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Implementation of a Multi-Level Approval System in the Vendor Management System (VMS) to Strengthen Vendor Verification at PT X

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ABSTRACT

This research aims to analyze the effect of implementing the tiered approval system on strengthening vendor verification within the Vendor Management System (VMS) platform at PT X. The research employs a quantitative approach by distributing questionnaires to 30 respondents directly involved in the procurement and vendor verification process. The research instrument was tested for validity and reliability, with all items found to be valid and highly reliable ($\alpha = 0.934$). The results of the linear regression analysis indicate that the implementation of the tiered approval system has a positive and significant effect on strengthening vendor verification, as evidenced by a t-count value of 14.173 > t-table and a significance level of 0.001. The 87.3% contribution rate demonstrates that the tiered approval system plays an important role in improving data accuracy, transparency, and accountability in the verification process. The study suggests enhancing digital infrastructure to accelerate approval workflows and providing regular user training to optimize VMS-based verification controls.

Keywords: *Vendor Management System, Tiered Approval System, Vendor Verification, Linear Regression, Procurement.*

INTRODUCTION

In modern corporate governance, an electronic-based procurement system or Vendor Management System (VMS) plays a vital role in maintaining efficiency, transparency, and accountability within the supply chain (Appelbaum et al., 2017). The VMS enables organizations to centralize vendor data, automate procurement processes, and establish standardized workflows for vendor selection, evaluation, and verification (Laudon & Laudon, 2020; Romney & Steinbart, 2018). As companies increasingly adopt digital transformation strategies, the integration of robust internal control mechanisms within VMS platforms has become a critical success factor for mitigating procurement risks, including fraud, data inaccuracy, and non-compliance with regulatory requirements ((COSO), 2013; Mulyadi, 2016).

PT X, a state-owned enterprise operating in the survey and inspection services sector, has implemented a Vendor Management System to manage supplier data and facilitate procurement processes. However, the effectiveness of the control mechanisms embedded within this system has not yet been objectively assessed. A recurring issue identified is the persistent gap in vendor data verification, which poses significant risks of non-compliance and potential financial losses. Incomplete or inaccurate vendor information, lack of real-time validation, and insufficient segregation of duties in the approval process have been observed as key weaknesses in the current system. To address these challenges, the company introduced a multi-level or tiered approval system within the VMS platform. This system is designed to enforce layered authorization flows, ensuring that vendor data and procurement transactions are reviewed and approved by multiple authorized personnel prior to finalization.

Previous research has extensively examined the role of digital approval systems and internal controls in procurement governance. (Putra & Rahmawati, 2022) investigated the

effect of hierarchical approval systems on vendor verification effectiveness in a manufacturing company and found that implementing multi-level approvals significantly improved verification accuracy and reduced processing errors. (Pratama & Nugroho, 2021) demonstrated that e-procurement systems with integrated approval workflows enhance transparency and accountability in public sector procurement. (Setiawan & Wibowo, 2020) emphasized that information system-based internal controls, including authorization controls, are essential for preventing procurement fraud and ensuring compliance with organizational policies. (Handayani & Suryanto, 2019) highlighted the role of management information systems in improving organizational accountability, particularly through structured approval mechanisms. Furthermore, (Wijaya & Kurniawan, 2021) examined digital approval systems as internal control tools and concluded that such systems contribute to increased operational efficiency and reduced manual errors.

Despite the growing body of literature, several research gaps remain unaddressed. First, most existing studies have focused on the general implementation of e-procurement or approval systems in manufacturing or public sector contexts, with limited empirical investigation in the specific domain of state-owned enterprises in Indonesia, particularly those in the survey and inspection services industry. Second, while previous research has examined the relationship between approval systems and verification outcomes, few studies have quantitatively measured the strength and significance of this relationship using rigorous statistical methods such as linear regression analysis. Third, the majority of prior studies have employed qualitative or case study approaches, leaving a gap in statistically validated evidence regarding the contribution of tiered approval systems to vendor verification enhancement (Miles & Huberman, 2014). Fourth, there is a lack of research that operationalizes the constructs of tiered approval systems (e.g., clarity of authorization flow, layered control, digital process effectiveness) and vendor verification (e.g., data accuracy, transparency, accountability) into measurable indicators that can be empirically tested ((ISO), 2018). Fifth, no study to date has examined the implementation of a multi-level approval system within a Vendor Management System platform at an Indonesian state-owned enterprise, making this research contextually novel (Robbins & Coulter, 2020).

The urgency of this research is underscored by several factors. First, the increasing complexity of procurement activities in state-owned enterprises demands more sophisticated and reliable internal control mechanisms to prevent fraud, errors, and non-compliance. Second, the Indonesian government has been actively promoting digital transformation and good corporate governance across state-owned enterprises, making it imperative to evaluate the effectiveness of implemented digital control systems. Third, the potential financial and reputational risks associated with inadequate vendor verification necessitate evidence-based recommendations for system improvement (Alzeban & Sawan, 2015). Fourth, the findings from this study may serve as a benchmark for other state-owned enterprises facing similar challenges in vendor governance.

This study aims to analyze the effect of implementing a multi-level approval system on strengthening vendor verification within the Vendor Management System platform at PT X. Specifically, this research seeks to: (1) measure the extent to which the tiered approval system influences vendor verification quality; (2) test the significance of this relationship using simple

linear regression analysis; and (3) provide empirical evidence on the contribution of digital approval controls to procurement governance (Eulerich et al., 2019).

The benefits of this research are multifaceted. From a theoretical perspective, this study contributes to the body of knowledge on internal control systems, digital governance, and procurement management by empirically testing the relationship between tiered approval systems and vendor verification. It extends the application of the COSO Internal Control Framework to the context of Vendor Management Systems in state-owned enterprises and provides a validated measurement model for future research. From a practical perspective, the findings offer actionable insights for PT X's management to evaluate the effectiveness of the current multi-level approval system and identify areas for improvement, particularly in terms of digital approval speed and system optimization. The results also provide empirical justification for further investment in digital infrastructure and user training. From a managerial perspective, this study underscores the importance of integrating layered authorization controls into procurement information systems and provides evidence-based recommendations for strengthening vendor governance policies. From a methodological perspective, this research contributes by operationalizing the constructs of tiered approval systems and vendor verification into measurable indicators and applying rigorous statistical testing, thus offering a replicable framework for similar studies in other organizational contexts. From a policy perspective, the findings can inform the development of standardized guidelines for digital approval systems in state-owned enterprises, supporting the national agenda for transparency and accountability in public procurement.

METHODS

This study employs a quantitative approach to measure and analyze the effect of implementing a tiered approval system on strengthening vendor verification within the Vendor Management System (VMS) platform. The research population comprises employees of the Asset Management Division and Procurement Unit at PT Surveyor Indonesia, including procurement staff, compliance teams, supervisors, and management personnel involved in vendor verification. The sample was determined using the purposive sampling method, resulting in 30 respondents who met the criteria for direct involvement with the tiered approval system. Primary data were collected through a questionnaire based on a 1–5 Likert scale, consisting of 18 question items representing two main variables: variable X (implementation of the tiered approval system), with indicators including clarity of authorization flow, multi-layered approval control, and effectiveness of the digital approval process; and variable Y (strengthening vendor verification), with indicators including data accuracy, transparency of the verification process, and accountability of verification decisions.

Data analysis was conducted using the SPSS application, following stages that included validity and reliability testing with Cronbach's Alpha, as well as classical assumption tests such as the normality test. Furthermore, simple linear regression was applied to determine the influence of variable X on variable Y, with a t-test used to assess the partial significance effect and an F-test to examine the simultaneous significance of influence. The operationalization of variables was carefully structured so that each indicator could be measured systematically, such as the clarity of authority division, the implementation of layered approvals, the speed of digital processes, the accuracy of vendor data, the transparency of verification information, and the

accountability of individuals responsible for verification decisions. Through this methodology, the research is expected to produce strong empirical findings that can serve as recommendations for PT Surveyor Indonesia in enhancing and strengthening the vendor verification system through the implementation of a tiered approval system within the VMS platform.

Variable Operations

According to (Sugiyono, 2019), the operational definition of research variables is an element or value derived from objects or activities that have a certain variety of variations that will then be determined by the researcher to study and draw conclusions. Based on the research object and research method used, the operationalization of this research variable is revealed below, which is as follows:

Table 1.Variable Operationalization

Research Variables	Indicator	Sub Indicator	No. Item
Implementation of a Tiered Approval System (X1)	1. Clarity of Authorization Flow	Clarity of the division of authority at each level of approval in the VMS	**1, 2**
		Clarity of the stages of the approval process from start to finish	**3**
	2. Layered Consent Control	Enforcement of more than one authorization level of consent	**4, 5**
		Error prevention through a tiered approval mechanism	**6**
	3. Effectiveness of the Digital Approval Process	Speed of approval process in VMS systems	**7, 8**
		Ease of use of digital approval features	**9**
Strengthening vendor verification (Y)	1. Vendor Data Accuracy	Accuracy and correctness of vendor data stored in VMS	**10, 11**
		Lack of data errors in the verification process	**12**
	2. Transparency of the Verification Process	Disclosure of vendor status information and verification results	**13, 14**
		Ease of tracking of verification process in the system	**15**
	3. Accountability of Verification Decisions	Clarity of the party responsible for the verification decision	**16, 17**
		Verification decisions can be accounted for systemically	**18**

Source: Developed by the author based on theoretical framework (2025)

RESULTS AND DISCUSSION

This study aims to analyze the effect of the implementation of the tiered approval system (X) on strengthening vendor verification (Y) in the Vendor Management System

(VMS) platform by using a quantitative approach through the distribution of questionnaires to 30 respondents who are directly involved in the vendor verification process, consisting of procurement staff, compliance team, supervisors, and heads of procurement (Heizer et al., 2017; Heizer & Render, 2017). Variable X is measured through three main indicators, namely layered control features, clarity of authorization flows, and effectiveness of the digital approval process, while variable Y is measured through three indicators, namely vendor data accuracy, verification transparency, and decision accountability. The measurement scale uses a Likert scale of 1–5, where the number 1 indicates strongly disagree and the number 5 indicates strongly agree, so that the respondents' perception can be converted into quantitative data that is ready to be analyzed statistically.

Validity Test

Table 2. Validity Test Results

Quesioner	Correlations	Total
1	Pearson Correlation	0.696
	Sig. (2-tailed)	0.000
	N	30
2	Pearson Correlation	0.696
	Sig. (2-tailed)	0.000
	N	30
3	Pearson Correlation	0.773
	Sig. (2-tailed)	0.000
	N	30
4	Pearson Correlation	0.597
	Sig. (2-tailed)	0.000
	N	30
5	Pearson Correlation	0.681
	Sig. (2-tailed)	0.000
	N	30
6	Pearson Correlation	0.585
	Sig. (2-tailed)	0.000
	N	30
7	Pearson Correlation	0.414
	Sig. (2-tailed)	0.000
	N	30
8	Pearson Correlation	0.656
	Sig. (2-tailed)	0.000
	N	30
9	Pearson Correlation	0.623
	Sig. (2-tailed)	0.000
	N	30
10	Pearson Correlation	0.696
	Sig. (2-tailed)	0.000
	N	30
11	Pearson Correlation	0.732
	Sig. (2-tailed)	0.000
	N	30
12	Pearson Correlation	0.684
	Sig. (2-tailed)	0.000
	N	30

Quesioner	Correlations	Total
13	Pearson Correlation	0.660
	Sig. (2-tailed)	0.000
	N	30
14	Pearson Correlation	0.783
	Sig. (2-tailed)	0.000
	N	30
15	Pearson Correlation	0.607
	Sig. (2-tailed)	0.000
	N	30
16	Pearson Correlation	0.797
	Sig. (2-tailed)	0.000
	N	30
17	Pearson Correlation	0.518
	Sig. (2-tailed)	0.003
	N	30
18	Pearson Correlation	0.525
	Sig. (2-tailed)	0.003
	N	30
Total	Pearson Correlation	1
	Sig. (2-tailed)	
	N	30

Source: Primary data processed using SPSS (2025)

Based on the results of the validity test using Pearson's correlation between each statement item and the total score, it was obtained that all items (X01–X18) had a correlation value above 0.30 and a significance value below 0.05. This shows that each item has a strong and significant relationship to the variable being measured. Thus, all statements are declared valid and suitable for use in the next research analysis.

Reliability Test

Table 3. Reliability Test Results

Case Processing Summary

		N	%
Cases	Valid	30	100
	Excluded	0	0
	Total	30	100

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
0.934	18

Based on the results of the reliability test using Cronbach's Alpha technique, an alpha value of 0.934 was obtained with a total of 18 items. This value is in the very reliable category ($\alpha > 0.90$), so it can be concluded that all items in the questionnaire have excellent internal consistency. Thus, this research instrument is suitable for use in the next stage of analysis because it is able to produce stable and reliable data.

Normality Test

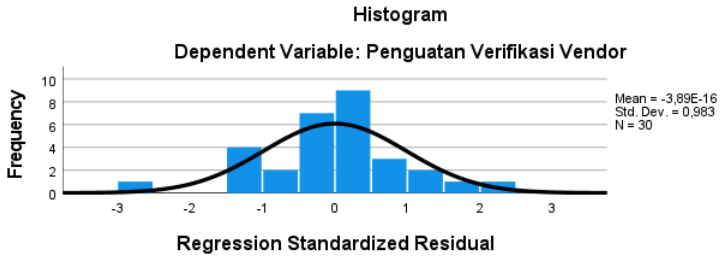

Figure 1. Normality Test Histogram

Source: Primary data processed using SPSS (2025)

Normality tests were performed using a residual histogram to see if the residual data in the regression model were normally distributed. The histogram results show that the residual distribution pattern forms a bell-shaped curve, with a symmetrical spread and a residual mean value close to zero. There are no extreme deviations or outliers on either side of the distribution. Thus, it can be concluded that the residual data is normally distributed so that the assumption of normality in the regression model has been met.

Simple Linear Regression Test Results

Table 4. Simple Linear Regression Test Results

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1.318	2.864		-0.460	0.649
Implementasi Sistem Persetujuan Berjenjang	1.034	0.073	0.937	14.173	<0,001

Devendent Variable: Penguatan Verifikasi vendor

Source: Primary data processed using SPSS (2025)

The regression model used is:

$$\boldsymbol{Y = a + bX}$$

Regression equations:

$$\boldsymbol{Y = -1.318 + 1.034\ (X)}$$

The value of the coefficient b = 1.034 indicates that every 1 unit increase in the implementation of the tiered approval system will increase the vendor verification strengthening rate by 1.034 units.

Hypothesis Test (t-Test)

Table 5. t-Test Results

Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	-1.318	2.864		-0.460	0.649
Implementasi Sistem Persetujuan Berjenjang	1.034	0.073	0.937	14.173	<0,001

Devendent Variable: Penguatan Verifikasi vendor

Source: Primary data processed using SPSS (2025)

Hypotheses tested: H_0: There was no significant effect between the implementation of the tiered approval system on the strengthening of vendor verification. H_1: There is a significant influence between the implementation of the tiered approval system on strengthening vendor verification.

The results of the t-test showed: t-count = 14.173 > t-table (2.048), Sig. = 0.001< 0.05 Thus, H_0 is rejected and H_1 is accepted. This means that there is a positive and significant influence between the implementation of the tiered approval system (VMS) on strengthening vendor verification.

Hypothesis Test (F-Test)

Table 6. F-Test Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	569,575	1	569,575	200,878	<0.001
	Residual	79,392	28	2,835		
	Total	648,967	29			

a. **Dependent Variable:** Penguatan Verifikasi Vendor

b. **Predictors:** (Constant), Implementasi Sistem Persetujuan Berjenjang

Source: Primary data processed using SPSS (2025)

The results of the f test showed: f-count = 200.878 > f-table, Sig. = 0.001< 0.05. Thus, H_0 is rejected and H_1 is accepted. Thus, the implementation of a tiered approval system together can significantly explain the variables of strengthening vendor verification.

Interpretation of Statistical Results

Based on the results of the data analysis that has been carried out, the implementation of the tiered approval system in the Vendor Management System (VMS) has proven to have a positive and significant effect on strengthening vendor verification at PT X (Kotler & Keller, 2016). Variables of the implementation of the tiered approval system are measured through indicators of clarity of authorization flow, layered approval control, and effectiveness of the digital approval process, while the strengthening of vendor verification is measured through indicators of vendor data accuracy. transparency of the verification process, and accountability of verification decisions. The results of the simple linear regression test showed a t-count value of 14.173 with a significance level of 0.001 (< 0.05), so the research hypothesis was accepted.

The determination coefficient value of 87.3% indicates that the tiered approval system has a very strong contribution in improving the quality of vendor verification. These findings confirm that the implementation of tiered management control is able to improve data accuracy, process transparency, and accountability of verification decisions systematically.

Interpretation of Statistical Results

The results show that the tiered approval system in VMS has a positive and significant effect on strengthening vendor verification. The correlation value (R = 0.764) indicates a strong relationship between variables, where the more effectively the approval system is implemented, the more accuracy, transparency, and accountability of the verification process will be improved. The variable contribution of 87.3% shows that the existence of layered approvals is able to improve the quality of control in the verification process. These findings are in line with COSO theory which emphasizes the importance of a layered authorization structure to prevent errors and fraud, and supports the results of previous research that stated that a hierarchy approval system can improve verification efficiency. In practical terms, this research indicates that companies need to continue to optimize digital approval flows and increase the speed of the process so that the benefits of the system can be felt more fully. Thus, the implementation of a tiered approval system has proven to be effective as a mechanism to strengthen vendor verification control.

Relevance to Previous Theory and Research

This finding is in line with the Internal Control Framework (COSO) theory which states that a layered authorization structure is a form of control activity that can prevent errors and fraud in procurement ((COSO), 2013; Saad et al., 2020). In addition, the results of this study support a study by Putra & Rahmawati (2022) which found that the application of an approval hierarchy system in procurement improves the efficiency and accuracy of vendor verification.

Managerial Implications

In practical terms, these results show that companies need to continue: Optimize VMS system configurations to speed up the approval process without compromising controls. Provide regular training to users to understand the digital approval flow. Align internal policies to be consistent with the digital authorization system.

Other Influential Factors

Although the tiered approval system makes a major contribution (87.3%), there are still other factors such as: Quality of network infrastructure, User discipline in following SOPs, Management commitment to digital governance. These factors can affect the effectiveness of the system in the long run.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the implementation of the tiered approval system (X) has a positive and significant effect on strengthening vendor verification (Y) at PT X, as evidenced by a significance value of 0.000 < 0.05 and a t-count of 14.173 > t-table. The contribution of the tiered approval system to the quality of vendor verification reached 87.3%, confirming the system's dominant role in vendor governance. Descriptively, respondents assessed that the implementation of the tiered approval system had been carried out effectively; however, the indicator of "speed of the digital approval process" received the lowest score, indicating the need for improvement, particularly in network

infrastructure and system optimization, so that the verification process can proceed more efficiently.

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