

The Effect of Internal Control Systems and Inventory Information Systems on the Effectiveness of Inventory Stock Recording

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Article Info

Article history:

Accepted: 20 May 2026

Publish: 30 May 2026

Keywords:

Internal Control System;

Inventory information System;

Inventory Stock Recording;

Inventory Control.

Abstract

This study aims to analyze the effect of internal control system implementation and inventory information system on the effectiveness of inventory stock recording at PT Pindad (Persero) BUMN Bandung. Managing inventory effectively is a critical operational foundation for manufacturing companies to avoid overstocking or stockouts. The internal control system provides a structured mechanism to safeguard corporate assets and ensure financial report reliability, while the inventory information system minimizes manual human errors through integrated databases. The dependent variable, effectiveness of inventory stock recording, reflects the system's capacity to maintain accurate, timely, and complete inventory records. This study applied a quantitative approach with descriptive and verification methods. Questionnaires were distributed via purposive sampling to a total sample of 33 respondents across the Rentalprod, General, Engineering, and Production departments under the Industrial Engineering Manufacturing division. Data analysis was performed using Structural Equation Modeling-Partial Least Squares (SEM-PLS) via SmartPLS version 4 to evaluate the outer measurement model and inner structural model. The structural model testing results revealed that the internal control system has a positive but non-significant influence on the effectiveness of inventory stock recording. Conversely, the inventory information system exerts a positive, strong, and statistically significant effect on the effectiveness of inventory stock recording. These empirical findings highlight that maximizing technical information system optimization and aligning system data with physical inventory counts are essential strategies to elevate stock record precision within national strategic state-owned enterprises.

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1. INTRODUCTION

Every manufacturing and trading company fundamentally requires an optimized level of inventory to successfully maintain day-to-day business operations. According to standard guidelines (PSAK 14), inventory represents corporate assets held either for resale within normal operational cycles or utilized directly as raw materials within processing activities. Managing these assets demands strict operational precision; failure to manage inventory effectively triggers massive corporate vulnerabilities, such as overstocking which heavily inflates storage overhead, or critical stockouts that halt entire production lines and drastically reduce consumer fulfillment metrics. Therefore, modern organizations are urgently required to implement systematic management frameworks and deploy technical

accounting control procedures to systematically secure inventory operations. Effectiveness serves as the key benchmark to evaluate whether execution and processes seamlessly align with specified organizational targets.

In real-world applications, optimizing stock control mechanisms remains a profound challenge across public and corporate sectors alike. For example, the financial optimization policies executed within the Ministry of Health of the Republic of Indonesia in 2025 mandated massive budget reductions of up to IDR 19.6 trillion. This policy heavily stressed the national healthcare infrastructure, requiring strategic stock safety buffers to counteract diminished funding. This public sector phenomenon emphasizes that whenever operational budgets encounter extreme limitations, data reliability, absolute system accuracy, and operational controls become irreplaceable tools to prevent critical deficits or severe asset mismanagement.

Furthermore, vulnerabilities emerging from compromised internal oversight and fragile administrative tracking are heavily highlighted across recent institutional crises. A severe structural failure occurred within regional infrastructure governance in North Sumatra in 2026, where widespread data manipulation and audit evasion within massive engineering procurement programs caused catastrophic state financial damages estimated between Rp. 8 billion and Rp. 15 billion. Judicial investigations revealed that formal procedures were fundamentally bypassed through informal actor networks, demonstrating a total breakdown of internal hazard mitigations. Similarly, public confusion surrounding the distribution and physical authenticity of emergency Covid-19 vaccines produced by state-owned biopharmaceutical enterprise PT Bio Farma showcased how information discrepancies can severely threaten corporate trust. When information architectures fail to cleanly align real-time administrative records with empirical physical stock, the underlying institutional credibility deteriorates. Hence, enabling bulletproof internal control systems and sophisticated information systems is completely paramount to sustain public and institutional integrity.

An internal control system consists of an integrated organizational structure, collaborative policies, and preventative protocols explicitly designed to isolate corporate assets against fraud while maintaining information reliability. This process relies on a core behavioral framework that guides human agencies to conform with statutory mandates. Grounded in the specialized conceptual frameworks established by Zamzami et al. (2021), an internal control environment operates across five foundational dimensions: control environment, risk assessment, control activities, information and communication, and continuous monitoring operations. Concurrently, an inventory information system functions as a robust technical framework engineered to capture transactional flows, process input data into high-security databases, and output dependable logistics reports.

Numerous previous empirical studies have explored these operational dynamics. Research executed by Uswandi (2020), Hambani et al. (2023), and Pramudito et al. (2024) consistently observed that rigorous implementation of internal controls effectively mitigates the risk of material asset loss and enforces precise warehouse transaction transparency. Similarly, investigation tracking by Efendi et al. (2025), Sarafi et al. (2020), and Aubrey et al. (2025) verified that automated continuous-review software and modern supply chain information tracking drastically elevate inventory precision while reducing transactional overhead. Nonetheless, minor inconsistencies still emerge when evaluating the simultaneous, interactive impacts of these frameworks within specific state-owned defense manufacturing organizations that follow rigid bureaucratic systems.

Based on these theoretical concepts and historical empirical patterns, this study establishes its novelty by assessing the concurrent impacts of both administrative internal oversight and computer-based database tracking on the ultimate effectiveness of stock

recording within a vital national strategic state-owned enterprise, specifically PT Pindad (Persero) Bandung.

Based on the theoretical framework and previous empirical studies, the hypotheses proposed in this study are as follows:

H1: The internal control system significantly influences the effectiveness of inventory stock recording.

H2: The inventory information system significantly influences the effectiveness of inventory stock recording

2. METHOD

This study applied a quantitative approach using descriptive and verification methods to investigate the causal relationships between the internal control system, inventory information system, and the effectiveness of inventory stock recording at PT Pindad (Persero) BUMN Bandung. The research population comprised 90 employees heavily involved in inventory management across several operational divisions. A purposive sampling technique was utilized, yielding a final sample size of 33 respondents drawn strictly from the Rendalprod, General, Engineering, and Production departments within the Industrial Engineering Manufacturing (MRI) division.

Data collection was executed by distributing questionnaires measured on a 5-point ordinal rating scale. The obtained data were structurally analyzed using the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach processed via SmartPLS version 4.1 software. The PLS-SEM procedure involves two primary evaluative stages: the outer measurement model and the inner structural model. The outer model assesses indicators of validity and reliability using criteria such as Loading Factors (> 0.70), Average Variance Extracted ($AVE > 0.50$), and Composite Reliability ($CR > 0.70$). The inner model tests the hypotheses, structural path coefficients, coefficient of determination (R^2), and the substantive (f^2) effect size.

To support the methodology section, it is recommended to include a research design figure adapted from Indra and Cahyaningrum (2019). The figure may contain the following sequence:

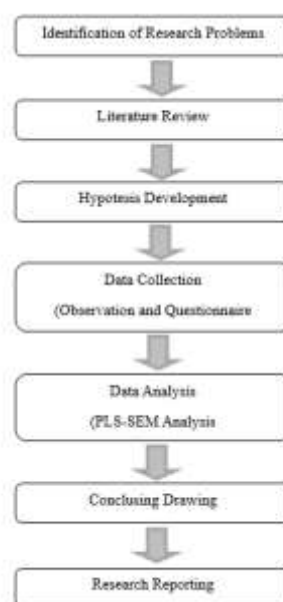


Figure 1 Research Design

Source: Developed by the author (2026)

3. RESULTS AND DISCUSSION

Descriptive Statistical Analysis

The structural model in this study is presented in Figure 2, illustrating the relationships among the internal control system, inventory information system, and the effectiveness of inventory stock recording at PT Pindad (Persero) BUMN Bandung. The model explains the direction and magnitude of the relationship between the independent variables and the dependent variable through path coefficients. Furthermore, the structural model demonstrates how the internal control system and inventory information system contributes to explaining the effectiveness of inventory stock recording within the state-owned manufacturing enterprise.

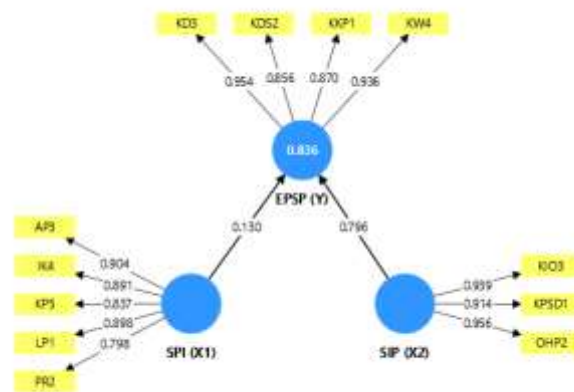


Figure 2 Standardized Loading Factor Path Diagram of Internal Control System and Inventory Information System on the Effectiveness of Inventory Stock Recording

Source: Data Processed by SEM-PLS (2026)

Internal Control System

A measurement model evaluation was conducted to assess the validity and reliability of the Internal Control System construct. This construct was measured using several dimensions: control environment, risk assessment, control activities, information and communication, and monitoring activities. These dimensions describe the implementation of the internal control system in safeguarding organizational assets and ensuring the effective and efficient achievement of organizational goals. In this study, the operationalization of the Internal Control System construct was adapted from Zamzami et al. (2021). Table 1 presents the results of the measurement model evaluation for the Internal Control System construct.

Table 1 Measurement Model Calculation Results of Internal Control System

<i>Item</i>	<i>Loading Factor</i>	<i>Indicator Reliability</i>	<i>t-count</i>	<i>p-value</i>
Control Environment	0.898	0.808	27.003	0.000
Risk Assessment	0.798	0.637	10.376	0.000
Control Activities	0.904	0.817	24.508	0.000
Information and Communication	0.891	0.794	22.231	0.000
Monitoring Activities	0.837	0.701	11.025	0.000
Average Variance Extracted (AVE)	0.938			
Composite Reliability (CR)	0.751			

Source: Data Processed by SEM-PLS (2026)

The results in Table 1 indicate that all indicators of the Internal Control System construct have loading factor values above 0.70, demonstrating that the indicators meet the convergent validity criteria and are capable of properly reflecting the construct. In addition, the Average Variance Extracted (AVE) value of 0.938 exceeds the recommended threshold of 0.50, confirming adequate convergent validity. The Composite Reliability (CR) value of 0.751 is also higher than 0.70, indicating excellent internal consistency reliability. Overall, the measurement model for the Internal Control System construct can be considered valid and reliable for further analysis.

Inventory Information System

The measurement model evaluation was conducted to examine the validity and reliability of the Inventory Information System construct. The construct was measured using several dimensions, namely accuracy of resource utilization, optimization of recording results, and input and output suitability. These dimensions reflect the operational and technical framework used to manage inventory data regularly through databases to minimize recording errors, reduce clerical costs, and support corporate operations. In this study, the operationalization of the Inventory Information System construct was adapted from Sutabri (2012) in Rusdianto (2020). Table 2 presents the measurement model evaluation results for the Inventory Information System construct.

Table 2 Measurement Model Calculation Results of Inventory Information System

<i>Item</i>	<i>Loading Factor</i>	<i>Indicator Reliability</i>	<i>t-count</i>	<i>P-Value</i>
Accuracy of Resource Utilization	0.914	0.818	23.924	0.000
Optimization of Recording Results	0.956	0.703	55.206	0.000
Input and Output Suitability	0.939	0.845	32.658	0.000
Average Variance Extracted (AVE)	0.819			
Composite Reliability (CR)	0.948			

Source: Data processed by SEM-PLS (2026)

The findings presented in Table 2 indicate that all indicators of the Inventory Information System construct obtained factor loading values greater than 0.70, indicating

that the indicators adequately reflect the construct and meet the convergent validity criteria. In addition, the Average Variance Extracted (AVE) value of 0.819 is higher than the recommended minimum value of 0.50, indicating acceptable convergent validity. The Composite Reliability (CR) value of 0.948 also exceeds the threshold of 0.70, indicating a high level of internal consistency reliability. Thus, the Inventory Information System construct is considered appropriate for further analysis.

Effectiveness of Inventory Stock Recording

The measurement model evaluation was conducted to test the validity and reliability of the Stock Inventory Recording Effectiveness construct. This construct was assessed through several dimensions, including completeness of recording, orderliness and systematization, data accuracy, and timeliness. These dimensions represent the system's capacity to document all inventory activities systematically, accurately, and timely to support organizational targets. The operationalization of the Stock Inventory Recording Effectiveness construct in this study was adopted from Maulidella (2025). The results of the measurement model assessment for the Stock Inventory Recording Effectiveness construct are presented in Table 3.

Table 3 Measurement Model Calculation Results of Effectiveness of Inventory Stock Recording

<i>Item</i>	<i>Loading Factor</i>	<i>Indicator Reliability</i>	<i>t-count</i>	<i>p-value</i>
Completeness of Recording	0.870	0.897	16.665	0.000
Orderliness and Systematic	0.856	0.883	15.292	0.000
Data Accuracy	0.954	0.785	42.185	0.000
Timeliness	0.936	0.721	22.231	0.000
Average Variance Extracted (AVE)	0.819			
Composite Reliability (CR)	0.948			

Source: Data processed by SEM-PLS (2026)

The findings in Table 3 show that all indicators of the Effectiveness of Inventory Stock Recording construct obtained loading factor values greater than 0.70, indicating that the indicators are capable of reflecting the construct appropriately and have met the convergent validity requirement. Moreover, the Average Variance Extracted (AVE) value of 0.819 is above the minimum recommended value of 0.50, demonstrating adequate convergent validity. The Composite Reliability (CR) value of 0.948 also exceeds the threshold of 0.70, which indicates excellent internal consistency among the indicators. Accordingly, the Effectiveness of Inventory Stock Recording construct is considered suitable for subsequent analysis.

The assessment of collinearity was conducted using the Variance Inflation Factor (VIF). According to Hair et al. (2019) in Juniarty (2025), collinearity assessment is necessary to ensure there is no severe multicollinearity between exogenous constructs.

Table 4 Collinearity Assessment

<i>Construct</i>	<i>VIF</i>
Internal Control System	4.989
Inventory Information System	4.989

Source: Data processed by SEM-PLS (2026)

The structural model was assessed for collinearity between internal control system and inventory information system toward the effectiveness of inventory stock recording. Based on Table 4, both variables obtained VIF values of 4.989, indicating no severe collinearity issues since the values remain below 5. Therefore, the structural model is suitable for further analysis.

The structural model was assessed using the coefficient of determination (R^2) to measure the model's ability to explain the endogenous variable. The results indicate an R^2 value of 0.836 for the Effectiveness of Inventory Stock Recording, which means that 83.6% of the variance in the effectiveness of inventory stock recording can be explained by the internal control system and inventory information system. Meanwhile, the remaining 16.4% is explained by other factors beyond the scope of this study. Moreover, hypothesis testing was carried out to evaluate the statistical effects among the variables.

In addition, hypothesis testing was performed to analyze the structural relationships and statistical significance between the variables.

Table 5 Hypothesis Testing Results

Statistical Hypothesis	Path Coefficients	t-statistics	F-Square	p-value	Description
$H_0: \gamma_{11} = 0$ $H_0: \gamma_{11} \neq 0$	0.130	0.876	0.021	0.000	H_0 Diterima
$H_0: \gamma_{12} = 0$ $H_0: \gamma_{12} \neq 0$	0.796	5.022	0.744	0.000	H_0 Ditolak

Source: Data processed by SEM-PLS (2026)

The results of the hypothesis testing indicate that the internal control system has a positive but insignificant effect on the effectiveness of inventory recording, as reflected by the path coefficient of 0.130, the t-statistic value of 0.876 (which is lower than the critical t-value of 1.96), and the p-value of 0.381 ($p > 0.05$). Furthermore, the f-square value of 0.021 indicates a small effect size. These findings indicate that the internal control system—as measured by the control environment, risk assessment, control activities, information and communication, and monitoring activities—does not independently have a statistically significant impact on the accuracy of inventory documentation within the company. These results contradict some conventional perspectives but align with the empirical frameworks of Pramudito et al. (2024), Hambani et al. (2023), and Uswandi (2020), who argue that structural administrative configurations require optimal technical integration to actively transform the recording system.

The findings strongly reveal that the inventory information system exerts a positive, robust, and highly significant influence on the effectiveness of inventory stock recording, indicated by a path coefficient of 0.796, a t-statistic value of 5.022 (well above

1.96), and a highly significant p-value of 0.000. Furthermore, the f-square value of 0.744 demonstrates a very large effect size. These results imply that a technically structured, automated, and integrated application architecture directly drives the capacity to log, update, and manage storage materials cleanly. The optimization of the inventory information system, reflected through the accuracy of resource utilization, optimization of recording results, and input-output suitability, successfully eliminates data recording discrepancies and keeps systemic database values perfectly matched with empirical warehouse physical counts. This finding is completely in line with previous research executed by Efendi et al. (2025), Sarafi et al. (2020), and Aubrey et al. (2025), which verified that computer-based ledger automation substantially minimizes human verification errors and maximizes stock administrative effectiveness.

Overall, the results confirm that while the internal control system serves as a baseline organizational environment, the inventory information system acts as the primary and dominant determinant of the effectiveness of inventory stock recording at PT Pindad (Persero) BUMN Bandung. These findings highlight the critical importance of modernizing technical database configurations, maximizing technical information system optimization, and strategically aligning continuous system data flows with real-time physical inventory verification to uphold supreme resource accountability within strategic national state-owned organizations.

Discussion of the Effect of Internal Control System on the Effectiveness of Inventory Stock Recording

The empirical results indicate that the Internal Control System has a positive but statistically non-significant effect on the Effectiveness of Inventory Stock Recording at PT Pindad (Persero) BUMN Bandung. Descriptive analysis findings reveal that the overall implementation of the internal control system is highly categorized as "Very Good," with an excellent Grand Mean score of 4.23, demonstrating that the organizational environment and foundational structural policies strongly support inventory protection protocols.

However, a more in-depth evaluation of specific dimensions revealed critical operational gaps that explain why the structural control system does not directly translate into effective recordkeeping. The control activity dimension, specifically the implementation of activity oversight, received a relatively low rating compared to the other dimensions, resulting in a moderate score of 3.2. Furthermore, the information and communication dimension showed significant gaps, indicating that inventory data and management updates were not utilized uniformly or communicated smoothly across all participating departments. This lack of ongoing technical coordination meant that despite strict formal guidelines, internal procedures were often overlooked or disconnected from active daily recordkeepers. Therefore, strengthening strict real-time supervisory controls, clarifying interdepartmental workflows, and eliminating information distribution barriers are critical actions necessary to successfully transform administrative regulations into superior and error-free stock recordkeeping accuracy.

Discussion of the Effect of Inventory Information System on the Effectiveness of Inventory Stock Recording

The findings clearly show that the Inventory Information System has a positive, strong, and highly significant impact on the Inventory Recording Effectiveness at PT Pindad (Persero) BUMN Bandung. The descriptive analysis results show that the overall inventory information system implementation is categorized as "Good," with an Overall Average score of 3.67, which confirms that the technical database infrastructure successfully supports logistics and operational documentation effectively..

Nevertheless, a detailed examination of the underlying dimensions reveals specific operational limitations. The dimension of accuracy of resource utilization obtained a significantly lower assessment compared to the other dimensions, yielding a moderate dimension mean of 3.18. This constraint is primarily driven by the indicator for optimal utilization of labor or human resources, which scored exceptionally low at 2.21, falling into the "Poor" category. This condition suggests that while the software and database architectures are structurally capable of maintaining records, the allocation, division of work, and technical competence of the personnel operating the system have not fully supported data administration optimally. Therefore, executing intensive employee competency training, refining labor management structures, and maximizing resource efficiency are crucial strategies needed to elevate system accuracy and ensure zero discrepancies between physical storage counts and system data.

4. CONCLUSION

The results of this study indicate that the internal control system does not have a statistically significant effect on the effectiveness of inventory recording at PT Pindad (Persero) Bandung, a state-owned enterprise. Although the implementation of the internal control system is descriptively categorized as very good overall, structural weaknesses in control activities and the information and communication dimension prevent it from directly driving recording accuracy. Conversely, the inventory information system has a large, positive, and highly significant impact on inventory recording effectiveness. Optimization of this technical database framework supported by accurate resource utilization, optimized recording results, and input-output compatibility serves as a primary and dominant driver in ensuring automated ledger accuracy and minimizing inventory management errors.

Further findings revealed that while basic administrative protocols were stable, several critical operational gaps still required immediate improvement. In the internal control system, strict implementation of activity oversight and transaction authorization required stronger enforcement. Similarly, in the inventory information system, optimization of human resource competencies and allocation of technical labor remained suboptimal. These strategic areas demonstrate a clear need for intensive personnel training, clearer interdepartmental communication workflows, and structured resource management to maximize the potential of a fully computerized database architecture.

Overall, this study highlights that relying solely on formal internal control policies is insufficient without immediate modernization of operational technology. Strengthening the operationalization of technical inventory information systems, eliminating communication barriers between departments, and implementing systematic and routine reconciliations between system ledger data and empirical physical warehouse stock counts are critical strategies for achieving maximum data accuracy and maintaining strong supply chain accountability in nationally strategic state-owned enterprises.

5. ACKNOWLEDGMENTS

The author would like to express his sincere gratitude to Langlangbuana University Bandung for the academic support and facilities provided during this research process. Special appreciation is also extended to the management and staff of PT Pindad (Persero) BUMN Bandung for their excellent cooperation, openness, and permission to collect the empirical data needed for this research. Furthermore, the author expresses his deepest gratitude to the academic supervisors, lecturers, and all academic staff at the Faculty of Economics and Business for their invaluable guidance, continuous encouragement, and constructive contributions during the completion of this research.

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