



The influence of whistleblowing systems and internal audit on fraud prevention: evidence from PT Angkasa Pura Indonesia

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ABSTRACT

Fraud represents a critical threat to organizational integrity, particularly within state-owned enterprises in Indonesia. This study aims to examine the influence of whistleblowing systems and internal audit on fraud prevention in PT Angkasa Pura Indonesia. Employing a quantitative approach with Partial Least Squares Structural Equation Modeling (PLS-SEM), the research evaluates the relationships of whistleblowing and internal audit to fraud prevention. Data were collected via a structured questionnaire and validated through reliability and validity tests. The findings reveal that whistleblowing systems and internal audit have significant positive effects on fraud prevention, with internal audit showing a stronger influence ($\beta = 0.594$; $p < 0.001$) compared to whistleblowing ($\beta = 0.335$; $p < 0.001$). The structural model explains 75.2% of the variance in fraud prevention outcomes. Dominant indicators were identified: accessibility of reporting channels (whistleblowing), compliance with audit international standards (internal audit), and consistent enforcement of ethical sanctions (fraud prevention). The study concludes that integrating effective whistleblowing mechanisms and high-quality internal audits is essential to strengthening fraud prevention strategies. These mechanisms must be supported by a governance environment that emphasizes ethical enforcement, transparency, and accountability. Practical implications are offered for public enterprises seeking to minimize fraud risk through internal governance reform.

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INTRODUCTION

Fraud remains a systemic threat to organizational integrity and public trust, particularly within Indonesia's state-owned enterprises (SOEs). Various studies indicate that ineffective governance, weak ethical enforcement, and limited oversight mechanisms are key enablers of fraud (ACFE,

2024); (Yuniarti, 2017). In response, organizations increasingly rely on whistleblowing systems and internal audit functions as preventive strategies.

Whistleblowing systems (WBS) offer confidential channels for reporting unethical conduct. Their effectiveness depends on accessibility, trust, and assurance of protection for whistleblowers (Purnamawati, 2018). Research shows that WBS can deter fraud by fostering early detection and ethical vigilance (Fitriani Basri, 2021);(Rahman, 2020); (Sri Wahyuni & Nova, 2018). Moreover, recent studies emphasize that robust WBS integrated with ethical leadership can significantly deter fraudulent activities (Fitriani Basri, 2021); Rahman, 2020).

According to (Dapit et al., 2017), a whistleblowing system involves disclosures that must be made in good faith, and are not simply a company grievance policy or driven by malice or defamation. (Jayanti & Suardana, 2019) explain that whistleblowing is the act of reporting violations or unethical behavior by an organization's members (whether active or inactive) to internal or external parties as an effort to prevent fraud. This system functions as a means to uncover and report fraud in order to detect and minimize it. According to (Setiawati & Sari, 2016), whistleblowing is the process of disclosing fraudulent acts occurring within an organization or company to the relevant authorities, regardless of whether the fraud was committed by an individual or a team. Whistleblowing is simply the act of disclosing information to expose all kinds of harmful fraudulent issues from private or public organizations (Kumar & Santoro, 2017).

(Petraşcu & Ticianu, 2014) emphasize the role of internal audit in evaluating the effectiveness of internal control systems. Internal audit not only identifies weaknesses but also provides constructive recommendations for improvement. (Oki et al., 2021) highlight the role of internal audit in overseeing organizational activities. This oversight includes monitoring compliance with regulations, policies, and ethical standards, and how internal audit acts as an early detection mechanism for potential risks and deviations. (Onoja Emmanuel & Usman, 2015) emphasize the significant responsibility of internal audit in monitoring organizational activities to ensure that anti-fraud programs and controls are effective. They also highlight how internal audit plays a role in ensuring that organizational resources are used efficiently and effectively. (Hendri et al., 2020) emphasize the role of internal audit as a barometer of behavioral standards within an organization. Through continuous monitoring, internal audit fosters an efficient and ethical work environment and helps build an anti-fraud organizational culture.

Meanwhile, Internal audit functions (IAF) play a crucial role in fraud prevention by assessing risk management processes and internal controls. The competence and independence of internal auditors are pivotal in enhancing the quality of audits and, consequently, in preventing fraudulent financial reporting (Marfiana & Gunarto, 2021). When conducted with professionalism and independence, it significantly contributes to fraud prevention (Marfiana & Gunarto, 2021); (Rahmi et al., 2024); (Syafidinal et al., 2019). Technological advancements, such as the incorporation of artificial intelligence, have further augmented the capabilities of IAF in detecting complex fraud schemes (Mechta Mediana & Ellia Sandari, 2024).

Despite these mechanisms, empirical evidence on their combined effectiveness in large, integrated SOEs like PT Angkasa Pura Indonesia remains limited. Formed through the merger of PT Angkasa Pura I and II, this enterprise manages 37 airports nationwide and has adopted both internal audit systems and a whistleblowing framework. However, the impact of these systems on fraud prevention within the organization is yet to be thoroughly examined.

The selection of PT Angkasa Pura Indonesia as a case study is empirically highly relevant because this entity is a large State-Owned Enterprise (SOE) formed from the merger of two companies, which creates unique operational and structural complexities in managing 37 airports across Indonesia. This organization has also simultaneously adopted both whistleblowing systems and internal audit functions, yet empirical evidence on their combined effectiveness within such an integrated SOE context remains limited. Therefore, this study is crucial to fill this research gap and provide specific practical recommendations for fraud prevention in an organization as complex as

PT Angkasa Pura Indonesia, findings that might not be generalizable from SOEs with simpler oversight structures.

While whistleblowing systems and internal audit functions have been extensively studied in isolation as fraud prevention efforts, a key research gap lies in the scarcity of empirical evidence examining the combined effectiveness of these two mechanisms, particularly within the context of integrated Indonesian State-Owned Enterprises (SOEs). This study addresses this void by specifically evaluating the synergistic influence of whistleblowing systems and internal audit on fraud prevention at PT Angkasa Pura Indonesia, a large SOE resulting from a merger. This uniqueness not only enriches academic literature but also offers relevant practical recommendations for improving fraud prevention frameworks in the SOE sector.

This study aims to assess the influence of whistleblowing systems and internal audit on fraud prevention within PT Angkasa Pura Indonesia. Building on prior literature (Puryati & Febriani, 2020) and Utilizing Partial Least Squares Structural Equation Modeling (PLS-SEM), the research seeks to identify key indicators contributing to effective fraud deterrence. The findings are expected to contribute not only to the academic literature but also to provide practical recommendations for improving corporate fraud prevention frameworks in state-owned enterprises.

RESEARCH METHOD

This study employed a quantitative approach with a survey-based design to examine the influence of whistleblowing systems and internal audit on fraud prevention during May 2025. The population included employees of PT Angkasa Pura Indonesia who are involved in governance, risk, finance, or compliance functions. The sampling technique used was purposive sampling, targeting respondents with adequate knowledge and involvement in organizational governance. The instrument was developed based on validated indicators from previous studies and tested for reliability and validity through a pilot study. Indicators in the structured questionnaires were constructed from validated dimensions of whistleblowing systems, internal audit, and fraud prevention. All indicators were designed by reflective model since the causalities were from constructs to indicators (Hafiz Hanafiah, 2020). Before full-scale data collection, the instrument was tested for validity and reliability using a sample of 20 respondents. Validity was confirmed via item-total correlation ($r > 0.444$), while reliability was confirmed with Cronbach's alpha > 0.7 for all variables. Below the details of 27 indicators included in the questionnaire used.

Table 1. Exogenous and Endogenous Latent Variables and Reflective Indicators

Latent Variable	Dimensions	Code	Indicator
Whistleblowing System	Commitment	Ko1	The company and its employees are committed to caring about and understanding the implementation of the whistleblowing system.
		Ko2	The company is committed to enforcing strict sanctions against individuals involved in fraudulent acts.
	Policy	Ke1	The company has a detailed policy on whistleblowing, including definitions of violations, reporting procedures, confidentiality assurances, and protection for whistleblowers.
		Ke2	The company conducts regular training and socialization sessions to ensure employee understanding of the whistleblowing policy.
	Accessability	Ak1	The company provides various reporting channels (e.g., hotline, email, online

			forms, or suggestion boxes) for the whistleblowing system.
		Ak2	Employees find it easy to access whistleblowing reporting channels, whether anonymously or openly.
Internal Audit	Role & Services	PL1	The internal audit charter clearly defines the purpose, authority, responsibilities, and independence of the internal audit function.
		PL2	The internal audit function is positioned in the organizational structure to perform its duties independently and objectively.
	Human Resources Management	SDM1	The structure and number of internal audit staff are adequate to fulfill assigned responsibilities.
		SDM2	There are continuous training and development programs to keep internal audit staff competent and updated.
	Professional Practice	PP1	The internal audit function complies with the International Standards for the Professional Practice of Internal Auditing.
		PP2	The annual audit plan is developed based on identification and assessment of significant organizational risks.
		PP3	The audit methodology and techniques used include sufficient documentation, competent and relevant evidence collection, and effective supervision.
		PP4	There is an effective process for monitoring and following up on the implementation of audit recommendations by management.
	Accountability & Work Management	AMK1	Key Performance Indicators (KPIs) used to measure internal audit performance align with the organization's strategic goals.
		AMK2	Periodic external evaluations are conducted by independent parties to objectively assess the capabilities of the internal audit function.
	Corporate Culture & Realitions	BHK1	Communication and collaboration between internal audit and management are of high quality.
		BHK2	The internal audit function is significantly involved in the organization's governance process, such as providing input on policies and procedures.
	Corporate Governance Structure	STKK1	The Board of Directors and Audit Committee understand and support the internal audit function.
		STKK2	There is good coordination and collaboration between internal audit and other oversight functions (e.g., compliance, risk management).
Fraud Prevention	Opportunity	O1	The company ensures that no individual has full control over a transaction from beginning to end.
		O2	The company regularly reconciles accounts and monitors financial activities to detect irregular or unauthorized transactions.
	Justification	J1	Company leadership demonstrates ethical behavior and serves as a role model for all

		J2	The company consistently enforces strict sanctions for violations of the code of ethics.
Financial Pressure	FP1		The company provides compensation that is appropriate to employees' responsibilities, performance, and industry standards.
	FP2		The company sets realistic performance targets to avoid excessive pressure that could lead to unethical behavior.
	FP3		The company conducts objective performance evaluations and provides constructive feedback so employees feel valued for their contributions.

Finally, a total of 105 valid responses were collected. The main survey was analyzed with Partial Least Square-Structural Equation Modeling (PLS-SEM) using SmartPLS 4.0. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed in this study as the primary analytical tool due to its suitability for analyzing complex models with multiple constructs, especially when the research is exploratory or prediction-oriented. According to (Hair et al., 2017), PLS-SEM is particularly advantageous when the research model includes both formative and reflective constructs, when the data does not meet the assumption of normality, or when the sample size is relatively small.

The 105 respondents in this study are considered representative due to a purposive sampling technique that targeted employees from governance, risk, finance, or compliance functions within PT Angkasa Pura Indonesia. This ensures their direct involvement and adequate knowledge in oversight and anti-fraud activities, implicitly reflecting relevant work experience for understanding whistleblowing systems and internal audit's impact on fraud prevention.

The analysis followed the two-stage procedure of evaluating the measurement (outer) model and structural (inner) model (Sarstedt et al., 2021). First, the assessment of reflective measurement model, several tests must be taken to confirm valid and reliable namely reflective indicator loadings, internal consistency reliability, convergent validity, and convergent validity. Secondly, evaluating the structural model through path coefficients, T-statistics, and P-values were examined for hypothesis testing. There were two hypotheses in this study; (H1) The implementation of the whistleblowing system has a significant positive effect on fraud prevention at PT Angkasa Pura Indonesia, (H2) Internal audit has a significant positive effect on fraud prevention at PT Angkasa Pura Indonesia. Additionally, R^2 values and predictive relevance (Q^2) were used to assess the power of explanatory and predictive model. This method allows robust estimation of latent constructs and identification of dominant indicators that contribute significantly to fraud prevention outcomes.

RESULTS AND DISCUSSIONS

The final structural equation model presented in Figure 1 illustrates the influence of two latent constructs – Whistleblowing System (X1) and Internal Audit (X2) – on Fraud Prevention (Y) within PT Angkasa Pura Indonesia. This consists of a total of 20 reflective indicators distributed across three latent constructs; whistleblowing (6 indicators), internal audit (10 indicators), and fraud prevention (7 indicators).

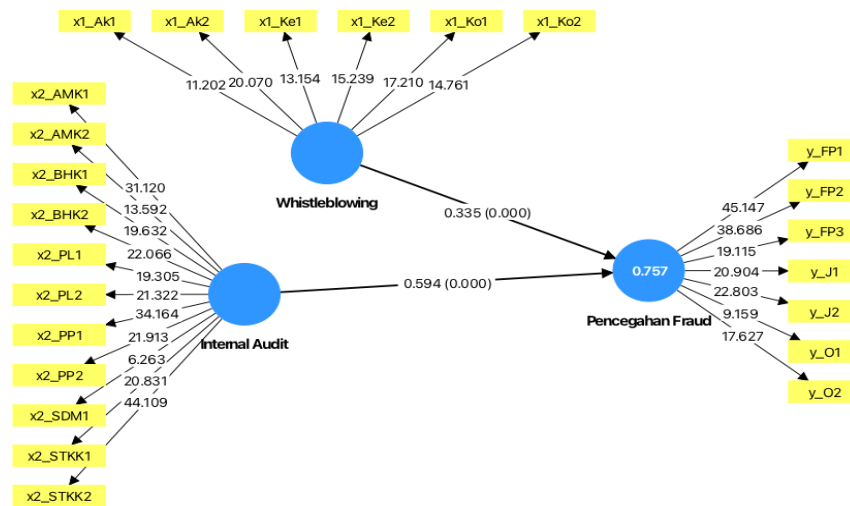


Figure 1. PLS-SEM Final Model of The Influence of Whistleblowing Systems and Internal Audit on Fraud Prevention in State-Owned Enterprises: Evidence from PT Angkasa Pura Indonesia

In the first step of analysis, Table 2 and 3 showed the information about the assessment of reflective measurement model both reliability and validity. The outer model evaluation confirmed strong reliability and convergent validity for all constructs: composite reliability scores for internal audit (0.955), fraud prevention (0.938), and whistleblowing (0.880) exceeded the threshold of 0.7; AVE values also met the minimum criterion (>0.5), consistent with guidelines from (Hair et al., 2017). Discriminant validity using HTMT was achieved after refining indicators with high cross-loadings. The final HTMT values were all below 0.9, indicating adequate construct distinctiveness.

Table 2. Assesment of Reflective Measurement Model (Outer Model)

Latent Variable	Indicator	Reflective Model Evaluation			
		Loading Factor	Composite Reliability (ρc)	Validity	
				Convergent (AVE)	Discriminant (HTMT)
Whistleblowing	Ko1	0.794	0.880	0.551	< 0.9
	Ko2	0.725			
	Ke1	0.717			
	Ke2	0.745			
	Ak1	0.735			
	Ak2	0.734			
Audit Internal	PL1	0.84	0.955	0.662	< 0.9
	PL2	0.815			
	SDM1	0.554			
	PP1	0.889			
	PP2	0.829			
	AMK1	0.874			
	AMK2	0.751			
	BHK1	0.830			
	BHK2	0.840			
	STKK1	0.807			
	STKK2	0.905			
	Fraud Prevention	O1			
J1		0.821			
J2		0.840			
FP1		0.900			
FP2		0.901			
FP3		0.802			

Table 3. Assesment of Structural Model (Inner Model)

Latent Variable	Structural Model Evaluation		
	VIF (< 5)	R^2	$Q_{predict}^2$ (> 0)
Whistleblowing	2.151	75.2%	-
Audit Internal	2.151		-
Fraud Prevention	-		0.392; 0.537; 0.422; 0.544; 0.531; 0.6; 0.462

After confirming that the measurement model is valid and reliable, the inner model (relationship between constructs) was assessed (Table 3). The Variance Inflation Factor (VIF) values for predictor constructs were 2.151, suggesting no multicollinearity issues.

Table 4. Hypothesis Test Results of Factors that Affecting Fraud Prevention in PT Angkasa Pura Indonesia

Relationship		Coef	T-values	P-values	95% CI	Decision
From	To					
Whistleblowing	Fraud Prevention	0.335	3.761	0.000	[0.172; 0.520]	Significant
Audit Internal	Fraud Prevention	0.594	6.944	0.000	[0.418; 0.751]	Significant

The hypothesis testing in this study was conducted with a bootstrapping procedure of 10,000 resamples and a significance level of 5% (Table 4). According to hypothesis testing results, they revealed that both whistleblowing systems and internal audit have a statistically significant positive effect on fraud prevention. Specifically, the path coefficient from whistleblowing to fraud prevention was 0.335 with a t-value of 3.761 ($p < 0.001$), and from internal audit to fraud prevention was 0.594 with a t-value of 6.944 ($p < 0.001$). These values exceed the threshold of $t > 1.96$ and $p < 0.05$, indicating strong support for the proposed hypotheses.

These results are consistent with the global report by the Association of Certified Fraud Examiners (ACFE, 2024), which emphasizes the importance of whistleblowing and audit mechanisms in combating fraud, particularly in public-sector organizations. Similarly, (Yuniarti, 2017) highlights that internal control systems and anti-fraud awareness are key drivers in promoting integrity within intergovernmental institutions.

From Table 5, the most dominant indicators were: ease of access to whistleblowing channels (0.288), compliance with audit standards (0.124), and enforcement of ethical sanctions (0.189). In terms of whistleblowing, the study identifies the accessibility of reporting channels as the most dominant indicator, aligning with research by (Purnamawati, 2018) and (Hamilah et al., 2022), who found that employee perception of ethical behavior and a trusted reporting system reduces fraud risk. (Brown, Lewis, & Moberly, 2014) also argue that effective whistleblowing systems significantly enhance fraud detection, particularly when confidentiality, managerial support, and protection from retaliation are present. This is reinforced by local evidence from (Rahman, 2020), (Sri Wahyuni & Nova, 2018), all of whom underline the need for anonymous and easily accessible reporting tools to encourage disclosures. Similarly, (Fitriani Basri, 2021) observed that when whistleblowing systems are easy to access and trusted, employees are more likely to report unethical conduct. According to (Purnamawati, 2018), individual perceptions of ethical behavior and the self-efficacy to report wrongdoing are key mediators in the fraud prevention process.

Table 4. Indicator Dominant Evaluation for Whistleblowing, Internal Audit, and Fraud Prevention

From Construct to Indikator	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics (O/STDEV)	P values
Ak1 <- Whistleblowing	0.209	0.209	0.023	9.078	0.000
Ak2 <- Whistleblowing	0.288	0.290	0.040	7.119	0.000
Ke1 <- Whistleblowing	0.183	0.183	0.022	8.327	0.000

Ke2 <- Whistleblowing	0.222	0.221	0.024	9.136	0.000
Ko1 <- Whistleblowing	0.229	0.228	0.021	11.124	0.000
Ko2 <- Whistleblowing	0.215	0.215	0.019	11.299	0.000
AMK1 <- Internal Audit	0.116	0.116	0.006	19.439	0.000
AMK2 <- Internal Audit	0.109	0.110	0.011	10.297	0.000
BHK1 <- Internal Audit	0.120	0.120	0.007	18.432	0.000
BHK2 <- Internal Audit	0.105	0.105	0.008	13.542	0.000
PL1 <- Internal Audit	0.105	0.105	0.008	13.899	0.000
PL2 <- Internal Audit	0.102	0.102	0.007	14.683	0.000
PP1 <- Internal Audit	0.124	0.124	0.007	18.958	0.000
PP2 <- Internal Audit	0.112	0.112	0.007	15.645	0.000
SDM <- Internal Audit	0.090	0.090	0.011	8.469	0.000
STKK1<- Internal Audit	0.120	0.121	0.009	14.058	0.000
STKK2<- Internal Audit	0.122	0.123	0.007	18.187	0.000
FP1 <- Pencegahan Fraud	0.178	0.178	0.009	19.482	0.000
FP2 <- Pencegahan Fraud	0.189	0.188	0.011	17.311	0.000
FP3 <- Pencegahan Fraud	0.167	0.167	0.011	14.900	0.000
J1 <- Pencegahan Fraud	0.162	0.162	0.011	14.642	0.000
J2 <- Pencegahan Fraud	0.180	0.179	0.011	16.402	0.000
O1 <- Pencegahan Fraud	0.152	0.152	0.019	8.228	0.000
O2 <- Pencegahan Fraud	0.179	0.179	0.011	16.266	0.000

On the other hand, the internal audit function's strongest indicator was compliance with international auditing standards. These findings align with states (The Institute of Internal Auditors, 2017) that strong internal audit capabilities play a crucial role in fraud prevention through comprehensive risk assessment, evaluation of internal control system effectiveness, provision of value-added recommendations for improvement, increased awareness of fraud risks throughout the organization, testing and monitoring of anti-fraud controls, and contribution to building a strong culture of ethics and integrity. Internal audit helps minimize opportunity by strengthening control environments, while whistleblowing mechanisms address rationalization by reinforcing ethical accountability. This finding is supported by studies such as (Marfiana & Gunarto, 2021), which stress the role of auditor competence and independence in improving fraud detection and prevention.

These findings affirm that fraud prevention is most effective when technical controls (e.g., audit systems) are combined with ethical governance (e.g., transparent sanctioning and moral leadership). As (Syafidinal et al., 2019) emphasize, good governance practices are inseparable from effective internal audits and whistleblowing integration. Additionally, the (ACFE, 2024) report stresses that fraud detection and prevention are most successful in organizations that empower employees to report concerns and regularly audit critical processes.

In practice, SOEs such as PT Angkasa Pura Indonesia should prioritize: ensuring multiple and anonymous reporting channels, enhancing auditor competencies and aligning audits with international standards, promoting consistent, ethical enforcement through leadership modeling. By strengthening these areas, organizations can develop resilient anti-fraud frameworks aligned with both international best practices and contextual needs of the Indonesian public sector.

Finally, for the power of explanatory, this final PLS-SEM model has R^2 value of 0.752 for the fraud prevention construct, indicating that the two predictors explain 75.2% of the variance in fraud prevention. Predictive relevance (Q^2) values for all indicators exceeded zero, affirming good predictive quality.

CONCLUSION

This study provides empirical evidence that both whistleblowing systems and internal audit functions significantly influence fraud prevention efforts within PT Angkasa Pura Indonesia. The analysis further identifies key indicators within each construct. For whistleblowing systems, the

most dominant factor is the accessibility of reporting channels, underscoring the importance of user-friendly, anonymous, and well-publicized mechanisms to encourage reporting. Within internal audit, compliance with international audit standards emerged as the strongest indicator, highlighting the role of audit professionalism and alignment with global best practices. In the context of fraud prevention, the consistent enforcement of ethical sanctions was identified as the leading factor, reflecting the critical influence of ethical leadership and deterrent effects in preventing misconduct.

These findings reinforce the notion that fraud prevention in state-owned enterprises requires more than formal systems—it demands integration between accessible reporting tools, high-quality audits, and strong ethical enforcement. Organizations are encouraged to invest in strengthening these mechanisms as part of a comprehensive governance framework. By doing so, they can improve internal accountability, reduce fraud risk, and foster a culture of integrity aligned with national governance standards and international expectations.

While this study provides significant empirical evidence on the role of whistleblowing systems and internal audit in fraud prevention at PT Angkasa Pura Indonesia, it has limitations in generalizability due to its focus on a single merged State-Owned Enterprise (SOE) and potential bias from self-reported data. Therefore, future research is recommended to expand its scope to other SOEs or sectors for findings validation, explore additional factors such as technology and organizational culture, and adopt more diverse methodologies like qualitative or longitudinal studies to gain a more comprehensive understanding.

This study indicates that national anti-fraud policies in the SOE sector must move beyond formal systems, by mandating highly accessible and anonymous whistleblowing systems and promoting adherence to international internal audit standards to enhance professionalism. Crucially, regulations should emphasize consistent enforcement of ethical sanctions to bolster ethical leadership and deterrent effects. The implication is a need for an integrated governance framework that blends accessible reporting tools, high-quality audits, and robust ethical enforcement to improve internal accountability, reduce fraud risk, and foster a culture of integrity within Indonesian SOEs.

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