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| RESEARCH ARTICLE

Evaluating Internal Control over Financial Reporting in State-Owned Enterprises: A COSO-Based Case Study of Indonesia's Infrastructure Sector

Moch Faisal Rizky[1]✉, Sudarso Kaderi Wiryono[2], and Taufik Faturohman[3]
[1,2,3] *School of Business and Management, Institut Teknologi Bandung, Bandung, Indonesia*
Corresponding Author: Moch Faisal Rizky, **E-mail**: faisalrizzky@gmail.com

| ABSTRACT

The integrity of financial reporting constitutes a fundamental pillar of corporate governance, particularly for state-owned enterprises operating under heightened public scrutiny. PT Hutama Karya (Persero), a major Indonesian state-owned infrastructure enterprise, faces significant challenges in its financial consolidation process due to heavy reliance on manual procedures despite SAP implementation at the entity level. This dependency exposes the organization to human error, inconsistent accounting policies, and potential fraud risks. This study evaluates the design effectiveness of Internal Control over Financial Reporting within the Financial Statement Closing Process at PT Hutama Karya using a qualitative case study methodology grounded in the COSO 2013 framework. Data from semi-structured interviews with eight key stakeholders, questionnaire responses from financial and risk management personnel, and comprehensive document analysis were thematically assessed across the five COSO components. The findings reveal that the current ICFR design is not fully effective, with critical deficiencies identified in manual process dependency, system integration gaps, competency limitations, inadequate IT general controls, and restricted monitoring scope. Four interrelated root causes underpin these deficiencies: technology-process mismatch between entity-level SAP and group-level Excel consolidation; competency and awareness gaps across all three lines of defense; inadequate IT general controls including absence of digital approval workflows; and monitoring scope limitations driven by resource constraints. The study proposes an enhanced, technology-integrated ICFR framework anchored on automation, integration, standardization, real-time monitoring, and competency development. A phased implementation roadmap is developed to transform the consolidation process, aiming to significantly reduce consolidation cycle times, improve data timeliness, minimize control deficiencies, and strengthen external audit readiness. This study contributes to the internal control literature by extending the COSO framework to complex state-owned enterprise contexts, identifying "technology-process mismatch" as a distinct theoretical construct, developing a competency framework for ICFR implementation, and refining the Three Lines of Defense model through identification of the "testing gap." The enhanced framework provides reasonable assurance over financial reporting, ultimately strengthening corporate governance and stakeholder confidence in the organization's financial disclosures.

| KEYWORDS

COSO, Financial Consolidation, ICFR, Internal Controls, State-Owned Enterprise

| ARTICLE INFORMATION

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1. Heading

The integrity of financial reporting constitutes a fundamental pillar of corporate governance, particularly for state-owned enterprises (SOEs) that operate under heightened public scrutiny and bear substantial responsibility for national economic development. PT Hutama Karya (Persero), a major Indonesian state-owned infrastructure enterprise, exemplifies the complex challenges inherent in maintaining robust financial reporting controls within a multi-entity, project-based organizational structure. As the parent entity overseeing a network of subsidiaries across diverse sectors including toll roads, construction, and manufacturing, the company faces significant operational complexity that amplifies the risk of material misstatement in its

consolidated financial statements. This complexity is further compounded by accounting intricacies such as revenue recognition under the percentage-of-completion method, intercompany transaction eliminations, and the harmonization of accounting policies across multiple entities.

Despite the implementation of an enterprise resource planning (ERP) system, specifically SAP, to standardize financial processes at the entity level, a critical bottleneck persists within the group-wide consolidation process. The financial statement closing process (FSCP) at PT Hutama Karya remains heavily dependent on manual procedures, relying on spreadsheets for data aggregation, intercompany eliminations, and reconciliations. This manual dependency creates heightened exposure to human error, inconsistent accounting treatments, and potential fraud risks that are difficult to detect in the absence of effective internal controls. The tension between accelerating demands for timely financial information and the current labour-intensive consolidation procedures creates a high-risk environment where undetected discrepancies can propagate material misstatements throughout consolidated financial reports.

The critical importance of a well-designed and effective Internal Control over Financial Reporting (ICFR) framework becomes evident in this context. A robust ICFR system provides reasonable assurance regarding the reliability and accuracy of consolidated financial data, ensuring that all transactions are recorded completely, accounting policies are applied consistently, and risks of error or fraud are mitigated (COSO, 2013). The Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework, with its five interrelated components—Control Environment, Risk Assessment, Control Activities, Information and Communication, and Monitoring—provides the globally accepted paradigm for structuring ICFR (COSO, 2013). However, the theoretical robustness of this framework often clashes with practical implementation challenges, particularly in complex organizational structures where consolidation processes introduce significant vulnerabilities (Vallabhaneni, 2024).

Previous research has established that effective ICFR significantly reduces both the risk and occurrence of financial statement fraud, with components such as control environment and monitoring activities serving as statistically significant predictors of fraud prevention (Lokanan & Sharma, 2025). Hermanson et al. (2012) further demonstrated that organizations with mature ICFR frameworks experience fewer material weaknesses and enhanced detection capabilities. Nevertheless, the implementation gap remains substantial, especially in state-owned enterprises where complex ownership structures and diverse operational segments create unique control challenges that demand tailored approaches beyond generic COSO implementation (Chen et al., 2025). Studies examining the operational consequences of ineffective ICFR have revealed that material weaknesses in internal controls impair not only reporting quality but also operational efficiency, with remediation efforts yielding improvements in sales, margins, and return on assets (Feng et al., 2015).

Despite these contributions, research examining ICFR effectiveness within the specific context of Indonesian state-owned enterprises, particularly those operating in the infrastructure sector with multi-entity consolidation requirements, remains limited. The manual consolidation process at PT Hutama Karya presents a unique opportunity to investigate how technology-process mismatches, competency gaps, and inadequate IT general controls undermine ICFR effectiveness. Moreover, the company's ongoing technology transformation provides a timely context for developing an enhanced, technology-integrated ICFR framework that addresses the inherent weaknesses of manual consolidation processes. This study, therefore, addresses the following research questions: (1) How effective is the current design of Internal Control over Financial Reporting in the Financial Statement Closing Process at PT Hutama Karya (Persero)? and (2) How can the design of ICFR be enhanced to strengthen internal controls within the FSCP consolidation process at PT Hutama Karya (Persero)?

This study makes several contributions to the existing body of knowledge. First, it extends the application of the COSO 2013 framework to complex, multi-entity state-owned enterprises in emerging economies, demonstrating that even strong "tone at the top" is insufficient without corresponding attention to technology integration and human capital infrastructure. Second, it identifies "technology-process mismatch" as a distinct theoretical construct, revealing that adequate entity-level technology does not guarantee effective group-level controls without integration across organizational levels. Third, it develops a competency framework for ICFR implementation specifying three critical competencies—financial accounting and IFRS knowledge, business process understanding, and internal control concepts—that must be systematically developed across all three lines of defense. Fourth, it refines the Three Lines of Defense model through identification of the "testing gap" in resource-constrained environments, where critical FSCP controls are systematically excluded from testing due to resource limitations.

2. Literature Review

2.1. Theoretical Foundation of Internal Control over Financial Reporting

The efficacy of Internal Control over Financial Reporting (ICFR) transcends mere regulatory compliance, serving as a cornerstone of corporate governance that directly impacts the reliability and credibility of financial information. While regulatory frameworks like the Sarbanes-Oxley Act (SOX) of 2002 provide the mandatory impetus for ICFR implementation—specifically Section 404, which mandates management assessments and external auditor attestations for publicly listed companies (SEC, 2003)—its

strategic value lies in creating a robust mechanism for safeguarding stakeholder interests. Section 404(a) requires management to assess and report on the effectiveness of its internal control over financial reporting annually, while Section 404(b) mandates that external auditors provide independent attestation of that assessment, creating a dual-layer validation system (PCAOB, 2005; SEC, 2003).

The regulatory foundation for ICFR implementation establishes a multi-layered accountability structure where management must not only establish and maintain adequate ICFR but also formally assess and report on its effectiveness, while external auditors must provide independent attestation (PCAOB, 2005). For organizations like PT Hutama Karya (Persero), operating with multiple subsidiaries across diverse sectors including toll roads, construction, and manufacturing, the implementation imperatives extend beyond basic compliance. The conglomerate structure introduces heightened risks related to intercompany transactions, foreign currency translations, and policy harmonization across operational units, necessitating a tailored approach to ICFR implementation that addresses sector-specific risks while maintaining consolidated control integrity.

The COSO (2013) framework remains the globally accepted paradigm for structuring ICFR, with its five interrelated components providing a comprehensive blueprint for organizations. The framework comprises three fundamental dimensions: objectives of internal control (operations, reporting, and compliance), organizational structure (applicable to the overall entity and its subunits), and five components of internal control supported by 17 principles that must be present and functioning to constitute an effective system (COSO, 2013). The five components are: Control Environment, which sets the organization's ethical tone and operating discipline; Risk Assessment, a dynamic process for identifying and analyzing risks; Control Activities, the actions established through policies and procedures to mitigate risks; Information and Communication, the systems that support the identification, capture, and exchange of information; and Monitoring Activities, processes used to assess the quality of internal control performance over time.

However, the theoretical robustness of this framework often clashes with practical implementation challenges, particularly in complex organizational structures like multi-subsidiary corporations where consolidation processes introduce significant vulnerabilities. Vallabhaneni (2024) emphasizes that the control environment, or "tone at the top," is critical for successful implementation, noting that without strong ethical leadership and management commitment, control activities may prove ineffective. Additionally, risk assessment processes must remain dynamic to address evolving risks such as cybersecurity threats and regulatory changes. The critical role of ICFR becomes particularly evident during the financial statement closing process (FSCP), where control failures can propagate material misstatements throughout consolidated financial reports.

Research demonstrates that effective ICFR significantly reduces both the risk and occurrence of financial statement fraud, with Lokanan & Sharma (2025), providing empirical evidence through machine learning models that components like control environment and monitoring activities are statistically significant predictors of fraud prevention. Effective ICFR provides numerous benefits, including promoting accountability, safeguarding a company's assets from fraud or significant loss, maintaining the integrity of financial data and transactions, facilitating compliance with applicable financial reporting frameworks, and enabling information flows across the entity (KPMG, 2025). Similarly, Hermanson et al. (2012) established that organizations with mature ICFR frameworks experience fewer material weaknesses and enhanced detection capabilities. Beasley et al. (2005) emphasize that organizations with strong "tone at the top" and ethical leadership demonstrate significantly better ICFR outcomes, suggesting that beyond technical implementation, cultural factors play a decisive role in ICFR effectiveness.

Despite its comprehensive structure, COSO framework implementation faces significant challenges, particularly in complex organizational structures like multi-subsidiary corporations. In the context of financial consolidation, implementation challenges include standardizing accounting policies across subsidiaries, managing complex intercompany transactions, and ensuring timely data submission. (Lokanan & Sharma, 2025) demonstrate that inconsistencies in policies and procedures can lead to material misstatements, while emphasizing that monitoring activities must be continuous to promptly identify control deficiencies. However, the framework's effectiveness ultimately depends on its integration with technological solutions and organizational culture, particularly in state-owned enterprises where bureaucratic traditions may conflict with control consciousness requirements.

2.2. Risks in the Financial Statement Closing Process and the Role of Technology

The financial statement closing process in complex infrastructure organizations represents a critical convergence point where multiple operational vulnerabilities manifest as financial reporting risks. The inherent complexity of long-term contracts, multi-entity structures, and manual consolidation processes creates a high-risk environment requiring robust internal controls. Particularly in construction and infrastructure sectors, the application of percentage-of-completion accounting introduces significant estimation risk, where subjective assessments of project completion and cost-to-complete estimates can lead to material misstatements (Power, 2007). This risk is compounded by organizational pressures to meet financial targets, creating conditions where management override of controls becomes a substantive threat to reporting integrity (Beasley et al., 2005).

The manual nature of consolidation processes in many organizations presents a fundamental control challenge. Manual intercompany eliminations and data aggregation processes are inherently prone to human error and manipulation, creating vulnerabilities that automated systems would otherwise mitigate (Nicolaou & McKnight, 2006). This risk is particularly acute in decentralized operations with diverse business segments, where inconsistent application of accounting policies across subsidiaries can result in non-comparable financial information and violation of group accounting standards (Cohen et al., 2004). The time pressure inherent in financial closing cycles further exacerbates these risks, leading to potential cut-off errors where transactions are recorded in incorrect periods, particularly affecting revenue recognition and liability accounting (Kinney Jr, 2000).

This risk of delayed reporting creates a critical tension between the need for speed and the demand for accuracy. Management and stakeholders are deprived of timely information for strategic decision-making, and the company operates under heightened regulatory and reputational pressure as reporting deadlines approach or are exceeded (Janvrin & Mascha, 2014). For a state-owned enterprise, this also impacts transparency and accountability to the public and government. The risk of inconsistent accounting policies is exacerbated in a diversified holding structure spanning toll roads, construction, and manufacturing. Each sector may interpret and apply group-wide accounting policies—especially for complex areas like revenue recognition from long-term contracts and asset capitalization—differently. Without a centralized, automated validation control, the parent entity's consolidation team faces significant challenges in ensuring uniform application, leading to non-comparable data and adjustments that are often retrospective and error-prone (Iziduh et al., 2021). The effective mitigation of these FSCP risks requires a multi-layered control approach that addresses both technical accounting challenges and process vulnerabilities, including implementing robust supervisory review processes for significant estimates, enhancing automated controls in consolidation systems, strengthening IT governance, and maintaining a control environment that discourages inappropriate management intervention (Maijoor, 2000; Simons, 1994).

Technological advancements, particularly in the realms of Business Intelligence, machine learning, and automation, have significantly transformed Internal Control over Financial Reporting by enabling real-time monitoring, predictive analytics, and enhanced accuracy in financial processes. These innovations address longstanding challenges such as manual errors, fraud risks, and inefficiencies in financial consolidation. Business Intelligence systems facilitate the integration of data from disparate sources, improving the accuracy and efficiency of financial consolidation processes (Alshehadeh et al., 2023). Enterprise Performance Management systems automate data validation, translation, and elimination, thereby reducing the risk of human error and potential fraud. Such automation not only streamlines reporting but also enhances the reliability of financial data.

Research indicates that Enterprise Resource Planning systems generally enhance accuracy, efficiency, and transparency in financial reporting, support accounting process automation, and strengthen internal controls, though successful implementation requires process adaptation (Ramadani & Fiddin, 2025). Machine learning algorithms further bolster ICFR by identifying subtle patterns and anomalies indicative of fraudulent activities. Lokanan & Sharma (2025) demonstrate that models such as Random Forest and Autoencoders achieve near-perfect accuracy in detecting financial statement fraud based on COSO framework components. These technologies enable proactive risk management by flagging irregularities before they escalate into significant issues. Additionally, automated tools for continuous monitoring, including robotic process automation, improve the timeliness and reliability of control activities (Villar & Khan, 2021). Robotic process automation can execute repetitive tasks with high precision, freeing up human resources for more strategic functions such as analysis and decision-making.

For entities like PT Hutama Karya, leveraging these technologies can mitigate challenges associated with manual consolidation, such as prolonged timelines and recurrent errors. However, successful implementation requires skilled personnel and a robust IT infrastructure, which may pose barriers for some organizations (Charoenwong et al., 2024; Hamed, 2023). Moreover, the integration of regulatory technology solutions driven by compliance requirements can further enhance ICFR by improving data integrity and monitoring capabilities, though it may also increase operational costs, particularly for smaller firms (Charoenwong et al., 2024).

The technological infrastructure supporting FSCP often reveals significant control gaps. Many organizations operate with incompatible systems between parent and subsidiary entities, creating data integrity issues that compromise the consolidation process (Ifinedo, 2014). These system integration failures, combined with inadequate IT general controls, create an environment where fraudulent activities in manual processes may go undetected, especially when segregation of duties is weak (Sarens & De Beelde, 2006). The convergence of these risks—estimation subjectivity, manual process dependency, system limitations, and time pressure—creates a perfect storm where regulatory non-compliance becomes a material concern, potentially resulting in legal penalties and reputational damage (Treviño et al., 2014).

3. Methods

3.1. Approaches and Methods

The characteristics of this study, which focuses on a phenomenon that has received limited attention in contemporary research within the Indonesian state-owned enterprise context, suggest the value of taking an exploratory direction. Hair Jr et al. (2023) underscore the merit of exploratory inquiry when knowledge of an issue is lacking. As a result, exploratory research, which often involves qualitative techniques such as interviews, can produce new themes, ideas, or relationships (Hair et al., 2010). These principles align with a qualitative case study methodology, which is widely recognized as the most suitable research strategy for exploring complex organizational phenomena where contextual factors are inseparable from the subject of inquiry (Yin, 2018). Case studies are particularly effective for addressing "how" and "why" questions in real-world settings where the researcher has limited control over events (Yin, 2018).

The research design adopts a dual-stage structure that systematically transitions from understanding the current state of ICFR effectiveness to designing a robust, future-state framework. Stage One assesses the effectiveness of the existing ICFR design within the FSCP at PT Hutama Karya, employing a diagnostic analysis grounded in the COSO 2013 framework (COSO, 2013). Stage Two focuses on the development of prescriptive recommendations for redesigning the FSCP, applying Business Process Reengineering principles integrated with the COSO framework to achieve significant improvements in efficiency and alignment with internal control objectives (Hammer & Champy, 2009). The research design is illustrated in Figure 3.1.

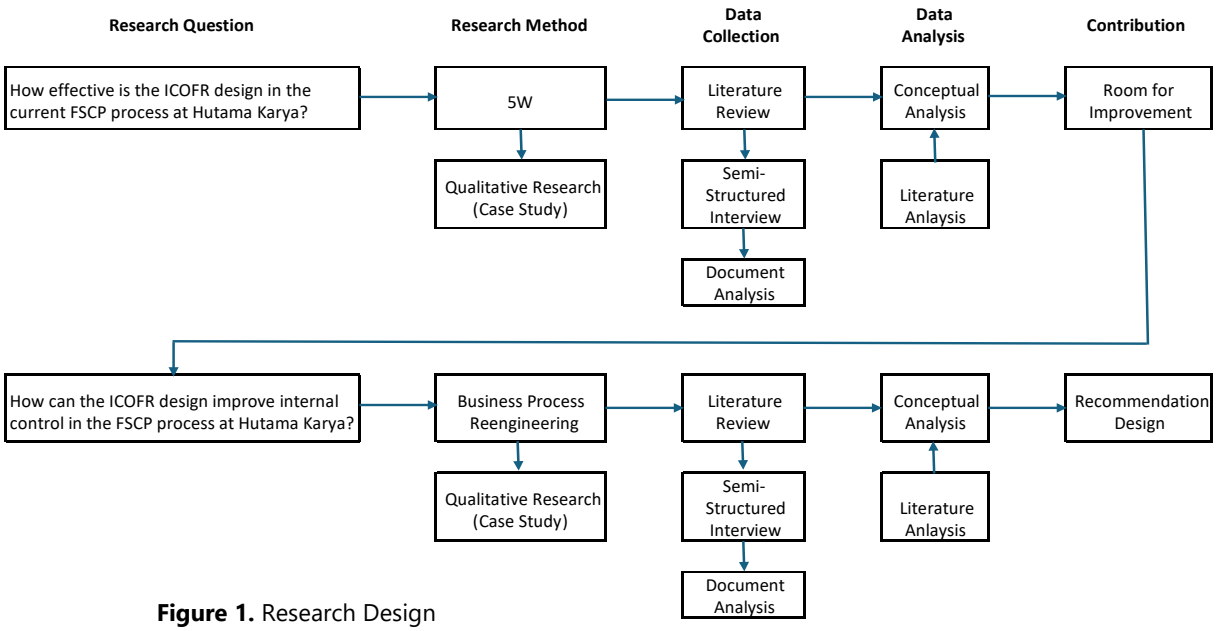


Figure 1. Research Design

Source: Authors' own work

3.2. Data Collection

To learn about the key themes under investigation, purposive sampling was chosen. This method entails making decisions concerning the participation of subjects based on several criteria that include their specialist knowledge, experience associated with the particular focus of the study, as well as their disposition and capacity to partake in it (Jupp, 2006). Additional criteria for this research included, but were not limited to: strategic oversight of financial reporting, operational responsibility for consolidation activities, technical expertise in internal controls and accounting systems, and cross-representation from different organizational levels. A total of eight potential participants were identified through consultation with organizational leadership and the researcher's professional network within PT Hutama Karya. All eight individuals initially contacted agreed to participate in the study. However, one participant was excluded from the final analysis because their role was not directly relevant to the FSCP consolidation process. Table 1 contains descriptive participant information with participant-identified roles.

Table 1. Interview Respondents

No.	Respondent	Position
1	Mr. WL	Vice President of Accounting, PT Hutama Karya
2	Mr. AR	Vice President of Risk, PT Hutama Karya
3	Mr. GT	Consolidation Accounting, PT Hutama Karya
4	Mr. BS	Accountant, PT Hutama Karya
5	Ms. IV	Accountant, PT Hutama Karya
6	Mr. KN	Risk Manager, PT Hutama Karya
7	Mr. BT	Internal Audit Department, PT Hutama Karya
8	Mr. TB	Internal Audit Department, PT Hutama Karya

The interview protocol was developed in Indonesian, adhering to principles of contextual relevance to maximize functional and construct equivalence (Douglas & Craig, 2007). Two sections were featured in the interview protocol, with the first seeking to learn about participants' roles and responsibilities, while the second was composed of semi-structured open-ended questions exploring risk assessment, control activities, information and communication, monitoring activities, control environment, technology and automation, gap analysis, and prescriptive design. The crafting of these questions considered various existing contributions to the fields of internal control, financial reporting, and the COSO framework, including (COSO, 2013), Feng et al. (2015), Hermanson et al. (2012),Lokanan & Sharma (2025), Power (2007), and Vallabhaneni (2024). To maximize data collection, participants were asked to provide extended comments and illustrations based on their experience and knowledge. At the start of the face-to-face meetings, conducted at PT Hutama Karya's headquarters in Jakarta, Indonesia, the participants were informed that completing the interview would constitute their consent to participate in the research.

In addition to interviews, a questionnaire was administered to complement the interview data. The questionnaire employed a five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree) and was structured around the five components of the COSO 2013 framework: Control Environment, Risk Assessment, Control Activities, Information and Communication, and Monitoring Activities. The questionnaire included 30 items, with both positively-worded and negatively-worded questions to capture perceptions of control effectiveness and risk prevalence.

Secondary data were also gathered, comprising pre-existing information not originally collected for this study but relevant to the research question, to provide contextual depth, theoretical foundation, and factual corroboration. Sources included internal corporate documents such as Standard Operating Procedures for the FSCP, internal audit reports, organizational charts, and the company's existing Risk Control Matrix. All secondary sources were subjected to critical evaluation based on their reliability, validity, authorship, and relevance to the specific research question to ensure the integrity of the analysis.

3.3. Data Analysis

In line with the chosen case study approach, two methods were considered for the data analysis. Firstly, thematic analysis was used (Braun & Clarke, 2006). This method enables the interpretation of text data by allowing researchers to code and identify themes and patterns through a classification process. Thematic analysis involved familiarization by immersing in the data through reading and re-reading transcripts; generating initial codes by systematically coding interesting features across the entire dataset; searching for themes by collating codes into potential themes; reviewing themes by checking if they work in relation to the coded extracts and the entire dataset; defining and naming themes by refining the specifics of each theme; and producing the report by selecting vivid, compelling extract examples. The coding framework was deductively structured around the five components of the COSO 2013 framework, providing a theoretically robust lens to categorize and analyze the qualitative data.

Secondly, the findings from the thematic analysis were systematically compared against the ideal standards set by the COSO 2013 framework. This gap analysis identified the precise areas where the current ICFR design deviates from best practices. A matrix was utilized to document and quantify these gaps across the five COSO components and 17 principles. Gap severity was classified into two levels: moderate gap, indicating that controls or processes are in place but require improvement to achieve consistent and effective implementation; and significant gap, indicating major deficiencies or the absence of key controls that require immediate management attention and corrective action.

For the questionnaire data, following established methodological conventions for interpreting summated Likert-scale data, response ranges were interpreted as: Strongly Disagree = 1.0 - 1.5, Disagree = 1.51 - 2.5, Neither Agree nor Disagree = 2.51 - 3.5, Agree = 3.51 - 4.5, and Strongly Agree = 4.51 - 5.0 (Jebb et al., 2021; Sullivan & Artino Jr, 2013). For diagnostic evaluation, mean scores below 3.39 were deemed low, scores between 3.40 and 3.79 were deemed moderate, and scores exceeding 3.79 were deemed high (Jebb et al., 2021). Because the questionnaire contained both positively-worded items (where higher scores indicate stronger control effectiveness) and negatively-worded items (where higher scores indicate greater control deficiencies), the ideal condition standard was contextualized to each question's orientation.

To confirm coding consistency, the researcher engaged in regular coding debriefing sessions with academic supervisors who had different levels of familiarity with the data. During these meetings, questions were raised, concerns noted, and patterns identified across the data. The product of the coding process was one set of final codes agreed upon by all members of the research supervision team. Through an iterative process that moved from initial coding to pattern coding, final themes emerged about how ICFR design effectiveness was perceived and how control gaps manifested across the organization. The combined analyses produced a comprehensive diagnostic assessment of ICFR design effectiveness, which informed the development of an enhanced, technology-integrated ICFR framework.

3.4 Trustworthiness in Qualitative Research

The study adheres to the trustworthiness criteria proposed by Guba (1981) and Shenton (2004). Credibility and confirmability were addressed through triangulation of multiple data sources (interviews, questionnaires, and internal documents) and methods, member checking with participants to verify interpretations, peer debriefing with academic supervisors to challenge assumptions, and thick description to provide contextual grounding. Dependability was ensured through a detailed audit trail documenting all research decisions and analytical steps, a structured and documented interview protocol, and a code-recode procedure to verify coding consistency. Transferability was supported through comprehensive description of the research context, allowing readers to assess the applicability of findings to similar organizational settings (Gioia et al., 2013; Shenton, 2004; Yin, 2018).

4. Results

4.1. Diagnostic Analysis-Current ICFR Design Effectiveness

The diagnostic analysis evaluated the current ICFR design against COSO 2013 framework benchmarks using questionnaire data from seven respondents and interview data from eight key stakeholders. The questionnaire employed a five-point Likert scale, with ideal thresholds set at ≥4.0 for positively-worded items and ≤2.5 for negatively-worded items (Jebb et al., 2021; Sullivan & Artino Jr, 2013).

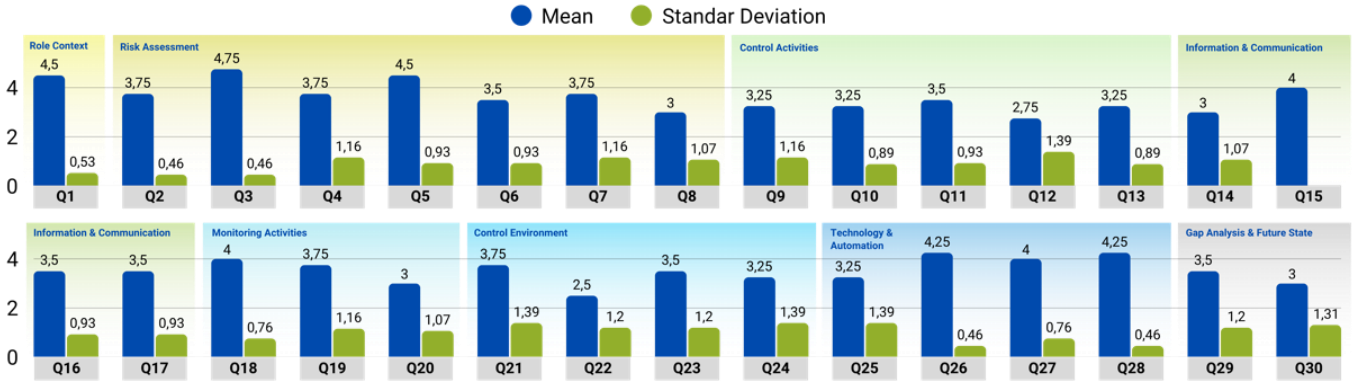


Figure 2. Questionnaire Evaluation of Current ICFR Design Effectiveness
Source: Authors' own work

a) Control Environment

The Control Environment component showed mixed results. Management commitment to control was evident (Q22 mean 2.50, meeting the ideal threshold for negatively-worded items), indicating respondents did not perceive management as explicitly prioritizing speed over accuracy. However, leadership role-modeling (Q23 mean 3.50, SD 1.20) fell below the ideal threshold of 4.0, and deadline pressure was perceived to impact quality (Q24 mean 3.25, SD 1.39), exceeding the ideal threshold of 2.5.

Interviews revealed a bifurcated picture: strong top-level commitment but significant implementation challenges at operational levels. The VP of Risk emphasized: "Management must be committed that ICFR must be implemented and must be able to provide benefits to the company" (AR, interview, 2025). Hutama Karya has established an ICFR implementation roadmap and formed a special team through KPTS, supported by external consultants (AR, interview, 2025). The VP of Accounting corroborated: "Management already has a high awareness of the importance of control. Even before ICFR, procedures, checklists, and administration already existed" (WL, interview, 2025).

However, the Consolidation Accounting revealed operational tensions: "The timeline for completing reports does not change, so the consolidation team has to work faster with increasingly tight time. This condition has the potential to reduce the quality of work" (GT, interview, 2025). Competency gaps were identified as a fundamental weakness: "The competence and capability of human resources still need to be improved. This is understandable because ICFR is still relatively new in Indonesia and not many companies have implemented it" (AR, interview, 2025). The VP of Risk articulated three required competencies: "understanding financial reports or accounting, understanding systems and business processes, and understanding the concept of internal control" (AR, interview, 2025).

Accountability mechanisms remained underdeveloped. The Risk Management specialist observed: "The biggest weakness is awareness... e-ICoFR implementation needs to be supported by reward and sanction mechanisms. If they don't fulfill their obligations, there must be consequences, and if they perform well, they should be given recognition" (KN, interview, 2025). Organizational changes disrupted governance, as "there has been a massive organizational structure change so that many PICs who had previously received socialization were replaced by new personnel" (KN, interview, 2025).

b) Risk Assessment

Subsidiary data delays (Q3, mean 4.75) and intercompany transaction mismatches (Q5, mean 4.50) represented the most critical risks. Interviews confirmed that "approximately 40% to 60% of entities experience delays every month" (GT, interview, 2025). The Consolidation Accounting identified data validity as the most significant operational risk: "The biggest risk is data validity. The data submitted must be accountable. Several times we found incorrect or inconsistent formulas so the quality of the numbers provided was not good" (GT, interview, 2025).

The VP of Accounting identified multiple specific risks: "delays in submission of reports from subsidiaries, accounting information system disruptions, and the complexity of eliminating intercompany transactions within one group... the reconciliation minutes (BAR) are also a critical area because delays or inaccuracies in numbers can affect the elimination process" (WL, interview, 2025). The Accounting staff member added: "The biggest risk in accounting is journal entry errors that will directly impact financial reports" (IV, interview, 2025).

Fraud risk assessment revealed a significant gap. The Internal Audit Manager noted: "We cannot ensure that the flagging done by the second line is completely correct. It could be that controls that actually have high impact and fraud risk are categorized as medium or low risk. We have not validated to that stage" (TB, interview, 2025). The VP of Risk stated that "fraud is a major concern because it has a very significant impact on financial reporting" (AR, interview, 2025), yet FSCP controls were excluded from testing priority due to resource constraints.

Change management processes were inadequate. The Risk Management specialist noted organizational changes disrupted ICFR implementation: "There has been a massive organizational structure change so that many PICs who had previously received socialization were replaced by new personnel. As a result, the understanding of CSA completion has become different and potentially affects the reliability of CSA assessment results" (KN, interview, 2025). The VP of Accounting confirmed: "There are still differences in the level of understanding among PICs at subsidiaries, especially when dealing with new transactions such as acquisitions or joint operations" (WL, interview, 2025).

c) Control Activities

The Consolidation Accounting elaborated: "We still use Excel extensively, which is quite heavy and requires higher laptop specifications. In addition, the systems used by the parent, subsidiaries, and subsidiaries are different... the setup and data structure are not yet uniform, so adjustments are needed during consolidation" (GT, interview, 2025). The VP of Accounting confirmed: "the consolidation process still heavily uses Microsoft Excel" (WL, interview, 2025).

Intercompany elimination controls represented the most critical control activity. The Consolidation Accounting explained: "Elimination is divided into two: elimination of profit and loss and elimination of receivables and payables. For profit and loss, more than 90% relies on the Reconciliation Minutes (BA Rekon) sent by subsidiaries" (GT, interview, 2025). The Accounting staff member noted: "Reconciliation using Excel is also quite vulnerable because there is potential for data changes, incorrect input, or typos due to not being fully automated" (BS, interview, 2025).

IT general controls were inadequate. The Accounting staff member observed: "For journal approval, the current system does not yet accommodate digital approval" (IV, interview, 2025). The Internal Audit Manager confirmed: "For the third line, everything is still manual. Working papers still use Excel and supporting documents... SPI has not yet entered the system. We still use manual data requests per control" (TB, interview, 2025).

Review and reconciliation controls existed but were manual and inefficient. The VP of Accounting described layered reviews: "Before closing, we create checklists and reminders... During closing, we check normal balances, suspense accounts, and significant accounts. After closing, we conduct layered examinations and communicate findings in writing" (WL, interview, 2025). However, the Consolidation Accounting noted: "If differences are found, we send an email with a screenshot for correction or further investigation" (GT, interview, 2025).

d) Monitoring Activities

Monitoring Activities revealed significant scope limitations. The Internal Audit Manager acknowledged: "controls related to financial report closing do not enter the testing priority" (TB, interview, 2025). This exclusion was attributed to resource constraints: "The number of controls Hutama Karya has is very large, so we developed an internal approach to reduce the number of controls tested" (TB, interview, 2025). Testing was conducted based on three criteria: "controls with high impact, high risk, and those with indications of fraud risk. After reduction, it turns out that controls related to financial report closing do not enter the testing priority" (TB, interview, 2025).

Three Lines of Defense structure existed but faced implementation challenges. The VP of Risk explained the layers: "First, the first line conducts Control Self-Assessment (CSA)... Second, the second line conducts evaluation through Test of One (ToO). Third, the third line conducts Test of Design (ToD) and Test of Operating Effectiveness (ToE)" (AR, interview, 2025). However, the Risk Management specialist confirmed technology gaps: "the third line still conducts TOD and TOE manually so the second line must import the test results data into the application. This process still has human error risk" (KN, interview, 2025).

CSA implementation faced significant challenges. The Risk Management specialist noted: "Problems most often occur at the CSA reporting stage. The main cause is still related to the awareness of the first line" (KN, interview, 2025). The VP of Risk acknowledged: "The assessment is quite interesting because there is no very detailed standard yet. In the training we attended, the approach used was common sense or professional judgment" (AR, interview, 2025).

Deficiency reporting and remediation were structured but potentially slow. The Internal Audit Manager explained: "Testing is done in stages... If findings are found, the results are conveyed to the second line for follow-up. Findings that are not completed will be carried over to the next testing period until the March deadline" (TB, interview, 2025). Questionnaire findings showed moderate gaps in error documentation (Q19 mean 3.75, SD 1.16) and correction documentation (Q20 mean 3.00, SD 1.07).

Table 2. ICFR Design Gap Analysis Against COSO Framework Benchmarks

Principle	Ideal Condition/ Characteristics of Effective Implementation	Existing Conditions	Gap Analysis*
Component 1: Control Environment Gaps			
Principle 1: The organization demonstrates a commitment to integrity and ethical values.	Leadership consistently prioritizes reporting accuracy over project deadlines, enforcing a zero-tolerance policy for data manipulation across all subsidiaries (Treviño et al., 2014)	Management demonstrates commitment to control and accuracy, but operational pressures (deadline constraints) create tension between speed and accuracy. Q22 (mean 2.50) meets ideal threshold, but Q24 (mean 3.25, SD 1.39) indicates deadline pressure affects quality.	**Moderate Gap:** While tone at the top is positive, operational pressures compromise integrity. No documented zero-tolerance policy for data manipulation.
Principle 2: The board of directors demonstrates independence from management and exercises oversight of internal control.	The board possesses specialized expertise in project accounting and risk management, actively challenging management on consolidation controls and significant estimates (Cohen et al., 2004).	Board oversight exists but depth of specialized expertise in consolidation accounting may be limited. The VP of Risk noted ICFR is "currently managed by the ICFR Management Unit Team" and will be "dedicated to the Risk, Systems, and Compliance Management Division" (AR, interview, 2025).	**Moderate Gap:** Board oversight is established but may lack specialized consolidation expertise.
Principle 3: The organization establishes, with board oversight, structures, reporting lines, and appropriate authorities.	Clear authority limits and reporting lines are established across the group, with defined accountability for financial results and adherence to accounting policies (Simons, 1994)	Three lines of defense structure is established. However, the Accounting staff member noted: "Procedures between the head office and subsidiaries are also different, so they are not yet fully uniform" (IV, interview, 2025).	**Moderate Gap:** Structure exists but procedure application is inconsistent across entities.
Principle 4: The organization demonstrates a commitment to attract, develop, and retain competent individuals.	Financial teams possess specialized skills in construction accounting and consolidation procedures, supported by continuous training programs (Ployhart & Moliterno, 2011)	Significant competency gaps exist. The VP of Risk acknowledged: "Competence and capability of human resources still need to be improved. This is understandable because ICFR is still relatively new in Indonesia" (AR, interview, 2025).	**Significant Gap:** Major competency gaps exist across all lines of defense. Limited training programs specific to ICFR.
Principle 5: The organization holds individuals accountable	Performance metrics balance operational targets with financial reporting quality, rewarding adherence to control	Absence of formal reward and sanction mechanisms. The Risk Management specialist stated: "e-ICoFR	**Significant Gap:** No formal accountability mechanisms exist. Documentation quality is

for their internal control responsibilities.	procedures and accurate data submission (Merchant & Van der Stede, 2007)	implementation needs to be supported by reward and sanction mechanisms" (KN, interview, 2025). Q19 (mean 3.75, SD 1.16) and Q20 (mean 3.00, SD 1.07) indicate inconsistent documentation.	inconsistent.
Component 2: Risk Assessment Gaps			
Principle 6: The organization specifies objectives with sufficient clarity to enable risk identification.	Financial reporting objectives are precisely defined for complex contracts and consolidation requirements, enabling clear risk identification (Chapman, 1997).	Objectives are specified but may not be sufficiently clear for consistent risk identification across the group. Q4 (IFRS policy differences) received mean 3.75 (SD 1.16).	**Moderate Gap:** Objectives exist but interpretation varies across entities.
Principle 7: The organization identifies and analyzes risks to the achievement of its objectives.	Formal processes identify consolidation risks including manual errors, policy inconsistencies, and revenue recognition complexities across projects (Power, 2007).	Risks are identified and analyzed, but analysis may not be comprehensive. Q2 (Excel error risk, mean 3.75), Q3 (Data delay risk, mean 4.75), Q7 (Human error impact, mean 3.75).	**Moderate Gap:** Risk identification exists but analysis may have blind spots.
Principle 8: The organization considers the potential for fraud in assessing risks.	Assessment specifically addresses manipulation risks in manual consolidation and accounting estimates, evaluating incentives and opportunities for misstatement (Zahra et al., 2005).	Fraud is identified as a primary concern, but fraud risk assessment is incomplete. FSCP controls are excluded from testing. Internal Audit Manager: "We have not validated to that stage" (TB, interview, 2025).	**Significant Gap:** Fraud risk assessment is not comprehensive. FSCP controls are not prioritized for fraud risk testing.
Principle 9: The organization identifies and assesses changes that could significantly impact internal control.	Procedures exist to assess how system changes, acquisitions, or new regulations impact financial reporting controls (Garengo & Biazzo, 2013).	Change management processes are inadequate. The Risk Management specialist noted organizational changes have disrupted governance (KN, interview, 2025).	**Significant Gap:** No systematic process for assessing impact of changes on internal controls.
Component 3: Control Activities Gaps			
Principle 10: The organization selects and develops control activities to mitigate risks to acceptable levels.	Controls directly address consolidation risks through automated system controls and standardized manual procedures for data validation and eliminations (Maijoor, 2000).	Controls are predominantly manual. The VP of Accounting confirmed the consolidation process "heavily uses Microsoft Excel" (WL, interview, 2025). Q26 (Excel dependency, mean 4.25, SD 0.46).	**Significant Gap:** Over-reliance on manual controls, particularly Excel-based processes. Automated controls are largely absent.
Principle 11: The organization selects and develops general control activities over technology.	Robust IT general controls ensure data integrity in source systems, with strict access management and change control procedures (Ifinedo, 2014).	IT general controls are inadequate. Accounting staff: "For journal approval, the current system does not yet accommodate digital approval" (IV, interview, 2025). Q28 (Digital approval needed, mean 4.25).	**Significant Gap:** Inadequate access controls, no digital approval workflows, limited system integration.
Principle 12: The organization deploys control activities through policies and procedures.	Formal consolidation policies establish standardized processes, timelines, and data requirements for the entire group (Speklé et al., 2017).	While policies exist, they are not consistently deployed. Q14 (Report formats not uniform, mean 3.00, SD 1.07); Q16 (SOP compliance inconsistent, mean 3.50, SD 0.93).	**Moderate Gap:** Policies exist but are inconsistently applied across entities.
Component 4: Information and Communication Gaps			
Principle 13: The organization obtains, generates, and uses relevant, quality information.	Systems produce accurate, complete project and entity-level data suitable for consolidation needs and decision-making (Nicolaou & McKnight, 2006)	Information quality is inconsistent. Q3 (Data delay risk, mean 4.75); Q15 (Frequent data revisions, mean 4.00).	**Significant Gap:** Inconsistent information quality due to manual processes and inadequate validation.
Principle 14: The organization internally communicates information necessary to support internal control.	Clear channels between corporate and subsidiary teams ensure understanding of requirements and prevent organizational silence on issues (Morrison & Milliken, 2000).	Communication channels are often informal. Accounting staff: "Communication is still mostly done through personal messages or WhatsApp" (IV, interview, 2025). Q17 (Communication ineffective, mean 3.50, SD 0.93).	**Moderate Gap:** Informal communication predominates; documentation gaps exist.
Principle 15: The organization communicates with external parties regarding matters affecting internal control.	Proactive engagement with auditors and regulators about operational complexities and accounting treatments maintains transparency (Dando & Swift, 2003).	External communication is primarily reactive. Limited evidence of proactive engagement about control matters.	**Moderate Gap:** Limited proactive external communication about control matters.
Component 5: Monitoring Activities Gaps			
Principle 16: The organization selects, develops, and performs evaluations to ascertain whether internal control is present and functioning.	Combination of real-time monitoring and periodic internal audits specifically tests the effectiveness of consolidation controls (Sarens & De Beelde, 2006).	Evaluations are conducted but are not comprehensive. FSCP controls are excluded from testing. Internal Audit Manager: "controls related to financial report closing do not enter the testing priority" (TB, interview, 2025).	**Significant Gap:** Monitoring scope is limited; FSCP controls are not prioritized for testing. No real-time monitoring.
Principle 17: The organization evaluates and communicates internal control deficiencies in a timely manner.	Deficiencies in consolidation are promptly escalated and tracked for remediation, with clear accountability for resolution (Kinney Jr, 2000).	Deficiencies are evaluated and communicated, but the process may be slow. Q19 (mean 3.75, SD 1.16); Q20 (mean 3.00, SD 1.07).	**Moderate Gap:** Remediation process is staged and may delay resolution of critical deficiencies. Documentation quality is inconsistent.

Note: (*) Gap severity is classified into two levels: (a) Moderate Gap indicates that controls or processes are in place but require improvement to achieve consistent and effective implementation; while **(b)** Significant Gap indicates major deficiencies or the absence of key controls that require immediate management attention and corrective action.

The integrated analysis of questionnaire and interview data, systematically benchmarked against the COSO 2013 framework, provides a comprehensive answer to Research Question 1: How effective is the current design of Internal Control over Financial Reporting (ICFR) in the Financial Statement Closing Process (FSCP) at PT Hutama Karya (Persero)? The current ICFR design is not fully effective in providing reasonable assurance over the Financial Statement Closing Process at PT Hutama Karya. The diagnostic analysis reveals:

Critical gaps (mean exceeding 4.0 on negatively-worded items):
Q3: Subsidiary data delays (mean 4.75, critical gap 2.25 above ideal)
Q26: High Excel dependency (mean 4.25, critical gap 1.75 above ideal)
Q5: Intercompany transaction mismatches (mean 4.50, critical gap 2.00 above ideal)
Q15: Frequent data revisions (mean 4.00, critical gap 1.50 above ideal)

Significant gaps across all five COSO components, with Risk Assessment (6 of 6 items exceeding ideal) and Information and Communication (5 of 5 items exceeding ideal) being the most severely compromised. Root causes identified as:

1. Technology-process mismatch between entity-level SAP and group-level Excel consolidation
2. Competency and awareness gaps across all three lines of defense
3. Inadequate IT general controls including absence of digital approval workflows
4. Monitoring scope limitations excluding FSCP controls from testing

These deficiencies violate multiple COSO principles across all five components, creating material risk of financial misstatement. The design effectiveness is rated as moderately to critically ineffective, with Risk Assessment and Information and Communication being the most severely compromised components.

4.1. Prescriptive Analysis-Enhanced ICFR Design

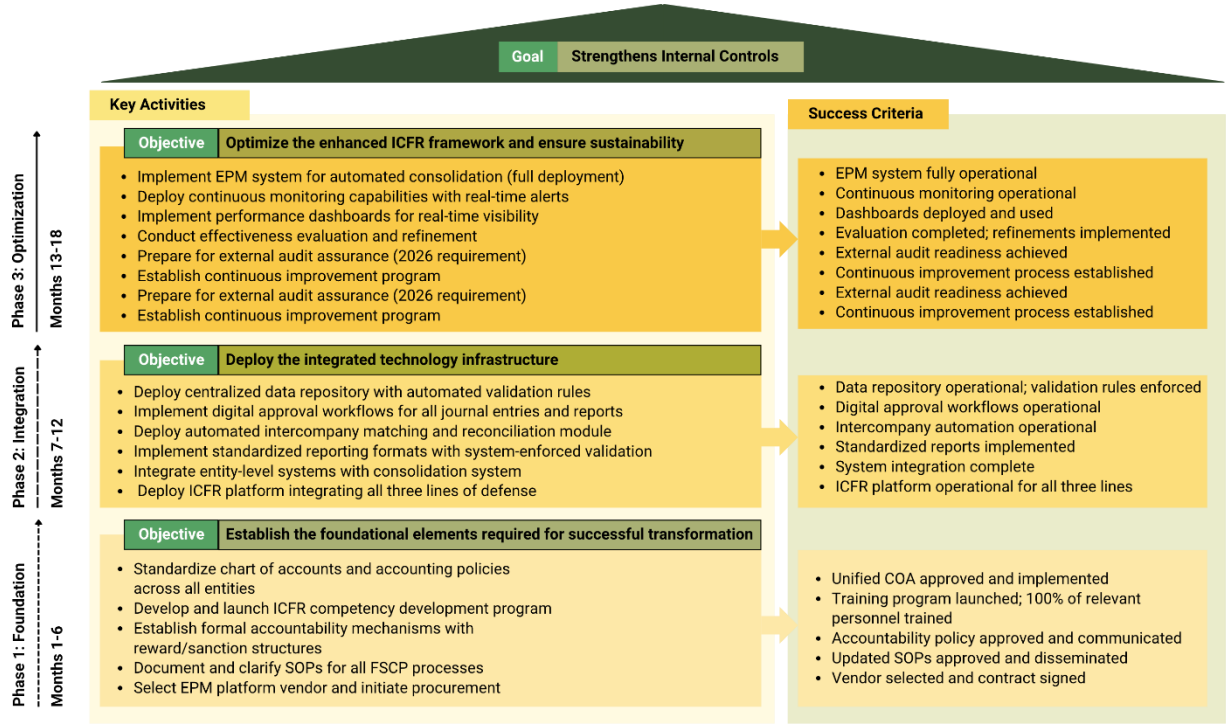
The prescriptive analysis addresses Research Question 2: How can the design of ICFR be enhanced to strengthen internal controls within the FSCP consolidation process at PT Hutama Karya (Persero)? The proposed design is guided by Business Process Reengineering principles (Hammer & Champy, 2009) and mapped against COSO 2013 and COBIT 2019 (Ashraf, 2025; ISACA, 2019).

Five core principles underpin the enhanced framework: Automation-First eliminates manual errors through EPM system implementation (Alshehadeh et al., 2023); Integration bridges entity-level and group-level systems (VP of Risk, interview, 2025); Standardization ensures consistent policy application across all entities; Real-Time Monitoring enables continuous control assessment (VP of Accounting, interview, 2025); and Competency Development builds human capital across three lines of defense (AR, interview, 2025).

Table 3. Future-State Control Design Summary

COSO Component	Key Enhancements	Technology Enabler
Control Environment	Structured competency program (3 modules); formal reward/sanction mechanisms; system-enforced quality gates	LMS; Performance Management System; Workflow Engine
Risk Assessment	AI-powered fraud risk assessment; formal change management; continuous risk identification with anomaly detection	AI Risk Scoring Engine; Change Management Module; Anomaly Detection Engine
Control Activities	EPM automating consolidation; digital approval workflows; standardized COA; automated intercompany matching	EPM Platform; Workflow Engine + IAM; System Configuration; RPA/AI Matching Engine
Information & Communication	Centralized data repository with validation; formal integrated communication channels; automated submission deadlines with escalation	Data Repository + Data Quality Engine; Integrated Communication Module; Workflow Engine + Dashboard
Monitoring Activities	Integrated ICFR platform connecting three lines of defense; continuous monitoring; automated remediation tracking	Integrated ICFR Platform; Real-Time Monitoring Engine; Remediation Tracking Module

Figure 3. Proposed Implementation Roadmap



Source: Authors' own work

5. Discussion of findings

This study evaluated the design effectiveness of Internal Control over Financial Reporting at PT Hutama Karya, revealing that the current ICFR framework is not fully effective in providing reasonable assurance over the Financial Statement Closing Process. The diagnostic analysis identified four critical gaps: subsidiary data delays (Q3 mean 4.75), high Excel dependency (Q26 mean 4.25), intercompany transaction mismatches (Q5 mean 4.50), and frequent data revisions (Q15 mean 4.00). These deficiencies violate multiple COSO principles across all five components, creating material risk of financial misstatement.

The findings demonstrate that even with strong "tone at the top" and SAP implementation at the entity level, operational-level control effectiveness remains compromised. This aligns with prior research establishing that organizations with mature ICFR frameworks experience fewer material weaknesses, yet implementation gaps persist, especially in complex organizational structures (Hermanson et al., 2012; Vallabhaneni, 2024). The study reveals that manual process dependency, competency gaps, and inadequate IT general controls collectively undermine control effectiveness, consistent with findings that deficiencies related to employee training, IT controls, and financial reporting processes continue to impact organizations across industries. The research also confirms that resource constraints significantly affect monitoring activities, as FSCP controls were excluded from testing due to the large number of controls and limited internal audit capacity. This finding resonates with broader evidence that resource constraints and weak internal control environments are positively associated with noncompliance with the COSO framework. Furthermore, the study provides empirical support from the Indonesian SOE context, where state-owned enterprises face challenges due to weak prevention of fraudulent financial statements, reinforcing the need for enhanced ICFR implementation in this sector.

The prescriptive analysis developed a technology-integrated ICFR framework anchored on automation, integration, standardization, real-time monitoring, and competency development. The proposed EPM implementation and digital approval workflows directly address the manual process dependency and IT control gaps identified in the diagnostic phase. This approach is consistent with evidence that Enterprise Resource Planning systems generally enhance accuracy, efficiency, and transparency in financial reporting, support accounting process automation, and strengthen internal controls. Technology helps finance teams embed internal controls directly into everyday processes through automated workflows that ensure transactions follow established approval hierarchies. The 18-month phased implementation roadmap provides a structured approach to transformation, with expected outcomes including reduced consolidation cycle time, improved data timeliness, and strengthened external audit readiness.

Theoretical Implications

This study makes several contributions to the theoretical understanding of ICFR effectiveness. First, it extends the application of the COSO 2013 framework to complex, multi-entity state-owned enterprises in emerging economies. While COSO is globally recognized, its implementation in organizations with multiple legal entities, diverse ERP systems, and project-based operations requires significant contextual adaptation. The finding that even strong "tone at the top" is insufficient without corresponding attention to technology integration and human capital infrastructure extends Beasley et al. (2005) work on control environment, suggesting that cultural factors alone cannot guarantee control effectiveness without operational infrastructure.

Second, the study identifies "technology-process mismatch" as a distinct theoretical construct. The gap between entity-level technology (SAP) and group-level technology (Excel) creates control vulnerabilities not addressed by existing frameworks. This extends Ifinedo (2014) work on IT general controls, demonstrating that even adequate entity-level IT controls do not guarantee effective group-level controls without integration. The finding challenges the "technology as panacea" assumption (Alshehadeh et al., 2023), suggesting that technology must be integrated across the organization to be effective. This is consistent with research showing that ERP does not always improve reporting timeliness or significantly reduce earnings management, and that successful implementation requires process adaptation, staff training, and proper system integration.

Third, the study refines the Three Lines of Defense model through identification of the "testing gap" in resource-constrained environments. The finding that FSCP controls are excluded from testing represents a significant theoretical insight: in resource-constrained environments, the Three Lines of Defense model creates systematic monitoring gaps that undermine the overall framework. This aligns with evidence that compared with design weaknesses, internal control operating weaknesses more severely impair financial reporting quality, leading to more earnings management, financial violations, and modified audit opinions. The implication is that under resource constraints, firms should prioritize strengthening the effective operation of internal controls.

Fourth, the study develops a competency framework for ICFR implementation, specifying three critical competencies: financial accounting and IFRS knowledge, business process understanding, and internal control concepts. This extends Ployhart & Moliterno (2011) work on human capital resources and Merchant & Van der Stede (2007) research on management control systems, providing a practical framework for competency development in the SOE context. The identification of these competencies is particularly relevant for state-owned enterprises where bureaucratic traditions may conflict with control consciousness requirements.

Practical Implications

The findings yield five critical practical implications for PT Hutama Karya and other Indonesian state-owned enterprises undertaking ICFR enhancement initiatives. Holistic Technology Investment. Organizations must adopt a holistic technology investment strategy that addresses integration across all organizational levels. The study demonstrates that entity-level SAP implementation is insufficient without corresponding group-level consolidation systems. The Consolidation Accounting's observation that "we still use Excel extensively" reflects a fundamental technology-process mismatch. Organizations must prioritize Enterprise Performance Management implementation that connects entity-level systems with group consolidation, automates manual processes, and establishes a single source of truth for financial data. This requires dedicated investment, clear governance structures, and a phased implementation approach.

Strategic Competency Development. Competency development must be elevated to a strategic priority with structured programs addressing three critical competencies: financial accounting and IFRS knowledge, business process understanding, and internal control concepts. Practical responses include implementing certification requirements for personnel involved in financial reporting, establishing knowledge transfer mechanisms to address staff turnover, and partnering with universities or professional bodies for specialized training.

Formal Accountability Mechanisms. Formal accountability mechanisms must embed ICFR compliance into organizational culture and performance management. Organizations should integrate ICFR performance into Key Performance Indicators for all personnel, establish clear consequences for non-compliance, and provide formal recognition for effective control implementation. Without formal mechanisms, ICFR implementation risks being perceived as a compliance exercise rather than operational excellence.

Integrated Monitoring Across Three Lines of Defense. Monitoring activities must be integrated through a common technology platform. The Internal Audit Manager's admission that "SPI has not yet entered the system" reflects fragmentation that undermines monitoring effectiveness. Organizations must invest in integrated ICFR platforms enabling real-time monitoring, automated control testing, and seamless information flow between lines of defense, addressing both immediate monitoring gaps and external audit readiness.

Continuous Improvement Culture. Organizations must establish a continuous improvement culture with annual effectiveness evaluations, lessons learned documentation, and systematic refinement of controls. Embedding ICFR improvement as a strategic priority with dedicated resources and governance structures ensures sustainability and ongoing refinement of the control framework.

6. Conclusions and Limitations

The findings demonstrate that the current ICFR design at PT Hutama Karya is not fully effective in providing reasonable assurance over the Financial Statement Closing Process. Four critical gaps were identified: subsidiary data delays (Q3 mean 4.75), high Excel dependency (Q26 mean 4.25), intercompany transaction mismatches (Q5 mean 4.50), and frequent data revisions (Q15 mean 4.00). These deficiencies violate multiple COSO principles across all five components, creating material risk of financial misstatement. Four interrelated root causes underpin these deficiencies: technology-process mismatch between entity-level SAP and group-level Excel consolidation; competency and awareness gaps across all three lines of defense; inadequate IT general controls including the absence of digital approval workflows; and monitoring scope limitations driven by resource constraints. The enhanced technology-integrated framework developed in this study, anchored on automation-first, integration, standardization, real-time monitoring, and competency development principles, provides a comprehensive solution. The 18-month phased implementation roadmap is expected to reduce consolidation cycle time from 10-15 days to 5 days, improve data submission timeliness from 40-60% to 95%, reduce control deficiencies by 70%, and reduce audit findings by 80%. This study makes four theoretical contributions: extending the COSO 2013 framework to complex SOE contexts; identifying "technology-process mismatch" as a distinct construct; developing a competency framework specifying three critical competencies; and refining the Three Lines of Defense model through identification of the "testing gap." The purpose of this study is to evaluate the effectiveness of ICFR design within the FSCP at PT Hutama Karya and develop an enhanced framework to strengthen internal controls.

There are several limitations to this research. First, the findings are context-specific to PT Hutama Karya's operational environment, limiting generalizability to other organizations. Second, this study evaluates design effectiveness rather than operating effectiveness, and does not test whether enhanced controls operate as intended in practice. Third, the necessarily small sample of eight interview participants, while capturing breadth across organizational roles, limits the representative nature of the findings. Fourth, the proposed ICFR framework was not tested for implementation efficacy. Fifth, the study excludes in-depth analysis of human error root causes. Thus, future studies should conduct comparative case studies across multiple Indonesian SOEs to examine contextual factors affecting ICFR implementation; undertake longitudinal research tracking ICFR effectiveness over time; examine the relationship between ICFR effectiveness and organizational performance; explore the application of emerging technologies including AI and machine learning for fraud detection; conduct comparative analysis between SOEs and private sector organizations; and investigate knowledge transfer mechanisms between external auditors and internal teams. The implication of this study leads to potential future research on investigating ICFR effectiveness in diverse SOE contexts especially measured from different approaches and methods.

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