance and periodic external audit engagements point to recurring weaknesses: incomplete follow-up on audit recommendations, chronic understaffing relative to the scope of institutional risk, and only partial adoption of digital tools for planning, execution, and monitoring of audit assignments. These symptoms are not unique to Indonesia; they echo a long-standing international literature showing that internal audit effectiveness is jointly determined by audit-unit capability and organizational context, rather than by audit methodology alone [1,2,3].

Two contextual forces are especially salient in the contemporary PTN-BH environment. The first is digital transformation. Indonesian universities have invested heavily in campus-wide digitalization, such as integrated financial systems, human-resource platforms, and, increasingly, dedicated audit information systems, in the expectation that data-driven, continuous auditing will improve the timeliness, coverage, and analytical depth of internal audit work [4,5]. The second is top management support. Because SPI reports structurally to the rector, its independence, resourcing, and the fate of its recommendations depend heavily on the willingness of university leadership to defend the unit's mandate, fund its operations, and act on its findings [6,7].

A smaller but growing body of work also points to three further organizational conditions that plausibly shape audit effectiveness in a university setting: the professionalism of auditors (certification, standards adherence, and competency development), the role conflict auditors experience when consultative or risk-management mandates blur the boundary between assurance and management [8,9],and the quality of synergy and collaboration between internal auditors and the external public accounting firms (Kantor Akuntan Publik, KAP) that audit the university's financial statements [10,11]. Prior studies have rarely tested all of these conditions jointly within a single, resource-constrained population such as PTN-BH internal audit units, where sample sizes are inherently small because the number of qualifying institutions and senior auditors is limited.

This study addresses that gap through a sequential explanatory mixed-methods design [12]. In the first, quantitative phase, survey responses from 30 internal auditors across five PTN-BH are analyzed with PLS-SEM to estimate (a) a parsimonious mediation model in which digital audit utilization affects internal audit effectiveness directly and indirectly through top management support, and (b) an extended six-construct model that additionally tests auditor professionalism, role conflict, internal-external

synergy, and internal-external collaboration as predictors of effectiveness. In the second, qualitative phase, semi-structured interviews with the heads of the internal audit units at three of the five surveyed universities, namely Institution A, Institution B, and Institution C, anonymized throughout this manuscript to preserve confidentiality, are analyzed thematically to explain the quantitative patterns, particularly the finding that several theoretically-motivated predictors failed to reach conventional statistical significance in the small-sample extended model.

The study makes three contributions. First, it provides quantitative evidence, calibrated to the realistic sample constraints of PTN-BH research, on the relative and combined influence of digital audit utilization and top management support on internal audit effectiveness, including a formally tested mediation pathway. Second, it extends the nomological net to auditor professionalism, role conflict, and inter-auditor synergy/collaboration, an extension rarely attempted jointly in previous PLS-SEM studies of internal audit. Third, and most distinctively, it uses qualitative cross-case evidence from three internal audit heads to explain why a quantitatively underpowered model nonetheless carries meaningful lessons, namely, that top management support functions as a necessary enabling condition without which digitalization, professional capability, and inter-auditor collaboration cannot translate into effectiveness.

2 Methods

2.1 Internal Audit Effectiveness

Internal audit effectiveness is generally defined as the extent to which an internal audit function achieves its intended purpose, namely providing assurance and advisory services that improve governance, risk management, and control processes [1]. Building on a case study of a large public-sector higher-education institution, study [1] show that effectiveness is best understood as the interplay of internal audit quality, management support, organizational setting, and auditee attributes, and, notably for the present study, find that internal audit quality and management support exert a strong influence on effectiveness while organizational setting and auditee attributes do not. Study 108 Israeli organizations, similarly conclude that support from top management is the principal determinant of internal audit effectiveness, with organizational independence of the audit function playing a secondary role [2]. Study [3] synthesizing the empirical literature, likewise identify management support, auditor competence, and the quality of the audit process as recurring antecedents of effectiveness, while cautioning that findings are highly context-dependent.

These findings are consequential for the present study in two ways. First, they justify treating top management support as a central, rather than peripheral, construct. Second, they anticipate the possibility, confirmed in the results below, that structural or contextual constructs such as role conflict or inter-auditor collaboration may exert weaker, less consistent effects than leadership-related constructs, particularly in small, heterogeneous samples.

2.2 Theoritical Framework

Technology-Organization-Environment (TOE) Framework. The TOE framework holds that an organization's adoption and exploitation of technology is jointly shaped by technological readiness, organizational characteristics, and environmental pressures [13]. In the internal audit setting, digital audit utilization represents the technological context, while top management support, operating through resource allocation, prioritization, and cultural signaling, represents the organizational context. The TOE framework therefore predicts not only a direct effect of digital audit utilization on effectiveness, but also an indirect pathway in which technology adoption is channeled through, and reinforced by, organizational support.

Resource-Based View (RBV). The Resource-Based View holds that sustained advantage accrues to organizations that possess valuable, rare, inimitable, and non-substitutable resources [14]. Applied to internal audit, digital audit capability and committed top management support constitute strategic, difficult-to-imitate resources; when combined, they form a bundled capability that is more consequential for audit effectiveness than either resource alone, thereby providing a theoretical rationale for a mediating, rather than merely additive, relationship between digital audit utilization, top management support, and effectiveness.

Agency Theory and the Monitoring Role of Internal Audit. Agency theory frames internal audit as a monitoring mechanism that reduces information asymmetry and aligns the interests of management (the agent) with those of stakeholders (the principal) [7]. In a PTN-BH, the rector and university leadership occupy an agency position vis-à-vis the Ministry of Education, the governing board, and the public; internal audit strengthens the monitoring apparatus available to these principals. Top management support determines whether this monitoring capacity is allowed to function with genuine independence and whether its output, namely audit recommendations, is translated into corrective action [6].

Role Theory and Auditor Role Conflict. Role theory [8,9] explains why internal auditors who are simultaneously asked to perform consultative, risk-management, or even operational tasks may experience role conflict, that is, competing expectations that can compromise perceived objectivity and, ultimately, audit quality. This literature motivates treating role conflict as a construct that plausibly reduces internal audit effectiveness, even though, as the results below show, its statistical effect proved difficult to detect with the available sample.

2.3 Hypothesis and Proposition Development

Digital Audit Utilization. Digital tools, such as audit analytics, dashboards, automated workflow systems, and audit information systems, are widely reported to improve the

timeliness, coverage, and analytical depth of audit engagements [4,5, 15]. In a university setting, digital audit systems allow real-time monitoring of follow-up status, systematic risk-based planning, and reduced reliance on manual, paper-based evidence gathering. Because the TOE and RBV perspectives both predict that technology functions best when embedded in a supportive organizational context, digital audit utilization is hypothesized to affect internal audit effectiveness both directly and indirectly, through top management support.

H1: Digital audit utilization has a significant positive direct effect on internal audit effectiveness.

H2: Digital audit utilization has a significant positive effect on top management support.

Top Management Support. Top management support, manifested as resource allocation, willingness to act on findings, and inclusion of internal audit in strategic decision-making, is one of the most consistently validated antecedents of internal audit effectiveness in the literature [1,2,6]. Agency theory further suggests that management support is the mechanism through which monitoring output is converted into governance outcomes.

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

H4: Top management support mediates the relationship between digital audit utilization and internal audit effectiveness.

Auditor Professionalism, Role Conflict, and Inter-Auditor Synergy/Collaboration. Beyond the core mediation model, four additional organizational conditions are theoretically plausible antecedents of internal audit effectiveness. Auditor professionalism, namely certification, adherence to Institute of Internal Auditors (IIA) standards, and continuing competency development [16], is associated with higher audit quality and, by extension, effectiveness [17]. Role conflict, per role theory, is expected to reduce effectiveness by compromising perceived objectivity [8]. Synergy between internal and external auditors, namely coordination of scope, information-sharing, and mutual reliance, has been shown to affect the depth and efficiency of the combined assurance function [10,18], while active collaboration (joint meetings, shared audit-scope planning) is a related but distinct behavioral manifestation of that relationship [11]. Because the population of senior internal auditors in PTN-BH is small, these four constructs are treated as exploratory propositions rather than confirmatory hypotheses, in acknowledgment of the statistical power constraints discussed in Section 3.

P1: Auditor professionalism is positively associated with internal audit effectiveness.

P2: Auditor role conflict is negatively associated with internal audit effectiveness.

P3: Internal-external auditor synergy is positively associated with internal audit effectiveness.

P4: Internal-external auditor collaboration is positively associated with internal audit effectiveness.

2.4 Conceptual Model

Figure 1 (described narratively, as the source structural diagram is reproduced in Appendix A) summarizes the two nested specifications examined in this study. Model A is the parsimonious mediation model: digital audit utilization → top management support → internal audit effectiveness, with a direct path from digital audit utilization to effectiveness. Model B extends Model A by adding four further exogenous constructs, namely auditor professionalism, role conflict, internal-external synergy, and internal-external collaboration, each specified with a direct path to internal audit effectiveness, alongside management support and digital audit. The two models are not competing so much as complementary: Model A is the confirmatory, adequately-powered specification, while Model B is an exploratory robustness check that probes whether additional organizational constructs retain explanatory value once management support and digital audit are held constant.

This study adopts a sequential explanatory mixed-methods design (Creswell & Plano Clark, 2018), in which a quantitative phase (QUAN) is followed by, and explained through, a qualitative phase (qual): QUAN → qual. The rationale for this design is twofold. First, PLS-SEM allows formal testing of the mediation hypotheses (H1-H4) and an exploratory assessment of four additional propositions (P1-P4) across the full survey sample. Second, because the population of senior PTN-BH internal auditors is inherently small, several theoretically-motivated constructs in the extended model were expected, and, as shown below, found, to fall short of conventional statistical significance; the qualitative phase was designed specifically to explain such patterns by probing the lived organizational experience of internal audit leaders at three of the surveyed institutions.

2.5 Quantitative Phase

Population, Sample, and Procedure. The population consisted of internal auditors serving in the SPI/Kantor Audit Internal (KAI) units of Indonesian PTN-BH. A purposive sample of internal auditors was drawn from five legally-autonomous public universities; institutional identities are withheld throughout this manuscript, and interviewees who agreed to participate in the qualitative phase are referred to only as Institution A, Institution B, and Institution C, consistent with the confidentiality assurances given to respondents at the time of data collection (see Section 3.5). Structured questionnaires were self-administered, using items adapted from prior internal-audit-effectiveness and technology-adoption literature and calibrated to the PTN-BH context through discussion with practicing SPI heads.

Measures. Six exogenous constructs were measured: top management support (five indicators, X11-X15), auditor professionalism (five indicators, X21-X25), role conflict (five indicators, X31-X35), internal-external synergy (five indicators, X41-X45), internal-external collaboration (five indicators, X51-X55), and digital audit utilization (five indicators, X61-X65). The endogenous construct, internal audit effectiveness, was

measured with five indicators (Y11-Y15) capturing early risk detection, recommendation follow-through, contribution to operational efficiency, perceived strategic-partner status, and contribution to accountability and governance quality. All items used multipoint Likert-type scales anchored at strongly disagree/strongly agree.Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) in SmartPLS, a variance-based approach well suited to small samples, formatively- and reflectively-specified constructs, and models with a predictive, theory-extension orientation [19,20]. Two nested specifications were estimated.

Model A (parsimonious mediation model) specified digital audit utilization and top management support as predictors of internal audit effectiveness, with top management support also specified as a mediator of the digital audit-effectiveness relationship. Measurement-model quality was assessed via indic ator loadings (> 0.70), discriminant validity via the Fornell-Larcker criterion [21], and reliability/convergent validity via Cronbach's alpha, composite reliability, and average variance extracted (AVE > 0.50). Structural-model relationships were assessed via bootstrapped (5,000 resamples) path coefficients, t-statistics, and p-values, with indirect effects used to test mediation (H4).

Model B (extended six-construct model) added auditor professionalism, role conflict, internal-external synergy, and internal-external collaboration as further direct predictors of internal audit effectiveness, alongside top management support and digital audit utilization. This specification was explicitly treated as exploratory: with 30 respondents and six exogenous latent variables, the sample falls well below the 10-times-the-largest-number-of-structural-paths heuristic commonly used to gauge minimum PLS-SEM sample adequacy [19], and several indicator loadings in this specification proved unstable (see Section 4.1.3). Model B results are therefore reported transparently, as an honest reflection of what the data show, but are interpreted as suggestive robustness evidence rather than confirmatory tests of P1-P4.

2.6 Qualitative Phase

The qualitative phase used semi-structured, in-depth interviews with the heads of the internal audit unit at three of the five surveyed universities, anonymized here as Institution A, Institution B, and Institution C. These three institutions were purposively selected because their internal audit units represent contrasting configurations of institutional age, staffing scale, and digital maturity, offering an information-rich basis for explaining variation in the quantitative results [22]. Interviews lasted approximately 60 minutes each, followed a common guide organized around the six constructs in the conceptual model (top management support, professionalism, role conflict, synergy, collaboration, and digital audit), and were conducted by members of the research team between June and July 2025. With participants' consent, interviews were recorded, transcribed verbatim in Bahasa Indonesia, and translated into English for analysis and reporting; direct quotations below are presented in translated form and stripped of any institution-identifying references (e.g., proper names of information systems, external audit firms, or internal regulations), consistent with the anonymization requested by participants.

Transcripts were analyzed using thematic analysis following the six-phase procedure of Braun and Clarke [23]: familiarization, initial coding, theme generation, theme review, theme definition, and write-up. Coding was organized deductively around the six constructs in the conceptual model, with an inductive allowance for emergent subthemes (e.g., budget contraction, staffing shortfalls, and audit-recommendation follow-up rates) that were not explicitly anticipated by the survey instrument. Cross-case comparison followed the case-study logic of Yin [24], treating each institution as an anonymized, embedded case within the broader PTN-BH population.

2.7 Integration Strategy

Quantitative and qualitative strands were integrated at the interpretation stage using a joint-display approach [12], in which each construct's quantitative result (coefficient, significance) is juxtaposed against the corresponding qualitative theme from the three case institutions. This joint display, presented in Section 4.3, is the primary analytic device used to explain why top management support proved robust across both models while professionalism, role conflict, synergy, collaboration, and the direct digital-audit path did not.

3 Results and Discusiion

3.1 Quantitative Results

Measurement Model for Model A (Parsimonious Mediation Model). Table 1 reports outer loadings for the three constructs in Model A: top management support, digital audit utilization, and internal audit effectiveness. All indicators loaded above the conventional 0.70 threshold, supporting indicator reliability [19].

Table 1. Outer Loadings for Model A

Indicator	Top Management Support	Digital Audit	Internal Audit Effectiveness
X11	0.758	-	-
X12	0.931	-	-
X13	0.820	-	-
X14	0.815	-	-
X62	-	0.883	-
X63	-	0.952	-
X64	-	0.922	-

Indicator	Top Management Support	Digital Audit	Internal Audit Effectiveness
X65	-	0.780	-
Y11	-	-	0.880
Y12	-	-	0.740
Y13	-	-	0.889
Y14	-	-	0.890
Y15	-	-	0.834

Note: Item X15 was dropped in the final measurement model due to insufficient loading

.Source: Author's work

Table 2. Discriminant Validity (Fornell-Larcker Criterion) and Reliability/Convergent Validity for Model A

Construct	Digital Audit	Internal Audit Effectiveness	Top Mgmt. Support	Cronbach's α	CR (rho_c)	AVE
Digital Audit	(0.887)			0.908	0.936	0.786
Internal Audit Effectiveness	0.708	(0.849)		0.901	0.928	0.720
Top Management Support	0.490	0.837	(0.834)	0.853	0.900	0.695

Note: Diagonal values in parentheses are the square roots of AVE. CR = composite reliability (rho_c). All AVE values exceed 0.50 and all square-root-AVE diagonal values exceed inter-construct correlations, supporting convergent and discriminant validity (Fornell & Larcker, 1981).

Source: Author's work

Reliability and validity criteria were fully satisfied: Cronbach's alpha and composite reliability exceeded 0.70 for all three constructs, AVE exceeded 0.50 for all constructs, and the Fornell-Larcker criterion was met throughout, confirming that the measurement model for Model A is sound.

Structural Model for Model A. Table 3 reports the direct and indirect (mediated) effects for Model A. All three hypothesized direct paths were statistically significant, and the indirect (mediated) path was also significant, supporting H1 through H4.

Table 3. Structural Model Results for Model A

Path	Coefficient (β)	t-statistic	p-value	Hypothesis
Digital Audit → Internal Audit Effectiveness	0.398	2.451	0.007	H1: Supported
Digital Audit → Top Management Support	0.456	2.998	0.001	H2: Supported
Top Management Support → Internal Audit Effectiveness	0.561	3.954	0.000	H3: Supported
Digital Audit → Top Mgmt. Support → Internal Audit Effectiveness (indirect)	0.256	2.679	0.004	H4: Supported

Source: Author's work

The total effect of digital audit utilization on internal audit effectiveness (direct plus indirect, 0.398 + 0.256 = 0.654) exceeds its direct effect alone, indicating that top management support amplifies, rather than merely transmits, the benefit of digital audit adoption, consistent with the TOE framework's emphasis on organizational context and the RBV's emphasis on bundled, complementary resources [13,14]. Because top management support carries both the largest direct coefficient (0.561) and a significant mediating role, it emerges as the pivotal construct in the parsimonious model, a pattern reinforced, as shown next, by the extended six-construct specification.

Figure 1. Estimated Structural Model of Model A (Parsimonious Mediation Model)

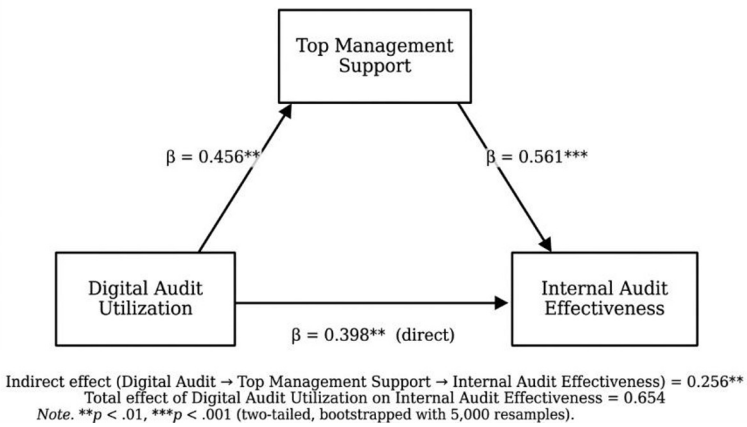

Fig 1. Estimated Structural Model of Model A (Parsimonious Mediation Model)

*Note. **p <0 .01, ***p < 0.001 (two-tailed, bootstrapped with 5,000 resamples).*

Structural Model for Model B (Extended Six-Construct Exploratory Model). Model B added four exogenous constructs, namely auditor professionalism, role conflict, internal-external synergy, and internal-external collaboration, to the digital-audit and top-management-support predictors already estimated in Model A, all specified as direct predictors of internal audit effectiveness. Table 4 reports the resulting path coefficients.

Table 4. Structural Model Results for Model B (n = 30, R^2 for Internal Audit Effectiveness = 0.792)

Path to Internal Audit Effectiveness	Coefficient (β)	p-value	Result
Top Management Support	0.487	0.001	Significant
Auditor Professionalism	0.210	0.086	Not significant
Role Conflict	-0.211	0.191	Not significant
Internal-External Collaboration	0.202	0.109	Not significant
Digital Audit Utilization	0.195	0.178	Not significant
Internal-External Synergy	-0.164	0.222	Not significant

Source: Author's work

Model B achieved a high coefficient of determination for internal audit effectiveness ($R^2 = 0.792$), yet only the path from top management support reached conventional significance ($p = 0.001$). The remaining five paths, including the direct effect of digital audit utilization that was significant in Model A, did not reach significance at the 0.05 level, although professionalism and collaboration approached it ($p = 0.086$ and $p = 0.109$, respectively).

Two features of Model B warrant transparent methodological comment. First, several indicator-level outer loadings for the four newly-added constructs proved unstable or failed to compute meaningfully in the SmartPLS output, a symptom consistent with the well-documented requirement that PLS-SEM sample size scale with the number of structural paths and indicators being simultaneously estimated [19]: with 30 respondents, six exogenous latent variables, and up to five indicators per construct, Model B is materially underpowered relative to Model A. Second, despite this limitation, the model's headline finding, namely that top management support is the only construct to survive as a robust, statistically significant predictor once all six constructs compete for explanatory variance, is highly consistent with, and indeed reinforces, the Model A result and the wider literature identifying management support as the principal driver of internal audit effectiveness [1,2]. For this reason, Model A is treated as this study's confirmatory structural model, while Model B is reported as exploratory, hypothesis-generating evidence that motivated the qualitative phase described next.

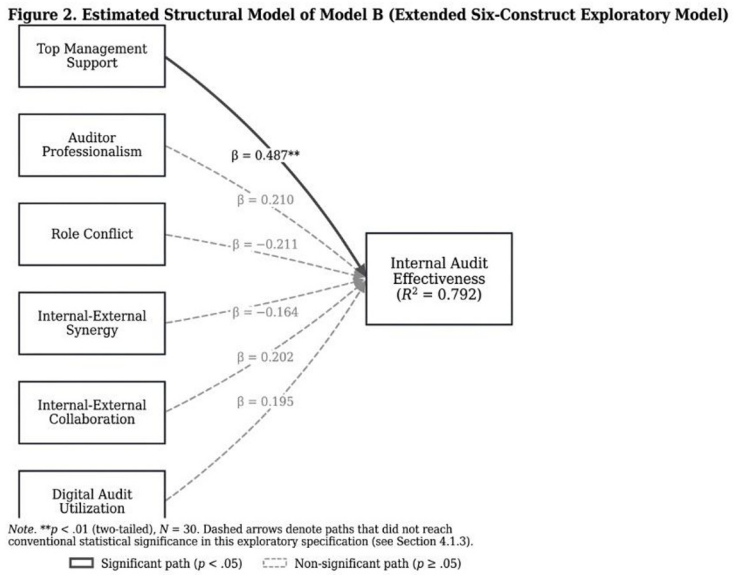

Fig 2. Estimated Structural Model of Model B (Extended Six-Construct Exploratory Model)

*Note. **p < .01 (two-tailed). n = 30. Dashed arrows denote paths that did not reach conventional statistical significance in this exploratory specification (see Section 4.1.3).*

Supplementary Analysis of Raw Survey Responses. Beyond the PLS-SEM estimation reported above, item-level responses to the underlying survey instrument were also available for a subset of respondents (N = 15) and were analyzed descriptively to provide a further, independent check on the pattern of results in Models A and B. Respondents in this subsample were predominantly early- to mid-career practitioners (53% aged 25-44; 53% holding a bachelor's/diploma degree, 40% a master's degree, and 13% a doctoral degree), with 53% reporting more than six years of experience in audit or internal control and the remainder more evenly split between one and six years. Respondents held a range of functional titles within their unit (auditor, unit member, unit head, or team head), and 53% reported having previously attended digital-audit-based training.

Tabel 4a. Descriptive Statistics, Reliability, and Bivariate Correlations for Raw Survey Responses (N = 15)

Construct (no. of items)	Mean	SD	Cronbach's α	r with Internal Audit Effectiveness	r with Overall Effectiveness (single item)
Top Management Support (5)	3.97	0.71	0.861	0.76	0.81

Construct (no. of items)	Mean	SD	Cronbach's α	r with Internal Audit Effectiveness	r with Overall Effectiveness (single item)
Auditor Professionalism (5)	4.53	0.48	0.818	0.53	0.27
Role Conflict (5, item 4 reverse-scored)	2.00	0.55	0.618	-0.56	-0.37
Internal-External Synergy (5)	4.03	0.51	0.791	0.26	0.11
Internal-External Collaboration (5)	3.72	0.70	0.848	0.36	0.21
Digital Audit Utilization (14)	4.12	0.42	0.863	0.32	0.40
Internal Audit Effectiveness (5)	4.39	0.55	0.912	1.00	0.74

Note: Correlations are Pearson product-moment coefficients computed on construct-level mean scores. The role-conflict item "Auditors have full freedom in conducting audits" was reverse-scored prior to composite scoring and reliability estimation, as it is worded in the opposite direction to the construct's other four items; reliability improved materially after this correction (from α = 0.29 to α = 0.62), illustrating a scoring artifact rather than a substantive measurement failure.

Source: Author's work

Three findings from this supplementary analysis converge with, and reinforce, the PLS-SEM results. First, top management support shows by far the strongest bivariate association with both the composite internal audit effectiveness score (r = 0.76) and respondents' single-item, holistic rating of overall audit effectiveness (r = 0.81), which is materially larger than the corresponding correlations for any other construct, including digital audit utilization (r = 0.32 and r = 0.40, respectively). This is precisely the pattern that both Model A (where management support carries the largest structural coefficient) and Model B (where management support is the only construct to remain significant) would predict. Second, role conflict is the only construct to correlate negatively with effectiveness (r = -0.56 with the composite measure), consistent with role theory [8] and with Model B's negatively-signed, if not statistically significant, coefficient. Third, professionalism, synergy, collaboration, and digital audit utilization all show positive but comparatively modest correlations with effectiveness (r = 0.26 to 0.53), mirroring their non-significant but directionally positive standing in Model B and supporting this

study's interpretation that these constructs are real but secondary contributors whose effect is conditioned on the presence of strong management support.

Because this subsample (N = 15) is smaller than the full PLS-SEM sample (N = 30) and was not itself used for structural equation modeling, these descriptive and correlational results are presented as corroborating, rather than independently confirmatory, evidence; they are nonetheless a useful triangulation device precisely because they were derived from raw item responses using a different analytical technique (bivariate correlation and reliability analysis) than the variance-based structural modeling reported in Sections 4.1.1-4.1.3.

3.2 Qualitative Findings

Interviews with the heads of internal audit at three anonymized institutions, referred to throughout as Institution A, Institution B, and Institution C, reveal substantial cross-institutional heterogeneity on every construct in the model. This heterogeneity, summarized case-by-case below and in the cross-case comparison in Table 5, offers a plausible explanation for the pattern observed in Model B: constructs whose institutional expression varies sharply from case to case (professionalism uptake, role-conflict management, follow-up rates, digital maturity) are precisely the constructs that failed to register as statistically robust predictors in a six-construct model estimated on only 30 respondents drawn from institutions this different from one another.

Top Management Support. Top management support emerged as the most uniformly strong theme across the three cases, though its behavioral expression differed. At Institution A, the head of internal audit described leadership as extending trust well beyond the formal audit mandate, reflected in an expanded scope of responsibility beyond the unit's original charter. At Institution C, the head of internal audit rated management support near the top of the measurement scale, describing broad access for the audit team and consistent leadership backing for the audit program. At Institution B, by contrast, the head of internal audit described support as cordial but institutionally partial: audit findings, in his assessment, were followed up only in a minority of cases, and management's engagement with results was characterized as partial rather than thorough.

This variation directly mirrors the quantitative pattern: management support was the only construct that remained significant when tested alongside five competitors (Model B, $\beta = 0.487$, $p = 0.001$), and interview evidence suggests why its effect is so large: at Institutions A and C, support translates into resourcing, follow-up discipline, and inclusion in strategic decision-making, whereas at Institution B the same nominal construct coexists with a materially lower follow-up rate and a self-rated overall audit effectiveness that was notably lower than at the other two institutions.

Auditor Professionalism. Professionalism practices also diverged. Institution A maintains a formal certification-tracking system for its auditors, several of whom hold relevant professional certifications, alongside adherence to an internal audit charter derived

from Institute of Internal Auditors standards. Institution C allocates an annual budget for staff certification and reported that senior auditors are largely certified while newer staff are not; the unit is additionally under-strength relative to its internally-assessed staffing need. Institution B's head of internal audit reported that certification is concentrated among a small number of senior staff, that other personnel had attempted certification without completing the required examination, and that the unit operates well below its estimated staffing requirement; he nonetheless characterized the team's practical grasp of the institution's risk landscape as strong despite this gap in formal credentialing.

This pattern, namely certification concentrated in unit leadership and staffing consistently below assessed need, but to sharply different degrees across the three institutions, offers a plausible account of why professionalism, though directionally positive and closer to significance than most other constructs in Model B ($\beta = 0.210$, $p = 0.086$), did not reach conventional significance: its practical meaning (formal credentialing versus tacit, experience-based competence) differs enough across cases that a single linear indicator may understate its true, context-dependent contribution.

Role Conflict. All three institutions reported active management of role conflict rather than its absence. Institution B's head of internal audit described an explicit conflict-of-interest rule under which auditors are barred from auditing their own academic unit, illustrating a deliberate structural safeguard used to contain role conflict. Institution C similarly reported that staff given assignments outside the audit function are formally reassigned out of the unit for the duration of that assignment, precisely to preserve independence, and confirmed that auditors are not permitted to be involved in the business processes they audit. Institution A's interview did not surface acute role-conflict incidents, consistent with a clear separation maintained between its assurance and advisory functions.

The consistent finding across cases, namely that role conflict is actively and successfully managed through procedural safeguards rather than left to chance, helps explain why the construct's effect in Model B was directionally negative, as role theory predicts ($\beta = -0.211$), but not statistically significant ($p = 0.191$): where safeguards are functioning, residual variance in perceived role conflict may be too small, and too similar across respondents, to produce a detectable linear effect on effectiveness.

Internal-External Auditor Synergy and Collaboration. Synergy and collaboration with external public accounting firms were reported as strong at Institutions A and C, and comparatively weaker at Institution B. Institution A has retained the same external audit firm for several consecutive years and has obtained an unqualified audit opinion in every recent cycle. Institution C described an intensive, near-gatekeeping relationship in which the internal audit team routinely accompanies the external firm during fieldwork and pre-screens findings in advance, such that only minor issues, typically missing documentation, remain outstanding by the time the external auditor arrives. Institution B's account was markedly different: the head of internal audit estimated that a substantial majority of findings are first identified internally, but that these findings

receive limited attention from leadership, so the same issues tend to resurface for the external auditor, and the two audit functions rarely formally share or discuss results together.

This divergence, namely collaborative gatekeeping at Institution C, a mature parallel relationship at Institution A, and an under-utilized, largely one-directional flow of findings at Institution B, is consistent with the non-significant, and in the case of synergy directionally negative, coefficients observed in Model B (collaboration $\beta = 0.202$, $p = 0.109$; synergy $\beta = -0.164$, $p = 0.222$). Where top management does not act on findings (as at Institution B), a well-functioning internal-external information flow cannot, by itself, raise perceived audit effectiveness; the qualitative evidence therefore suggests that synergy and collaboration operate largely as complements to, rather than substitutes for, management support.

Digital Audit Utilization. Digital maturity varied more than any other construct. Institution A has the most developed digital audit infrastructure among the three cases: a campus-wide digital transformation initiative has produced an integrated information system, within which internal audit operates a dedicated audit information system for planning, execution, reporting, and follow-up monitoring, supplemented by access to enterprise financial data and data-extraction tools. Its head of internal audit candidly described both benefits and burdens of the system, noting that it requires substantial data-entry effort from auditors while also generating useful records for documentation purposes. Institution C's digital audit system, by contrast, had only recently been introduced at the time of interview and was still undergoing refinement, was developed in-house by the institution's own information-technology function, and was explicitly distinguished from its already-mature systems in finance, human resources, and research administration. Institution B reported the least digital maturity in audit-specific processes, with its head of internal audit expressing a preference for paper-based documentation, while acknowledging that digital tools tend to be used more readily and effectively by younger staff.

This spread, from Institution A's mature, integrated digital audit ecosystem to Institution B's largely manual practice, offers a direct explanation for the divergence between Model A and Model B on the digital-audit path. In the parsimonious model, where digital audit utilization is estimated jointly with only top management support, its effect on effectiveness is significant ($\beta = 0.398$, $p = 0.007$) and its effect on management support is also significant ($\beta = 0.456$, $p = 0.001$), consistent with Institution A's case, in which digital investment and leadership support visibly reinforce one another. In the extended model, where digital audit must compete with five other constructs across a sample containing institutions at very different points on the digital-maturity spectrum (a mature system at Institution A versus a newly-launched system at Institution C versus a largely manual approach at Institution B), the direct path weakens to non-significance ($\beta = 0.195$, $p = 0.178$), which is precisely the outcome one would expect if digital audit's benefit is conditional on, and partly channeled through, management support rather than uniform across institutions.

across institutions.

Table 5. Cross-Case Comparison of the Six Constructs Across Three Anonymized PTN-BH

Construct	Institution A	Institution B	Institution C
Top management support	Very strong; unit granted an expanded scope of responsibility	Cordial but institutionally partial; follow-up occurred in only a minority of cases	Rated near the top of the scale; broad access and resourcing
Auditor professionalism	Formal certification tracking; several staff hold relevant professional certifications	Certification concentrated among senior staff; unit understaffed relative to assessed need	Annual budget allocated for staff certification; unit understaffed relative to assessed need
Role conflict	No acute incidents reported; clearly separated functional lines	Managed via a conflict-of-interest rule barring auditors from their own unit	Managed via formal reassignment out of the unit for special tasks
Internal-external synergy/collaboration	Stable multi-year external-auditor relationship; consistently unqualified audit opinions	Auditor-identified findings often receive limited follow-up from leadership	Intensive accompaniment model; internal team pre-screens for external auditor
Digital audit utilization	Mature, integrated audit information system within campus-wide platform	Largely manual; audit-specific software not yet planned	Audit system newly launched; other systems already mature
Self-assessed effectiveness	Consistently unqualified audit opinions	Comparatively lower self-rating; limited recommendation follow-through	Unqualified audit opinions; audit findings have driven institutional policy changes

Source: Author's work

3.3 Integration of Quantitative and Qualitative Findings

Table 6 presents a joint display integrating the quantitative coefficients from Models A and B with the qualitative themes from Section 4.2, following the meta-inference logic recommended for explanatory mixed-methods designs [12].

Table 6. Joint Display of Quantitative Results and Qualitative Explanation

Construct	Model A result	Model B result	Qualitative explanation
Top management support	$\beta = 0.561$, $p < 0.001$ (→ IAE)	$\beta = 0.487$, $p = 0.001$	Consistently strong and enacted differently (resourcing, follow-up, strategic inclusion) but present in some form at all three anonymized sites, making it the only construct whose signal survives model complexity
Digital audit utilization	$\beta = 0.398$, $p = 0.007$ (→ IAE); $\beta = 0.456$, $p = 0.001$ (→ management support)	$\beta = 0.195$, $p = 0.178$	Highly divergent digital maturity (mature, emerging, and manual, respectively) weakens a pooled linear estimate; effect is real but conditional on management support
Auditor professionalism	Not modeled	$\beta = 0.210$, $p = 0.086$	Certification concentrated in leadership, staffing shortfalls at all sites but of different magnitude
Role conflict	Not modeled	$\beta = -0.211$, $p = 0.191$	Actively and successfully managed via procedural safeguards at all sites, reducing observable variance
Internal-external synergy	Not modeled	$\beta = -0.164$, $p = 0.222$	Operates as a complement to, not a substitute for, management support (strong at two sites, underused at the third)
Internal-external collaboration	Not modeled	$\beta = 0.202$, $p = 0.109$	Intensive gatekeeping/accompaniment model at one site contrasts with a largely one-directional flow at another

Source: Author's work

The joint display makes clear that the quantitative and qualitative strands converge on a single meta-inference: top management support is not merely one predictor among

several but the enabling condition through which digital investment, professional capability, and inter-auditor collaboration are converted into internal audit effectiveness. Where that condition is strong and consistent (Institutions A and C), other capabilities appear to compound its effect; where it is only partially present (Institution B), even a comparatively well-functioning internal detection process fails to translate into high self-assessed effectiveness.

The findings support a layered understanding of internal audit effectiveness in Indonesian PTN-BH that is consistent with, and extends, the established literature. At the core of that understanding is the confirmed mediation result (H1-H4): digital audit utilization improves effectiveness both directly and through its positive effect on top management support, and top management support itself is the strongest direct predictor of effectiveness. This pattern is fully consistent with the Technology-Organization-Environment framework's central claim that technology adoption is realized through, not independent of, organizational context [13], and with the Resource-Based View's expectation that digital capability and leadership commitment function as complementary, bundled resources whose combined effect exceeds the sum of their parts [14].

The exploratory six-construct model (Model B) adds an important qualification to this core finding: when digital audit utilization must compete for explanatory variance against auditor professionalism, role conflict, internal-external synergy, and internal-external collaboration in a sample of only 30 respondents drawn from institutions with markedly different digital, staffing, and governance profiles, only top management support remains a statistically robust predictor. Rather than treating this as a null result, the qualitative phase shows it to be a substantively meaningful one: the three anonymized case institutions differ enormously in digital maturity (from an integrated, mature audit information system at one site to a largely manual practice at another), in staffing adequacy relative to internally-assessed need (a comparatively better-resourced unit at one site versus a chronically understaffed unit at another), and in the extent to which audit findings are acted upon (near-complete follow-through at one site versus an estimated 30 percent at another). Pooling such heterogeneous cases into a single linear model with limited degrees of freedom is likely to attenuate true effects toward zero for every construct except the one, namely management support, whose presence, however variably enacted, appears at some level in every case.

This interpretation aligns closely [1] Ethiopian case-study finding that internal audit quality and management support strongly influence effectiveness while organizational setting and auditee attributes do not, and with Cohen and Sayag's [2] conclusion, from a much larger sample of 108 Israeli organizations, that management support is the principal determinant of internal audit effectiveness. The present study extends these findings in a new institutional context, namely Indonesian legally-autonomous public universities, and adds a further layer, using role theory [8] and the inter-auditor synergy/collaboration literature [10,11], by showing qualitatively that role conflict and external-auditor collaboration are actively and often successfully managed at all three case institutions through concrete procedural safeguards, such as faculty-exclusion rules, formal reassignment of auditors given operational tasks, and structured accompaniment protocols with external KAP, which plausibly explains why these constructs

did not register as statistically significant threats to, or drivers of, effectiveness in Model B.

A further point of discussion concerns auditor professionalism, whose Model B coefficient ($\beta = 0.210$, $p = 0.086$) approached, without reaching, conventional significance. The qualitative data suggest that professionalism in these units is a two-tiered phenomenon: formal certification is concentrated among unit heads and senior staff, while broader unit competence rests substantially on tacit, experience-based risk knowledge that a standard certification-count indicator may not fully capture. This is consistent with Endaya and Hanefah's [17] observation that internal audit effectiveness frameworks often understate competency dimensions that are difficult to operationalize through simple indicators, and it suggests a concrete direction for instrument refinement in future PTN-BH research.

Taken together, the quantitative and qualitative strands converge on a coherent narrative: top management support is the decisive enabling condition for internal audit effectiveness in PTN-BH, digital audit utilization is a genuine but conditional lever whose benefit is realized largely through that same organizational support, and professionalism, role conflict management, and inter-auditor collaboration function as important but largely complementary, rather than independently decisive, contributors to effectiveness.

This study contributes to the internal audit effectiveness literature in three ways. First, it provides a formally-tested mediation model, which is rare in the PTN-BH context, showing that top management support is not merely an antecedent alongside digital audit utilization but a channel through which digital investment is converted into effectiveness, extending the TOE framework's organizational-context logic to a specific mediating mechanism. Second, by jointly estimating an extended six-construct model, the study offers an empirically transparent illustration of a common but under-discussed methodological reality in small-population organizational research: as the number of theoretically-relevant constructs grows, a fixed and small sample can produce a model with high explanatory power ($R^2 = 0.792$) yet very few individually significant predictors, a pattern that should caution against over-interpreting non-significant coefficients as evidence of no effect. Third, the mixed-methods integration demonstrates how qualitative case evidence can meaningfully explain, rather than merely illustrate, a quantitative result, specifically why cross-institutional heterogeneity in digital maturity, staffing, and follow-up culture attenuates the statistical signal of constructs whose real-world importance is well established in the broader internal audit literature [1,2,3].

3.4 Practical Implications

For PTN-BH leadership, the clearest practical implication is that digital investment in audit infrastructure, such as audit information systems, dashboards, and analytics tools, should not be pursued as a stand-alone initiative. Its effectiveness dividend depends on parallel, visible commitments from top management: timely review of findings, formal follow-up mechanisms, and inclusion of internal audit leadership in strategic decision-making. Institutions where digital adoption lags and follow-up rates remain low despite a personally supportive relationship between the audit head and university leadership

illustrate that informal goodwill is not a substitute for institutionalized support mechanisms.

For SPI units themselves, the findings suggest two priorities. First, closing the staffing gap between actual and internally-assessed auditor headcount (a gap present, to varying degrees, at all three case institutions) is likely to be a precondition for realizing the benefits of both professionalism investment and digital tooling. Second, formalizing role-conflict safeguards, such as the faculty-exclusion and staff-reassignment rules observed among the case institutions, and structured accompaniment protocols with external auditors, as practiced at one of the case institutions, are transferable governance mechanisms that other PTN-BH could adopt to strengthen both independence and audit depth.

For policymakers and accreditation bodies, the results suggest that governance quality assessments of PTN-BH should weight top management's demonstrated follow-through on audit recommendations, rather than merely the existence of an internal audit unit or its digital infrastructure, as a leading indicator of institutional accountability.

4 Conclusiona

This study examined the determinants of internal audit effectiveness in Indonesian legally-autonomous public universities (PTN-BH) using a sequential explanatory mixed-methods design that combined PLS-SEM analysis of survey data from 30 internal auditors across five institutions with in-depth interviews with the heads of internal audit at three of those institutions. The parsimonious structural model confirmed that digital audit utilization significantly improves internal audit effectiveness both directly and indirectly through top management support, and that top management support is itself the strongest direct predictor of effectiveness. An extended six-construct exploratory model showed that, once auditor professionalism, role conflict, internal-external synergy, and internal-external collaboration were added to the model, only top management support retained statistical robustness, a pattern that the qualitative case evidence explains through substantial, institution-specific variation in digital maturity, staffing adequacy, and audit-recommendation follow-through. Integrating both strands, the study concludes that top management support functions as the pivotal enabling condition for internal audit effectiveness in PTN-BH, through which digital transformation and professional capability are converted into governance value.

Several limitations should be acknowledged. First, the quantitative sample ($n = 30$) is small in absolute terms and, while adequate for the parsimonious three-construct mediation model under established PLS-SEM guidelines [19], is underpowered for the extended six-construct model; the latter's results should accordingly be read as exploratory rather than confirmatory. Second, the cross-sectional survey design cannot establish causal ordering with certainty, and self-reported measures of both predictors and the effectiveness outcome may be subject to common-method and social-desirability bias. Third, the qualitative phase, while offering rich explanatory depth, drew on only three of the five surveyed institutions and on a single senior informant per institution; future research would benefit from multiple informants per unit (including audit staff

and auditees) to triangulate leadership accounts. Fourth, this study examined internal audit effectiveness through auditors' own perceptions; future work could incorporate objective governance outcomes (e.g., external audit opinion history, timeliness of recommendation closure, or accreditation outcomes) as complementary effectiveness indicators.

Future research should expand the survey sample to a larger set of PTN-BH and other public higher-education institutions to permit adequately-powered estimation of the full six-construct model, employ longitudinal designs to capture how digital maturity and management support co-evolve over time, and extend the qualitative strand to the remaining two surveyed institutions to build a fuller comparative picture. Refining the measurement of auditor professionalism to capture tacit as well as certified competence, and testing role conflict and inter-auditor collaboration as moderators, rather than only as direct predictors, of the digital audit-effectiveness and management support-effectiveness relationships, represent promising theoretical extensions suggested directly by the present findings.

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