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Controller as User of Technology and Developer of Workforce Strategy are the Internal Control Succeed Pillars

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Abstract

Background: Internal control systems are essential for ensuring organizational accountability, risk mitigation, and operational efficiency in higher education institutions. The increasing adoption of digital technologies and the evolving role of internal auditors require *controllers as users of technology and developers of workforce strategy* to possess not only technological competencies but also strategic workforce management capabilities.
Objective: This study aims to analyze the influence of *controllers as workforce strategy developers, trusted advisors, value-added providers, and technology users* on the success of internal control at State Universities in Indonesia.
Method: This study employed a sequential explanatory mixed-methods design. Quantitative data were collected from 56 internal auditors at Indonesian State Universities and analyzed using PLS-SEM, followed by qualitative interviews with senior auditors to support the interpretation of findings.
Results: The bootstrapping results of the PLS-SEM analysis indicate that *controllers as workforce strategy developers and technology users* have a significant positive influence on internal control success. In contrast, the roles of *controllers as trusted advisors and value-added providers* were not found to have significant effects. The coefficient of determination (Adjusted R^2 = 72.20%) demonstrates that the independent variables strongly explain variations in internal control success. Qualitative findings further reveal that workforce development, technology infrastructure, audit data analytics, and information governance are critical factors supporting effective internal control implementation.
Conclusion: The study concludes that *workforce strategy development and technology utilization* significantly support the success of internal control in Indonesian State Universities, while the roles of *trusted advisors and value-added providers* do not show significant influence.

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INTRODUCTION

Internal control systems are essential for ensuring organizational accountability, risk mitigation, and operational efficiency (Otoo et al., 2023). With the increasing complexity of organizational environments and regulatory demands, internal audit functions have evolved from traditional assurance roles into strategic partners within organizations. Prior studies emphasize that internal audit effectiveness is influenced by governance quality, auditor competence, and technological capability (Al Amr & Jaradat, 2025).

Internal control refers to the systems, policies, procedures, and organizational processes

designed to provide reasonable assurance regarding the achievement of organizational objectives, including operational effectiveness, reliable reporting, and regulatory compliance (Bužinskienė & Padgureckienė, 2025). Meanwhile, the internal audit functions as an independent and objective assurance and advisory activity that evaluates the effectiveness of internal control systems (Odetunde et al., 2021).

Internal control activities ensure that management can provide operational assurance that high-risk operations are properly managed. Internal supervisors act as internal advisors in many areas of an organization's operations. Every organization, regardless of its size, should have some form of internal control structure or procedure. For this reason, a well-managed organization should be supported by professionally qualified and well-equipped internal audit personnel who provide value-added services necessary for the efficient and effective management of the organization.

Internal control specialists are appointed to help organizations effectively discharge their responsibilities, promote the establishment of cost-effective controls, measure risks, and recommend actions to mitigate those risks (Dumoga, 2022). As an essential part of the administrative team, internal supervisors provide senior management with analyses, evaluations, advice, and data regarding their activities.

They also monitor organizational ethics, evaluate emerging knowledge, analyze opportunities, assess quality, and ensure accurate and appropriate communications. The integral scope of the role of the internal supervisor is to allocate responsibilities from a broad organizational perspective (Kuusisto, 2025). The ideal internal supervisor can be a respected resource to the board of management and the board of directors in achieving overall organizational goals.

When the internal audit function is recognized as a strategic partner of management, internal auditors can contribute significantly to governance quality, risk management effectiveness, and organizational performance. Internal auditors provide independent evaluations, strategic recommendations, and continuous monitoring to support organizational accountability and informed decision-making.

The internal auditor's extensive knowledge of institutional processes and philosophy enables them to effectively manage risks associated with new business activities, joint ventures, mergers and acquisitions, restructuring implementation, new systems, management forecasting, budgeting, regulatory compliance, and environmental issues. Today, management increasingly focuses on risks associated with information technology, control specifications, and the auditability of new systems. Independent reviews of high-tech projects and information systems by internal auditors contribute to the controlled reliability of the IT environment.

The rapid advancement of digital technologies such as big data analytics, artificial intelligence, and continuous auditing has significantly transformed auditing practices (Farras et al., 2025; Okogun et al., 2026). These technologies enable auditors to analyze entire datasets, enhance anomaly detection, and improve audit quality (Alles, 2015; Appelbaum et al., 2021). Consequently, internal auditors must develop new competencies that combine technological expertise with strategic workforce management.

Previous studies predominantly focused on audit technology adoption or auditor competency independently. However, limited studies have integrated technological capability and workforce strategy simultaneously within the context of Indonesian public universities. Therefore, this study addresses this research gap by combining both perspectives to explain internal control success.

Literature Review

Internal Control and Audit Effectiveness

Internal control is a critical mechanism for ensuring reliable financial reporting and operational performance. Effective internal audit functions contribute to improved governance and organizational outcomes. Empirical evidence indicates that audit effectiveness is enhanced by strong oversight structures and institutional support (Alzeban & Gwilliam, 2014).

Currently, the role of internal supervisors is increasing across most sectors, yet there remain several hurdles to overcome. One of the most important is meeting the highest expectations. There are four key challenges that internal oversight departments must address to

capitalize on these opportunities and deliver the value improvements that the supervisory board and management team expect. These four categories include: handling capacity, being a trusted counselor, meeting growing stakeholder expectations, and overcoming technology-related threats and demands.

The internal audit unit has recently faced several major challenges, and the internal audit profession has encountered numerous others. Some of these signify opportunities as well as difficulties to be addressed. For example, difficulties in attracting talented candidates for internal audit roles have resulted in compensation increases for many internal auditors. The need to leverage technology effectively allows internal auditors to perform more valuable and complex work, raising the bar for internal audit functions within the organization.

Today's internal control presents new concerns, challenges, and opportunities for management's operational performance. The operational needs of increasingly complex departments must be supported by competent internal control. Internal control and audit are crucial for building strong organizations in governance, risk management, effective internal control, and operational excellence. In conducting organizational activities, management should anticipate further changes and increases in organizational risk, including: increased capacity and knowledge of lawsuits, laws, and regulations impacting compliance; the Information Security Department will continue to require commitment, planning, and individual and group interventions; keeping pace with globalization will further complicate the principles, norms, and culture in which organizations operate; rising competition will put additional pressure on organizations to improve efficiency; and other operational changes will disrupt traditional hierarchical structures and alter organizational reporting and management responsibilities.

Given the demand for a reliable organization, the internal audit function must drive change, remain motivated, and maintain relevance. That is why this research examines how Controller as User of Technology and Developer of Workforce Strategy are the Internal Control Succeed Pillars in supporting organizational operations. The four elements explored are the relationship between the success of internal control and various management efforts expected to provide a strategic foundation for internal control, achieving organizational goals while anticipating conflicting objectives and prioritizing aligned objectives.

Technology in Auditing

The adoption of audit analytics and digital tools has transformed traditional auditing practices. Audit analytics enables continuous monitoring and enhances risk assessment accuracy (Appelbaum et al., 2021). Furthermore, big data technologies allow comprehensive data analysis, reducing reliance on sampling methods (Alles, 2015). Recent studies also highlight the role of artificial intelligence in automating audit procedures and improving efficiency (Onyenahazi, 2025).

The correlation of auditing through internal audit is highly relevant to workforce strategy
Workforce Strategy and Human Capital

Human capital plays a crucial role in organizational performance. Workforce strategy ensures that employees possess the necessary skills to adapt to technological changes. Studies show that investment in human capital enhances productivity and organizational effectiveness (Chen et al., 2021).

METHOD

This study employs a mixed-method approach to provide a comprehensive analysis. Quantitative data were analyzed using PLS-SEM, which is suitable for complex models and small sample sizes (Hair Jr et al., 2016). Qualitative data were collected through interviews with experienced auditors to provide contextual insights. The sample consists of internal auditors from Indonesian state universities who have received professional training. Data collection was conducted using structured questionnaires and semi-structured interviews.

This study uses variables related to internal control success, where the independent variables consist of the role of internal control in developing workforce strategies, serving as trusted advisors, delivering added value, and leveraging technology, while the dependent variable is internal control success. This study examines whether internal control success is influenced by

the development of workforce strategies, the role of internal auditors as trusted advisors, the delivery of added value by internal auditors, and the use of technology. In addition, this study analyzes how these factors influence the success of internal control.

The hypothesis and understanding of the framework in this study can be described as follows:

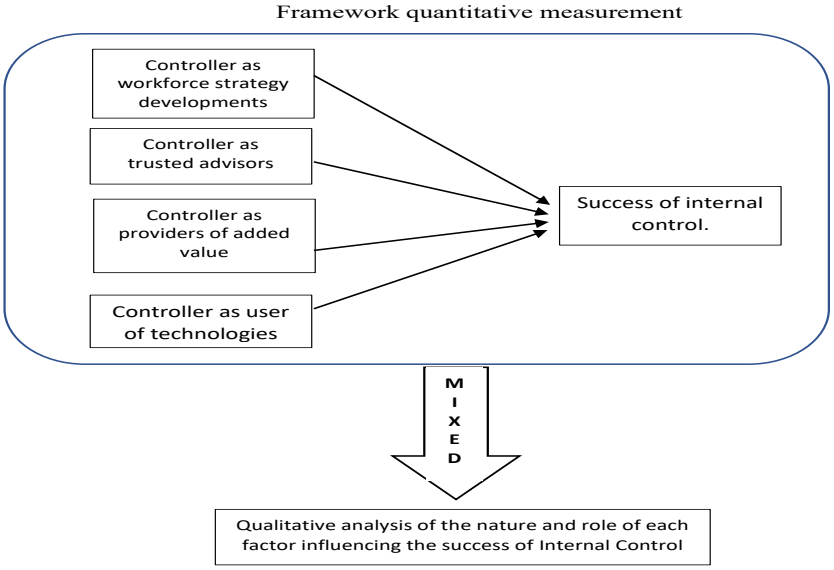

Figure 1. Conceptual Framework

Table 1. Conceptual Framework — Controller Roles and Internal Control Success

Independent Variables	Hypothesis	Dependent Variable
Controller as Workforce Strategy Developer (X1)	H1 (→)	**Internal Control Success (Y)**
Controller as Trusted Advisor (X2)	H2 (→)	
Controller as Value-Added Provider (X3)	H3 (→)	
Controller as Technology User (X4)	H4 (→)	

H1: Controller as workforce strategy developments significantly positive affects the success of internal control.
H2: Controller as trusted advisors significantly positive affect the success of internal control.
H3: Controller as providers of added value significantly positive affect the success of internal control.
H4: Controller as user of technologies has significantly positive influence on the success of internal control.

This study employed a mixed-methods research design by integrating quantitative and qualitative approaches to examine the factors influencing internal control success. The quantitative approach was used to analyze the relationships between workforce strategy development, the role of internal auditors as trusted advisors, value-added delivery, and technology utilization on internal control success. Meanwhile, the qualitative approach was conducted to obtain a deeper understanding of how these factors contribute to the effectiveness of internal control practices. The use of a mixed-methods design enabled a more comprehensive analysis of the research problem (Creswell & Plano Clark, 2023).

The core structures of a well-conceived mixed-methods study include: gathering and examining quantitative (closed) and qualitative (open) data; applying rigorous data collection and analysis procedures consistent with the traditions of each method, such as confirming appropriate sample sizes for both qualitative and quantitative research; integrating data during data collection, analysis, or interpretation; using approaches that apply both quantitative and qualitative mechanisms concurrently or sequentially, either with identical samples or with

different samples; and framing procedures within theoretical or philosophical research models, such as social construction models that aim to understand multiple perspectives on a single problem.

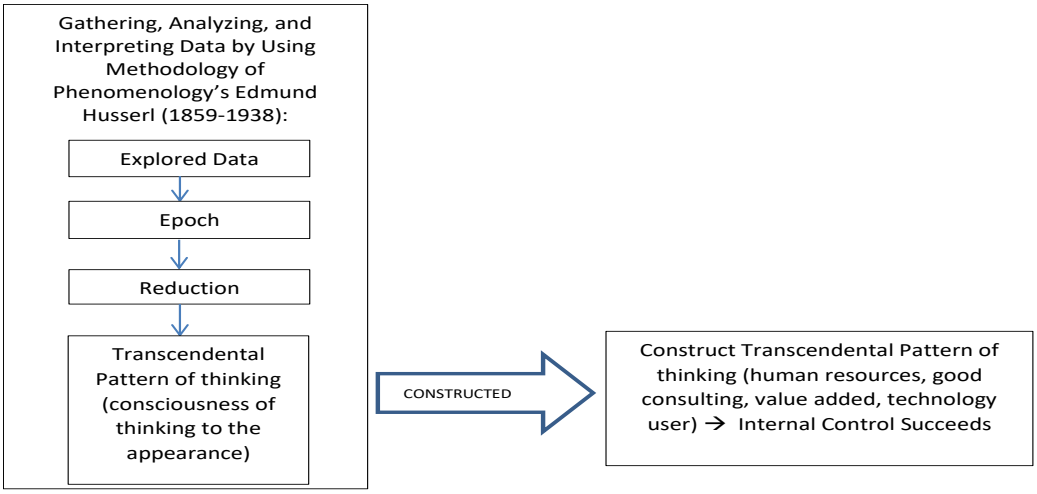

Figure 2. Research Framework of the Phenomenological Methodology in Constructing Internal Control Success

Data were obtained from questionnaires as primary data, with 56 (fifty-six) respondents from the Internal Controls of State Universities in Indonesia who had attended internal supervision training conducted by the Education and Training Agency of the State Audit Board and Development (Training of State Internal Auditor). A total of 93 questionnaires were distributed, and 90 were returned, leaving 3 respondents who did not submit their questionnaires. Among the 90 returned questionnaires, 34 respondents completed them partially, with some questions left unanswered. Consequently, the responses from these incomplete questionnaires were excluded from the data analysis. Details regarding the distribution and return of the questionnaires are presented in the table below.

Table 2. Details of Questionnaire Delivered and Returned

Questionnaire	**Total**	**Percentage**
Questionnaire distributed	93	100%
Questionnaire	**Total**	**Percentage**
Questionnaire not returned	3	3,33%
Questionnaire returned	90	96,77%
Aborted questionnaire	34	36,56%
Questionnaire used	56	60,22%
Response rate	90/93 x 100% =	96,77%
Usable response rate	56/93 x 100% =	60,22%

After analyzing the quantitative data, a qualitative interpretation of the data was requested from the informants. The laboratory identification technique employed by the researcher in this study was the intentional sampling technique. An informant (the source of the investigation) is a person who possesses information about the subject of the investigation. The informants for this study were obtained through direct interviews, referred to as reference persons. In this study, informants were identified using a hypothetical technique, chosen based on specific considerations and objectives, who had comprehensive mastery of the object under investigation. The informants in this study were senior auditors with extensive experience auditing government agencies and organizations.

As described in the research methodology above, there are two analyses for explaining latent variables: the reflective outer model and the formative outer model. This study employs partial least squares (PLS) using a reflective outer model. In the PLS reflective outer model, the role of indicators in describing the position and function of the latent variable is expected to yield insights into the nature of the latent variable. The initial test used a sample of 56 participants, each with

72 indicators.

RESULTS AND DISCUSSION

Results

The results of this initial test contained several indicators that did not meet the validity test requirements, which in this context can be measured by convergent validity, defined as the loading factor of a latent variable with its indicators. The expected convergent validity value is > 0.7. The results of the initial test showed that several indicators were still below 0.7.

For the resource development variable, convergent validity values meeting the requirements (above 0.7, loading factor according to Hair (2016) were obtained only for indicators number 12 and 18. Indicators on the latent variable Controller as a trusted advisor that met the requirements were indicators number 8, 11, 12, and 13. For the indicator assessing that the Controller is able to provide added value, the indicators meeting the convergent validity requirements were numbers 1, 2, 7, 8, 10, 12, and 13. In the Controller as a technology user variable, the indicators meeting the requirements were numbers 1, 4, 5, and 6. The dependent variable had indicators with convergent validity values above 0.7, namely numbers 2, 3, 4, 6, 10, 13, 14, and 15. Indicators that did not meet convergent validity criteria were subsequently eliminated.

Based on the results of the second run, some indicators were still below 0.7 according to the convergent validity requirements. Specifically, this was observed in the Controller as a technology user variable, with indicator number 2 underperforming. Therefore, it was necessary to rerun the data after eliminating these indicators. Based on the third run, satisfactory results were obtained, showing that all indicators had convergent validity values above 0.7.

Table 3. Measurement Model Assessment

Construct	AVE	CR	Cronbach's α	Min. Factor Loading
Workforce Strategy Developer (X1)	0.512	0.810	0.804	0.71
Trusted Advisor (X2)	0.538	0.823	0.817	0.72
Value-Added Provider (X3)	0.501	0.799	0.792	0.70
Technology User (X4)	0.557	0.836	0.831	0.72
Internal Control Success (Y)	0.531	0.819	0.813	0.73

Table 3: Measurement Model Assessment (AVE > 0.50; CR > 0.70; Cronbach's α > 0.70; Factor Loading > 0.70)
Note: Values in this table are based on PLS-SEM analysis conducted using SmartPLS. All indicators retained met the convergent validity threshold (loading > 0.70) as recommended by (Hair Jr et al., 2016). AVE values above 0.50 confirm convergent validity. CR and Cronbach's Alpha values above 0.70 confirm construct reliability.

Figure 3. Structural Model of Factors Influencing Internal Control Success

After all the outer models describing all indicators are validated, the regression coefficient test of the independent variable (independent) on the dependent variable (dependent) is conducted. For this purpose, bootstrapping is performed with a definite hypothetical direction, using a one-tailed test under the hypothesis condition that there is a positive relationship between variables X and Y. The outcomes of these tests are described as follows:

Thus, the H1 and H4 hypothesis tests were confirmed, whereas the H2 and H3 hypotheses were not supported. The confirmed and unconfirmed hypotheses can be explained as follows:

Confirmed hypothesis:

H1: Controller as a workforce strategy development significantly positively affects the success of internal control.

H4: Controller as technology users have a significant positive influence on the success of internal control.

Hypothesis that is not proven:

H2: Controller as trusted advisors significantly positively affect the success of internal control.

H3: Controller as providers of added value significantly positively affect the success of internal control.

Figure 4. Measurement and Structural Model of Internal Control Success

The coefficient of determination (R^2). This study shows that the relationship between the role of Controller and the success of internal control is significant, as indicated by a significance level below 0.05. This relationship can also be considered strong, as evidenced by the coefficient of determination (adjusted R^2) of 72.20%, which means that 27.80% of the determination of internal control success is attributable to other factors.

In the discussion above, it is stated that the variables significantly affecting the success of internal control are Controller as the development of workforce strategies and Controller as technology users. Furthermore, researchers need to pay attention to the indicators of the outer reflective model that exist in these variables, as they play a significant role in internal control success. The indicators within the variables that significantly influence internal audit success should be described to obtain further interpretation from informants in subsequent qualitative research. The Controller as workforce strategy development variable consists of: 1) Offering help to others in need. 2) Standing up for what is right.

The Controller as technology user variable consists of: 1) Control rules are directly generated from analyzed data. 2) Information technology has become a valuable control catalyst. 3) Technology infrastructure affects information technology governance. 4) Technology enables access to data in its original form and provides analytical capabilities to users

For the dependent variable, namely the success of internal control, the outer reflective model indicators that can be analyzed are: 1) Avoiding persistent delays in meeting obligations and

deadlines. 2) Avoiding low productivity, energy, and motivation. 3) Avoiding frustration over stalled progress. 4) Having an action plan to follow up on findings. 5) Providing recommendations for preventing reoccurrence. 6) Improving standard operating procedures (SOPs). 7) Leadership policies support the mitigation of goal barriers. 8) Human resources improvements and training.

Discussion

Development of workforce strategy (offering to help others in need)

Regarding the success of internal supervision, marked by a significant variable, namely Controller as a workforce strategy development, Informant 1 said, "Human labor is very useful in supporting internal control. Internal control requires the sincerity of the people who undergo the examination. It also includes its function of fostering and providing development input for the workforce."

In line with Informant 1, Informant 2 also stated, "From my experience working as an external auditor, who examines the effectiveness of internal control, I emphasize that the workforce is like a work partner. I noted the smoothness of the audit work I conducted. However, the existing workforce seems to have received less-focused training. Sometimes requests for audit documents supplied by employees are still difficult to use as basic evidence of the activity process. From that, I must say that the workforce must be developed."

Based on the whistleblower's description, it is necessary to develop an internal control strategy for the staff. By developing an effective and efficient workforce, internal supervisors can humanely succeed by prioritizing the inspection function with an advisory and consistent approach, including promoting favorable behavior. Helpful conduct refers to voluntary actions proposed to benefit others, as opposed to being ignored or considered irrelevant. It is a category of prosocial comportment (charitable actions intended to help another individual or group, such as entertaining, sharing, saving, and assisting). Altruism is differentiated from favorable comportment. Altruism refers to prosocial behavior performed without the expectation of extrinsic rewards (tangible or social rewards) or intrinsic rewards (self-esteem). An example of altruism is an anonymous donation to charity.

The development of the strategy described by the two informants, which seeks coordination and mutual aid, is consistent with Kane's theory explaining altruism from an evolutionary perspective. Because natural selection helps eradicate species unable to adapt to challenging environments, preserving decent character and greater genetic factors is important for the endurance of upcoming generations. W.D. Hamilton (1971) projected a scientific formula for Kane's theorem: $rB > C$, where B is the benefit to the receiver, C is the cost of altruism (measured by the quantity of offspring gained or lost), and r is the efficiency of the relationship (i.e., the probability that each offspring shares the same genetic factor). Experiments conducted in England support kin selection. The trial, demonstrated by the diagram, shows that people are more willing to offer support to individuals with a close affinity, consistent across cultures and genders.

Helping behavior can begin once we feel sympathy for another person, when we get to know and understand what that individual is experiencing. According to the sympathy and altruism hypothesis of Batson (1991), the decision to help or not depends primarily on whether one feels sympathy for the individual and on the costs and risks involved. This hypothesis is reinforced by several studies. For example, Fultz (1986) divided participants into a high-empathy group and a low-empathy group. Both listened to a student named Janet, who expressed feeling lonely. The study found that the more empathetic group, asked to vividly imagine Janet's feelings, voluntarily spent more time with her, regardless of whether their help was anonymous or not, resulting in lower social rewards. This indicates that empathy motivates helping behavior irrespective of costs and rewards, consistent with the empathy-altruism hypothesis.

In addition, a strong motivator for helping is a sense of responsibility to assist, especially when combined with the belief that one can help others. Responsibility can arise from a situation where accountability is centered on one person or as an individual characteristic (providing help when triggered by others' needs). Staub described a "positive orientation to social values" that increases the likelihood of helping under physical and psychological stress. Social orientation is negatively associated with childhood aggression and positively associated with "constructive patriotism." Components include a positive view of others, concern for others' well-being, and a sense of personal responsibility for others' welfare.

Development of workforce strategy (standing for what is right)

Informant 1 alluded to honesty in the audit assignment: “I am impressed with the human resources at the State University in Indonesia. They honestly state what they know and admit when they don’t know something. I could tell from the conversation during the assignment, which required the auditor to clarify transactions.” Honesty and integrity require courage, often difficult under pressure to conceal negative information, especially when superiors indoctrinate subordinates not to disclose wrongdoing.

Likewise, Informant 2 mentioned: "It's hard for people to tell the truth when rewards may outweigh risks if they withhold information. So long as protection and expected reward exist, honesty is difficult. Yet at the State Universities we audited, some individuals did tell the truth but requested anonymity.”

This scenario aligns with the views of Thomas Hobbes, Adam Smith, and the economic “man” concept, which suggests that people strategically act dishonestly in economic exchanges, balancing benefits and costs (Allingham & Sandmo, 1972; Becker, 1968). Psychologically and economically, truth-telling depends on internal rewards. Socialization instills cultural standards and values that guide individuals’ self-assessment and behavior. Trustworthiness is classically valued as part of internal reward systems. Adhering to these internal standards avoids negative self-concept and maintains a positive self-image. Thus, truth-telling requires courage and the ability to neutralize internal negative biases.

Controller as technology users - technology infrastructure affects information governance

Audit data analysis involves examining the entire dataset to identify deviations and trends for future review, providing audit evidence. Unlike traditional sample-based approaches, full-population analysis ensures greater accuracy. Informant 2 stated, "In the current digitization era, computers are essential to interpret large datasets quickly and accurately." Processing such data requires ethical rules and precision.

Audit data analytics allows auditors to identify problem areas early, perform better risk assessments, and generate high-quality evidence. Informant 1 emphasized careful data selection and compliance, noting that smaller firms may lack resources for advanced analytics tools. Still, the enhancement over traditional auditing is significant.

Controller as technology users — information technology as a control catalyst

Informant 2 stressed IT’s importance: “Internal control requires attention because stronger controls reduce material misstatements, whether intentional or unintentional. A reliable IT system is necessary.” IT controls safeguard assets, customers, and information, ensuring effectiveness, ethics, and trust. They are interdependent and susceptible to weak links, covering business control automation and IT operational/environmental controls. IT auditing has become essential to certify financial integrity and prevent failures, as seen in Enron and WorldCom.

Technology influences audits by enabling data acquisition, analysis, and informed assumptions on operational efficiency. Modern audits require technical skill development, adapting to dynamic, collaborative, and stringent global environments.

Controller as technology users — technology infrastructure impacts governance

Effective IT infrastructure enhances connectivity, productivity, and customer engagement. Informant 2 noted, “Flexible, consistent, and secure IT infrastructure allows companies to meet goals and maintain competitive advantages; poorly implemented infrastructure risks connectivity and operations.” Hardware, software, networks, virtualization, storage, and WAN management all contribute to performance, security, and operational continuity.

Controller as technology users — access to data and analytical capability

Data underpins economic activities, especially accounting. Modern technology enables access to massive, structured, and unstructured datasets, allowing comprehensive analyses. Informant 1 highlighted that IT enables auditors to identify outliers and generate insights critical for risk assessment and decision-making. Data security and cybersecurity are essential to protect networks, systems, and information. Informant 2 emphasized optimizing data processing for efficiency and audit accuracy. Human intervention remains critical for effective interpretation and advisory. By leveraging technology, audits integrate knowledge with strategy, reduce organizational risk, and guide supervisory boards, managers, and stakeholders.

CONCLUSION

The findings indicate that technology usage significantly enhances internal control effectiveness, aligning with prior studies showing that digital transformation improves audit quality and efficiency. Technology allows auditors to process large volumes of data, identify anomalies, and improve decision-making accuracy. Additionally, workforce strategy development ensures auditors have the necessary competencies to utilize these technologies effectively. However, the roles of trusted advisors and value-added providers were not found to be significant, suggesting that operational and technological capabilities may be more critical than advisory roles in public sector organizations. This study adopted a mixed-method approach, beginning with quantitative analysis followed by qualitative interpretation. The findings revealed that controllers as strategy developers and technology users significantly contributed to internal control success, with factors like data analysis and technology infrastructure playing vital roles in governance and decision-making.

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AUTHOR CONTRIBUTION STATEMENT

Choirul Anwar was responsible for conceptualization, methodology, formal analysis, and writing the original draft; Wiwik Pratiwi contributed to the literature review, qualitative interpretation, and editing; while Ika Tri Wahyuni conducted data collection, quantitative analysis, visualization, and manuscript proofreading.

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