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OPTIMIZATION OF ASSET MANAGEMENT IN STATE UNIVERSITIES WITH PUBLIC SERVICE AGENCIES THROUGH DIGITAL TECHNOLOGY-BASED INFORMATION SYSTEMS

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ABSTRACT
This study aims to examine the influence of Asset Inventory on Asset Optimization through Supervision and Control at State Universities with Public Service Agencies (PTN-BLU) in Indonesia. Employing a quantitative research approach, both direct relationships and mediating effects among these variables were analyzed using SEM-PLS with SmartPLS software. Data were collected from 275 respondents across 55 PTN-BLU in Indonesia through a random survey. The findings reveal a significant relationship between Asset Inventory and Asset Optimization, mediated by Supervision and Control. This research provides new insights into asset inventory dynamics and their impact on asset optimization within PTN-BLU. The study also recommends that PTN-BLU adjust their supervision and control activities according to the level of asset inventory dynamics they encounter. Practically, the study highlights the need to strengthen asset inventory systems and supervision to enhance asset optimization, minimize misuse, and improve financial efficiency. Theoretically, this research enriches the literature on asset management in the public sector, particularly regarding the mediating role of supervision and control in asset optimization. These findings serve as a foundation for future research on supervision and control in asset management at state universities.

Keywords: Asset Management, State Universities, Public Service Agencies, Digital Technology, Information Systems

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INTRODUCTION

Asset management plays a crucial role in achieving good governance in higher education, particularly for State Universities with Public Service Agencies (Niswaty et al., 2023); (Πpacerio et al., 2025). As higher education entities granted financial management flexibility, particularly for State Universities with Public Service Agencies are required to optimize the assets they own to support institutional operations, improve academic services, and contribute to non-tax state revenue (Niswaty et al., 2023); (Laily et al., 2025a). Effective and efficient asset management will enhance the university's performance and competitiveness, enabling the maximum utilization of resources in line with long-term goals (Hou, 2017); (Sudaryanto et al., 2025). Therefore, good asset management not only impacts operational sustainability but also contributes to national development through increased non-tax state revenue (Tajudin et al., 2021); (Indrawati et al., 2024; Sudaryanto et al., 2024)..

Despite various efforts being made, the management of state assets still faces significant challenges, particularly in terms of administrative order, asset maintenance, and the management of State-Owned Assets (Hou, 2017); (Indrawati et al., 2024; Utari et al., 2024). The complexity of these issues is reflected in the disclaimer opinion provided by the Supreme Audit Agency on the central government's financial statements,

where the management of State-Owned Assets remains a primary concern (Niswaty et al., 2023); (Hendrati, Kusumawardhani, et al., 2024; Prasetio et al., 2024). Disorganization in the management of state assets can lead to inaccuracies in financial reports, which affects public trust in government performance (Papenfuß, 2014); (Hendrati, Esquivias, et al., 2024; A. Kurniawan & Prasetio, 2024). According to the Ministry of Finance Regulation No. 181/PMK.05/2016, the management of State-Owned Assets must be carried out through bookkeeping, inventory, and reporting processes that prioritize accountability and efficiency (Pattawe et al., 2022); (Sabihaini et al., 2023; Shabbir et al., 2023). This process is expected to enhance the management of state assets in a more transparent and responsible manner, supporting the achievement of national development goals (Niswaty et al., 2023); (Laily et al., 2023; Nuswantara et al., 2023).

The four key elements in asset management—asset inventory, legal audit, asset valuation, and supervision and control—are essential foundations in establishing effective and efficient asset governance (Ahmed Khamis et al., 2020); (Hendrati et al., 2023; Prasetyo et al., 2023). These elements are interconnected to ensure accountable, transparent asset management that complies with applicable regulations (Rahmat & Rutinaias, 2020); (Asyik et al., 2023; Prasetio et al., 2023). Modern asset management has evolved from a static orientation, which focused solely on the physical management of assets, to a dynamic and strategic approach, incorporating information technology to enhance efficiency and effectiveness (Gavrikova et al., 2020); (Asyik et al., 2022; Tjaraka et al., 2022). Supervision and control play a critical role in the asset life cycle, ensuring that assets are not only properly managed but also utilized optimally to support the organization's long-term goals (Tryon, 2017); (Prasetyo et al., 2022; Sudaryanto et al., 2022). This transformation allows organizations to maximize the value of their assets and improve overall operational performance (Umbora et al., 2018); (Indrawati et al., 2021; Prasetyo et al., 2021).

The optimization of the utilization of State-Owned Assets is both an opportunity and a complex challenge for State Universities with Public Service Agencies, as it involves various important aspects, such as regulatory compliance, interaction with investors, and the integration of Good Governance principles (Adegbola et al., 2022); (Aliyyah, Siswomihardjo, et al., 2021; Prasetyo et al., 2021). State Universities with Public Service Agencies must manage the assets they own productively and efficiently to support educational goals, research, and the improvement of services to the community (Antipova, 2021); (Prasetio et al., 2021; Utari et al., 2021). According to Ministry of Finance Regulation No. 129/PMK.05/2020, efficient and accountable asset and financial management is an obligation that State Universities with Public Service Agencies must fulfill to support the achievement of higher education goals and contribute to societal welfare (Pisarska & Karpacz, 2021); . With the right approach to asset management, State Universities with Public Service Agencies can maximize the existing potential and strengthen the institution's position in achieving its objectives (Tajudin et al., 2021)..

Furthermore, the implementation of the utilization of State-Owned Assets, as regulated in Government Regulation No. 27 of 2014 and Government Regulation No. 28 of 2020, provides a clear legal framework for the implementation of leasing, borrowing, utilization partnerships, and infrastructure provision partnerships (Nsabimana, 2020). This legal framework offers guidelines for transparent and accountable management of state assets, which can enhance the efficiency and effectiveness of utilization of State-Owned Assets (Tajudin et al., 2021). In this regard, orderly and strategic asset management adds value not only in terms of physical asset utilization but also in government financial reporting (Niswaty et al., 2023). With better management, utilization of State-Owned Assets can make a significant contribution to national development and public welfare, as well as generate greater revenue potential for the state (Jun, 2017). Therefore, optimal management of State-Owned Assets is crucial to supporting the achievement of government objectives (Li & Chen, 2022). Previous studies have shown a variety of findings regarding the influence of asset inventory, legal audit, and asset valuation on the optimization of asset utilization. Some studies indicate that these factors have no partial significance, while other research demonstrates a significant positive influence (Fauziah & Mediawati, 2024), (F. Kurniawan & Lutfi, 2025).

This study focuses on 55 State Universities with Public Service Agencies under the Ministry of Education, Culture, Research, and Technology. The approach used in this study is SEM-PLS analysis with the SmartPLS program, which allows for more complex and detailed modeling of relationships between variables. The primary contribution expected from this research is the development of an effective asset governance model, which can enhance the efficiency and accountability of asset management in State Universities with Public Service Agencies. Additionally, this study aims to promote the optimization of Non-Tax State Revenue through the mediating role of asset supervision and control. With this approach, it is expected that a more transparent and efficient asset management system will be created, ultimately contributing to the improved performance of state universities in supporting national development.

The evolution of theories and the theoretical framework are described in the next section. The procedures for data collection and research implementation are then outlined. The paper then presents a thorough examination of the topic along with its key conclusions. The study's limitations are noted, theoretical and practical implications are discussed, and recommendations for future research opportunities are provided in the concluding section.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The theoretical framework for optimizing asset management in State Universities with Public Service Agencies (PTN-BLU) is grounded in asset management theory, which emphasizes the necessity of strategic planning, control, and efficient utilization of assets to achieve institutional objectives (Amadi-Echendu et al., 2010). The implementation of digital technology-based information systems plays a critical role in enhancing transparency, accuracy, and efficiency in asset management (Truong et al., 2023).

Recent research by (Okpala, 2025) reveals that the adoption of cloud-based asset information systems in PTN-BLU reduces the risk of asset loss and improves the quality of financial reporting. Furthermore, a study by (Aryawati et al., 2024) demonstrates that digitalization in asset management accelerates the inventory process and facilitates internal audits. Additionally, findings by (Brous et al., 2019) indicate that integrating big data and the Internet of Things (IoT) into asset information systems significantly boosts operational efficiency and supports better strategic decision-making in universities.

Asset management is a systematic series of activities designed to manage an organization's assets, covering aspects of legality, economic value, utilization, and oversight throughout the asset life cycle (Linuhung & Mediawati, 2023); (Prasetyo, Aliyyah, Rusdiyanto, Chamariah, et al., 2021; Rusdiyanto et al., 2021). In the context of State Universities with Public Service Agencies, asset management plays a strategic role as a tool to support operational efficiency, strengthen accountability, and increase state revenue through Non-Tax State Revenue. Effective asset management contributes to achieving higher education goals, research, and community service development. This strategic approach to asset management reflects the principles of Value-Based Management, which focuses on creating long-term value for the institution (Maskuriy et al., 2019); (Luwihono et al., 2021; Prasetyo, Aliyyah, Rusdiyanto, Chamariah, et al., 2021). Additionally, the application of the Life Cycle Asset Management model allows for more efficient and sustainable asset management by considering the entire asset life cycle, from acquisition, utilization, to disposition. Thus, integrated and strategically-based asset management will enhance the overall performance of State Universities with Public Service Agencies, contribute to national development, and support the achievement of broader educational goals.

Asset governance in State Universities with Public Service Agencies follows the guidelines set forth in Ministry of Finance Regulation No. 181/PMK.06/2016 and Government Regulation No. 28 of 2020, which emphasize the importance of accountable and transparent asset management (Niswaty et al., 2023);(Aliyyah, Prasetyo, et al., 2021; Endarto, Taufiqurrahman, Kurniawan, et al., 2021). Asset management includes processes such as inventory, legal audit, valuation, optimization, and the development of an integrated information system. These five stages are interconnected and form the basis for a productive strategy for managing State-Owned and Regional-Owned Goods (Rahmat & Rutinaias, 2020); (Endarto, Taufiqurrahman, Suhartono, et al., 2021; Kalbuana, Prasetyo, et al., 2021). Inventory is the process of recording and classifying assets based on physical data (location, form, volume) and legal data (ownership status, ownership documents). This inventory process serves as the initial step in ensuring the accuracy and completeness of asset data, which is used as the basis for asset optimization policies (Muchlis et al., 2024); (Abadi et al., 2021; Prasetyo, Aliyyah, Rusdiyanto, Nartasari, et al., 2021b). With a sound asset management system, state asset management can be carried out efficiently and effectively, supporting the achievement of government objectives.

Legal audit aims to evaluate the legal status of assets, including document verification, compliance with regulations, and resolving ownership disputes (Cîmpan et al., 2023); (Kalbuana, Suryati, et al., 2021; Prasetyo, Aliyyah, Rusdiyanto, Nartasari, et al., 2021a). Asset valuation is used to determine the fair value of assets through market, cost, or income approaches, and the results are used to formulate asset utilization strategies that impact the potential Non-Tax State Revenue (Niswaty et al., 2023); (Prasetyo et al., 2021; Prasetyo, Endarti, et al., 2021). Supervision and control serve as mechanisms for monitoring and risk mitigation in asset management. The implementation of Asset Management Information Systems supports transparency, operational efficiency, and control over potential deviations in state asset governance (Ahmed Khamis et al., 2020); (Prabowo et al., 2020; Rusdiyanto et al., 2020), Ministry of Finance Regulation No. 207/PMK.06/2021). Asset optimization is achieved by maximizing the potential of idle assets through utilization partnerships and the highest and best use approach. Optimal asset management significantly contributes to Non-Tax State Revenue, particularly in State Universities with Public Service Agencies (Hamilton-Hart & Schulze, 2016); (Wibowo & Murwaningsari, 2024).

Asset Inventory plays a crucial role in the process of efficient and optimal asset management. As the initial step in asset management, asset inventory ensures that all owned assets are accurately recorded, both in physical terms (location, shape, and condition) and legal terms (ownership documents and status) (Ahmed Khamis et al., 2020); (Juanamasta et al., 2019; Rusdiyanto et al., 2020). The accuracy of inventory data is

essential to determine the potential for proper asset utilization and to identify underutilized or less used assets (KP & Nayak, 2017).

Supervision and Control serve as mediators in the relationship between Asset Inventory and Asset Optimization. Effective oversight ensures that each inventoried asset is managed according to its purpose, and it monitors the use of assets to prevent deviations or discrepancies in their utilization (Naomi & Hadiprajitno, 2023). With an effective control system, such as the implementation of an Asset Management Information System, asset management can be optimized sustainably, minimizing the risk of misuse and improving operational efficiency (Ahmed Khamis et al., 2020).

Through integrated supervision and control, asset management based on accurate inventory data can drive the optimization of asset utilization (Ahmed Khamis et al., 2020). Therefore, the relationship between Asset Inventory and Asset Optimization is significantly influenced by the effectiveness of Supervision and Control in ensuring that assets are managed transparently and in accordance with the principles of efficient and accountable management (Naomi & Hadiprajitno, 2023).

Figure 1 of the model used in this study illustrates how Asset Inventory influences Asset Optimization through Supervision and Control, strengthened by control variables such as Legal Audit, Asset Valuation, and Non-Tax State Revenue. In this model, Asset Optimization serves as the dependent variable, while Asset Inventory functions as the independent variable. Legal Audit, Asset Valuation, and Non-Tax State Revenue serve as control variables, while the green business strategy acts as a mediating factor. The following theories are presented based on the theoretical framework of this study and the aforementioned empirical research.

H1: Asset Inventory positively impacts Supervision and Control.
H2: Supervision and Control positively impacts Asset Optimization
H3: Asset Inventory positively impacts the Asset Optimization
H4: The mediator effect of Supervision and Control on the relationship between Asset Inventory and Asset Optimization.

METHODOLOGY

Type of Research and Research Sample

This study adopts a causal quantitative approach to analyze the relationship between Asset Inventory, which can enhance Asset Optimization through Supervision and Control, with control variables such as Legal Audit, Asset Valuation, and Non-Tax State Revenue in State Universities with Public Service Agency (PTN BLU) status. This method aims to explain the direct and indirect effects among variables using the Structural Equation Modeling (SEM-PLS) model with SmartPLS software.

By employing a sustainable Supervision and Control approach, this study examines how Asset Inventory impacts Asset Optimization in PTN BLU across Indonesia. The study population comprises all 55 PTN BLU under the Ministry of Education, Culture, Research, and Technology. The sample was selected using purposive sampling based on criteria that institutions must have an asset management unit and well-documented financial reports. The research sample consists of 275 respondents, representing five functional groups from each PTN BLU: asset operators, financial operators, general coordinators, financial managers, and internal auditors.

This method ensures a 95% confidence level with a 5% margin of error. During the selection process, preference was given to respondents with extensive experience and a deep understanding of the research variables. To examine the impact of Asset Inventory on Asset Optimization through Supervision and Control, the study uses sustainable Supervision and Control as a mediating variable. Data were collected through an online survey utilizing a Likert scale (1–5), distributed via social media. The survey was conducted using Google Forms. Five academics from PTN BLU evaluated the questionnaire to ensure content validity. The item-objective congruence (IOC) index for each item exceeded 0.80, indicating statistical significance (Laily et al., 2025b).

Measurement of Research Variables

This study utilizes a five-point Likert scale, where 1 represents strongly disagree and 5 represents strongly agree, to measure each survey variable in accordance with previous research. A more detailed description of each variable is presented in Table 1 as follows:

Table 1: Definition of Operational Variables

Variable	Dimensions	Indicator
Dependent Variable (AI)		
Asset Inventory (AI)		
Asset inventory is the process of collecting, recording, and reporting data on the assets owned by an	Completeness of Asset Data.	All physical assets are recorded in the inventory list.
		The invoices and receipts for asset purchases are recorded according to the acquisition date and value.

Variable	Dimensions	Indicator
organization, both physical and legal. This process aims to support asset management in order to optimize its utilization and ensure compliance with applicable regulations (Firmansyah & Kuntadi, 2023).		Complete information about the location, technical specifications, and value of the assets is clearly recorded.
	Asset Data Accuracy	The alignment between the recorded asset data and the physical condition in the field.
		Good asset management requires the creation of an inventory list for each room.
		Periodic updates of asset data in accordance with the changes that occur.
	Legal Inventory	Legal certainty of asset ownership (certificates, deeds, and legal documents).
		Compliance with regulations related to asset management.
		The asset recording system initially used
Independent Variable (AO)		
Asset Optimization (AO)		
Optimization of asset utilization is a process in asset management aimed at optimizing the physical potential, location, value, quantity/volume, legality, and economic value of the assets (Nanang et al., 2023).	Efficient use of assets	The level of asset utilization is in accordance with its capacity and function.
		Reduction of idle assets (those not in use).
		Minimizing operational and asset maintenance costs.
	Economic Value of Assets	Increase in revenue generated from asset utilization.
		The contribution of assets to the increase in organizational revenue.
		Market evaluation of the optimal asset value.
	Suitability of Asset Use	The alignment of asset utilization with the organization's planning and needs.
		The implementation of utilization can be carried out through operational collaboration, utilization collaboration (leasing), and managerial collaboration.
		Asset utilization supports the achievement of the organization's strategic objectives.
Mediator Variable (SC)		
Supervision and Control (SC)		
Supervision and control are stages in asset management aimed at preserving the economic value of assets and ensuring objectivity in the allocation, utilization, and transfer of asset ownership (Engkus et al., 2019).	Asset utilization monitoring.	The frequency and consistency in conducting asset inspections.
		Compliance with the implementation of the Standard Operating Procedures (SOP) for asset management.
		Availability of periodic asset usage reports.
	Asset performance evaluation	Assessment of asset utilization level.
		To what extent the assets are utilized according to the capacity and objectives that have been set.
		Analysis of operational and asset maintenance costs.
	Identification and handling of deviations.	The ability to detect asset deviations or misuse.
		Leadership commitment to ensuring that every finding of deviation is thoroughly addressed.
		Speed and effectiveness in following up on deviation findings..
Control variables, such as asset valuation, legal audit, and non-tax state revenue, are used to ensure the research results are not distorted by external factors and focus on digital asset management analysis.		
Control Variables		
Asset Valuation		
Asset valuation is one of the stages in asset management aimed at determining the market value of each asset, reflecting its economic benefits, and supporting the optimization of its utilization (Pinto, 2020).	Application of Assessment Methods	Asset valuation must comply with feasibility based on regulations, physical condition, financial aspects, and maximum productivity.
		The entities authorized to conduct asset valuation for State-Owned Assets of State Universities are Public Appraisers and Government Appraisers.

Variable	Dimensions	Indicator
		The valuation is conducted using the market approach and cost approach methods on fixed asset objects.
	Data Suitability and Accuracy	The availability of complete and up-to-date data regarding the valued assets.
		The types of values derived from the valuation are fair value and market value.
		The importance of the validity and reliability of the data used in the valuation process.
	Compliance with Guideline Standards	The alignment of the valuation process with the applicable regulations and guidelines.
		The assets to be valued are ensured to be clear and free from legal disputes.
		Complete and transparent documentation of the valuation procedure.
Legal Audit		
Asset legal audit is a systematic process for evaluating the legal status of assets owned by an organization, including the identification of ownership documents, compliance with laws, and potential legal issues that may affect the management and utilization of the assets (Sudarna et al., 2020).	Verification of ownership documents.	The existence of certificates, deeds, or official legal documents proving asset ownership.
		The importance of commitment to organizing valid asset ownership documents..
		The validity of ownership documents based on applicable regulations..
	Compliance with legal regulations.	Tingkat kesesuaian dokumen hukum dengan peraturan dan perundang-undangan.
		Frekuensi audit legal dilakukan secara berkala dan konsisten.
		Compliance with legal procedures in asset procurement or transfer.
	The process of resolving legal issues.	The existence of steps or procedures for resolving legal disputes.
		Identifying issues related to legal disputes..
		Readiness of documentation for the dispute resolution process in a structured manner.
Non-Tax State Revenue		
It originates from non-tax sources, including revenue from public services, state asset management, and other legitimate income (Mourre & Reut, 2019).	Source of Income	Revenue from services provided by government agencies.
		Revenue from the management of separated state assets.
		Revenue from operational collaboration, managerial collaboration, and land use rights
	Management Process	Efficiency in the collection of Non-Tax State Revenue.
		The rate of return on assets..
		Transparency in the reporting and recording of Non-Tax State Revenue.
	Utilization of Non-Tax State Revenue	Increase in Non-Tax State Revenue (PNBP) to support the state revenue budget.
		The contribution of Non-Tax State Revenue to national development financing..
		Improving public welfare, education, and healthcare services.

RESEARCH RESULTS

Descriptive Statistics

The data were analyzed using SmartPLS, which is well-suited for models with mediators, small sample sizes, and second-order components. Additionally, SmartPLS offers several validity tests that SPSS does not, such as convergent and discriminant validity (Laily et al., 2025b). Descriptive data is included in Table 2. The skewness and kurtosis results show that the data are normally distributed because none of the values exceed the predetermined limit of ±2 (Laily et al., 2025b).

Table 2: Descriptive Statistics

Variable	Mean	Min	Max	Standard Deviation	Kurtosis	Skewness
Asset Inventory	0.000	-2.368	1.969	1.000	-0.512	-0.675
Asset Optimization	0.000	-2.116	1.927	1.000	-0.766	-0.541
Asset Valuation	0.000	-2.076	1.962	1.000	-0.977	-0.433
Legal Audit	0.000	-2.192	1.901	1.000	-0.796	-0.522
Non-Tax State Revenue	0.000	-2.251	1.841	1.000	-0.702	-0.667
Supervision and Control	0.000	-2.020	1.657	1.000	-0.943	-0.590

Factor Loading, Validity, Reliability, R Square, f Square and Q2 Evaluation

We employed an algorithmic method to determine factor loadings, validity, and reliability during the first SmartPLS analysis **Figure 1**. As indicated in **Table 3**, every item in our sample had the necessary factor loadings (about 0.70 or higher), and no significant cross-loading across items was found. All constructs meet the validity criteria outlined by(Laily et al., 2025b). as their discriminant and convergent validity are greater than 0.70 and 0.50, respectively. Additionally, all constructs meet the reliability criteria set by (Laily et al., 2025b) as their composite reliability is above the 0.70 threshold. The validity and reliability results for each construct are shown in **Table 3.**

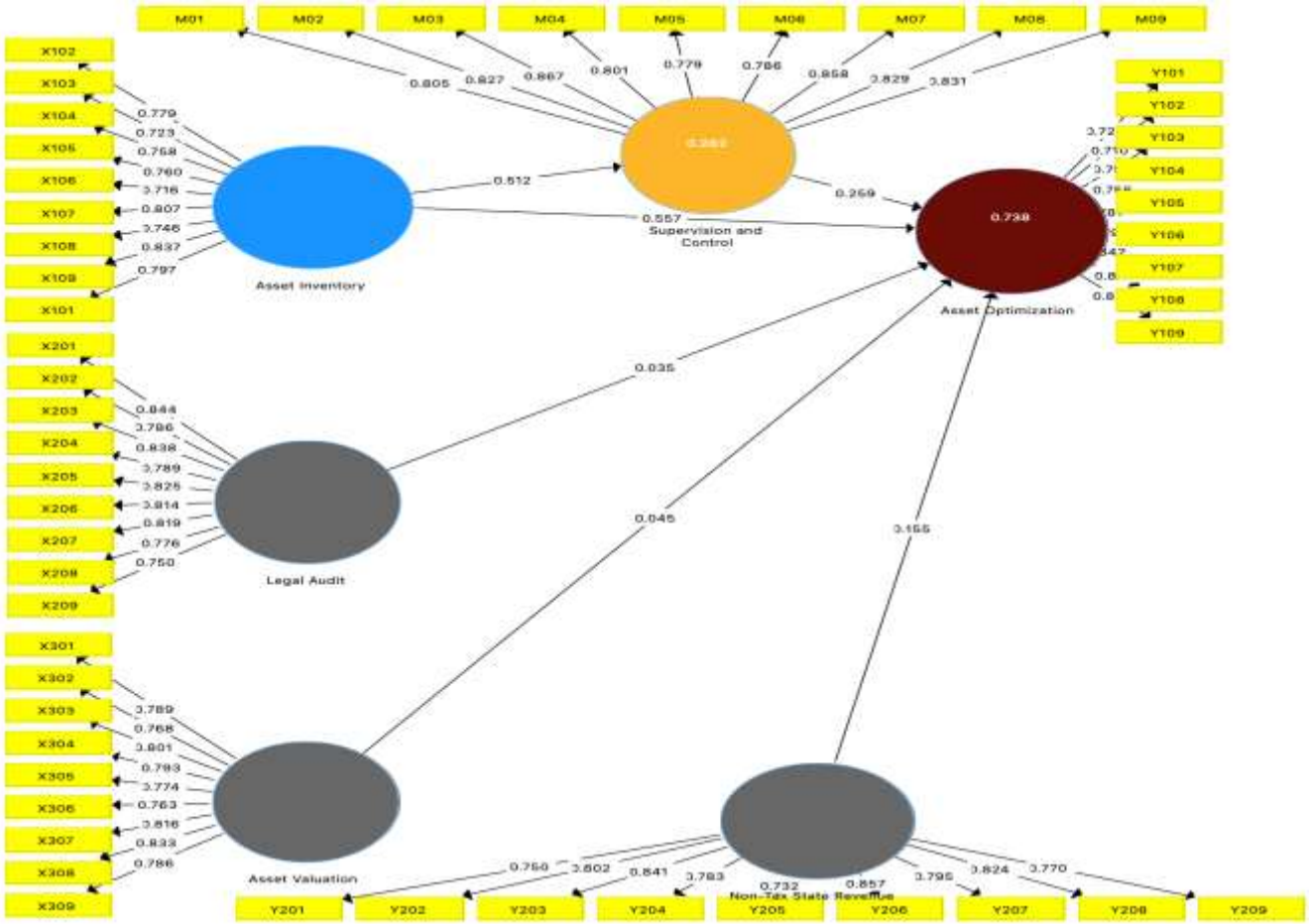

Figure 1: Model 1 for structure (algorithm)**.**

Table 3: Validity, and Reability R Square, f Square and Q2 Evaluation

Variable	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Asset Inventory	0.914	0.918	0.929	0.593
Asset Optimization	0.922	0.926	0.935	0.617
Asset Valuation	0.926	0.930	0.938	0.627
Legal Audit	0.932	0.937	0.943	0.648

Non-Tax State Revenue	0.927	0.931	0.939	0.633
Supervision and Control	0.939	0.943	0.949	0.674

Variable	R Square	R Square Adjusted
Asset Optimization	0.738	0.733
Supervision and Control	0.262	0.260

f Square	Asset Optimization	Supervision and Control
Asset Inventory	0.597	0.356
Asset Valuation	0.005	
Legal Audit	0.003	
Non-Tax State Revenue	0.065	
Supervision and Control	0.156	

Constructs	Q^2
Asset Optimization	0.448
Supervision and Control	0.173

The data processed by the author, 2025

Table 3 explains R-squared, where green business strategies account for 74% of Asset Optimization, while 26% is attributed to external variables that were not investigated in this study. 26% of Supervision and Control can be explained by their performance, with 74% coming from unexamined factors. According to (Laily et al., 2025b), f2 values of 0.02, 0.15, and 0.35 represent small, moderate, and large effects, respectively. Based on this study, Asset Inventory towards Asset Optimization has a significant impact on both Supervision and Control, with a moderate effect (>0.15). The Q2 results for Supervision and Control (0.173) and Asset Optimization (0.448) show predictive relevance.

The Heterotrait-Monotrait Ratio and Correlation

Table 4 shows that the Asset Optimization and Supervision and Control are strongly correlated. The findings highlight the interdependence of environmental performance and green business strategy by revealing a significant correlation between the two. Compared to other elements, these constructs exhibit superior discriminant validity, ensuring the resilience of the measurement model.

Table 4: The Heterotrait-Monotrait Ratio and Correlation

Variable	AI	AO	AV	LA	NTSR	SAC
Fornell-Larcker Criterion						
Asset Inventory	0.770					
Asset Optimization	0.809	0.786				
Asset Valuation	0.486	0.481	0.792			
Legal Audit	0.491	0.505	0.400	0.805		
Non-Tax State Revenue	0.518	0.544	0.179	0.307	0.796	
Supervision and Control	0.512	0.632	0.474	0.505	0.315	0.821
Heterotrait-Monotrait Ratio (HTMT)						
Asset Inventory						
Asset Optimization	0.873					
Asset Valuation	0.517	0.510				
Legal Audit	0.523	0.537	0.427			
Non-Tax State Revenue	0.561	0.583	0.189	0.322		
Supervision and Control	0.543	0.674	0.505	0.537	0.332	

verify the validity of structural relationships, defined validity standards must be followed. An HTMT ratio value below 0.90 indicates sufficient discriminant validity. The findings in **Table 4** show that every HTMT value is below the 0.90 threshold, meeting the required validity criteria.

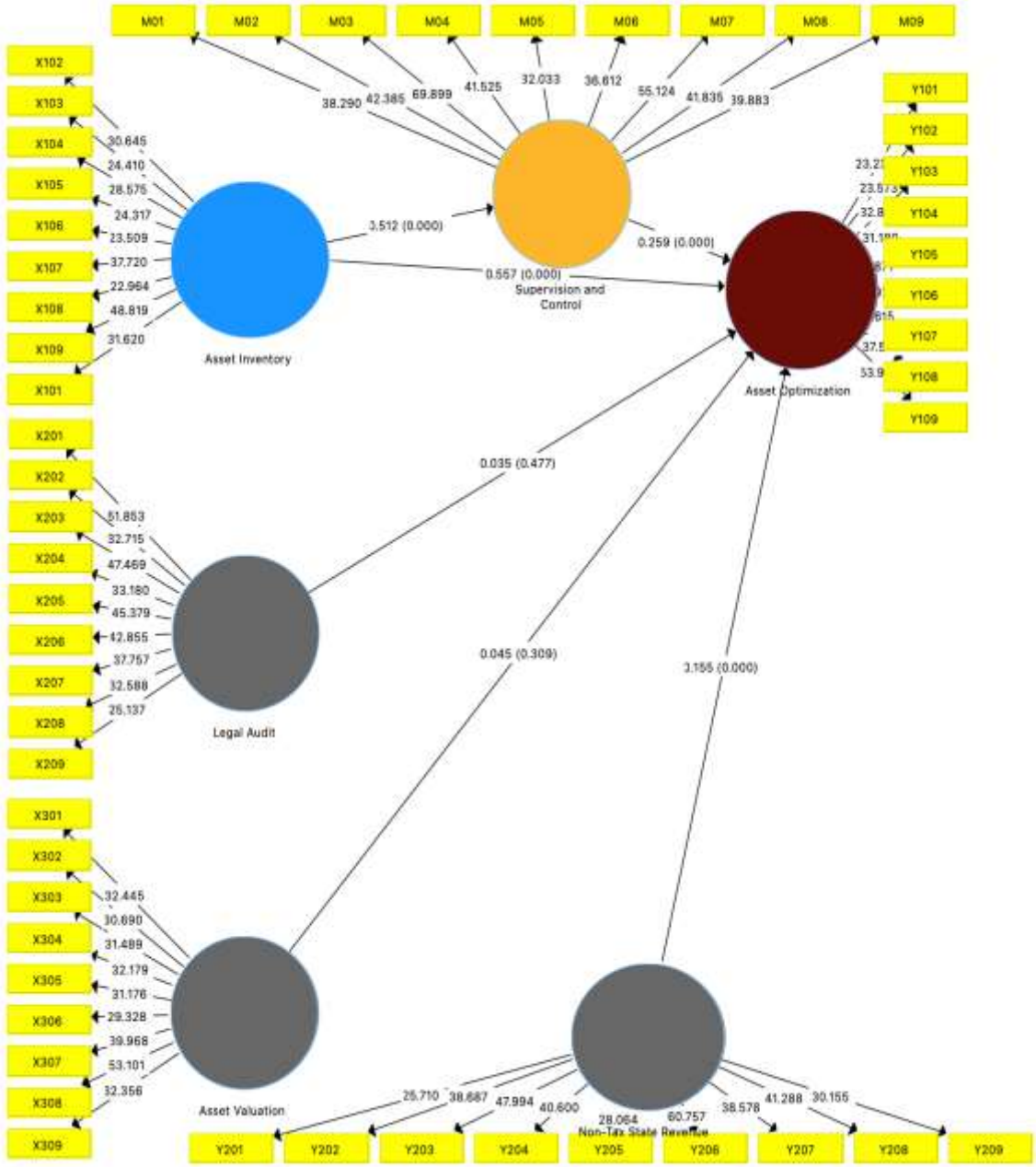

Figure 2: Bootstrapping in the second structural model

Table 5: Direct effects and Indirect Effects

Direct Effects	Original Sample	T Statistics	P Values	Information
H1_Asset Inventory -> Supervision and Control	0.512	8.458	0.000***	Accepted
H2_Supervision and Control -> Asset Optimization	0.259	4.641	0.000***	Accepted
H3_Asset Inventory -> Asset Optimization	0.557	8.265	0.000***	Accepted
Control Variable	Original Sample	T Statistics	P Values	Information
Non-Tax State Revenue -> Asset Optimization	0.155	3.596	0.000***	Accepted
Asset Valuation -> Asset Optimization	0.045	1.017	0.309	Rejected
Legal Audit -> Asset Optimization	0.035	0.712	0.477	Rejected
Indirect Effects	Original Sample	T Statistics	P Values	Information

H4_Asset Inventory -> Supervision and Control -> Asset Optimization	0.133	3.473	0.001***	Accepted

***sig<0,01 (1%), **sig<0,05 (5%), *sig<0,1(10%)

Structural Model Test Results

To investigate the proposed relationships, this study used 2,000 resamples with the bootstrapping feature of SmartPLS. The data analysis results support hypothesis H1, indicating that Asset Inventory positively and significantly impacts Supervision and Control with a value of (T = 8.458, p = 0.000***). Supervision and Control positively and significantly influences Asset Optimization, as supported by H2 with a value of (T = 4.641, p = 0.000***). Asset Inventory also positively and significantly affects Asset Optimization, with the data analysis supporting H3 with a value of (T = 8.265, p < 0.000***). Non-Tax State Revenue, which is a control variable, has a positive impact on Asset Optimization, while Asset Valuation and Legal Audit do not have a significant positive effect on Asset Optimization. As illustrated in **Figure 2 and Table 5**, Asset Inventory towards Supervision and Control has an indirect effect on Asset Optimization through Supervision and Control. These findings explain that Supervision and Control mediates Asset Optimization, supported by significant direct effects with a value of (T = 8.265, p = 0.000***) and indirect effects with a value of (T = 3.473, p = 0.001***) from Asset Inventory towards Asset Optimization through Supervision and Control.

DISCUSSION

Using Supervision and Control as a mediating variable, this study investigates the relationship between Asset Inventory, Supervision and Control, and Asset Optimization at State Universities with Public Service Agencies in Indonesia that agreed to participate in this study (Lubis et al., 2021). The findings show that Asset Inventory has an impact on Supervision and Control, meaning that the better the management of Asset Inventory, the higher the implementation of Supervision and Control at State Universities with Public Service Agencies in Indonesia (Naomi & Hadiprajitno, 2023). The findings also show that Supervision and Control has a positive and significant effect on Asset Optimization at State Universities with Public Service Agencies in Indonesia, meaning that the higher the level of Supervision and Control, the greater the impact on the improvement of Asset Optimization at State Universities with Public Service Agencies in Indonesia (Efendi, 2017).

The empirical findings regarding the influence of asset inventory on asset optimization at State Universities Public Service Bodies indicate that asset inventory significantly impacts asset optimization efforts (Naomi & Hadiprajitno, 2023). In other words, the better the asset inventory process is carried out, the more optimal the utilization of the assets will be (Odasco & Saong, 2023). The asset inventory process aims to ensure that all assets owned by State Universities Public Service Bodies are recorded completely, accurately, and systematically (Hossen et al., 2020). With comprehensive and accurate inventory data, the university can clearly determine the types and quantities of assets owned, their physical condition, and their economic value (Sulastiana et al., 2023). This collected information is crucial for determining more efficient and effective strategies for asset utilization and maintenance (Hossen et al., 2020). Therefore, a well-conducted asset inventory serves as a solid foundation for managing and optimizing assets at State Universities Public Service Bodies (Sulastiana et al., 2023).

The concept supporting this practice is found in (Basuki et al., 2022) research, which states that the recording of each asset must involve a physical inventory that covers various aspects such as shape, area, location, volume, quantity, type, address, and other elements (Safkaur et al., 2025). This aims to ensure that the assets are managed effectively and efficiently (Hossen et al., 2020). The location code for each item is an integral part of the physical inventory process, which is essential for understanding and managing assets better (Ghlichlee & Bayat, 2021). By applying the correct location code, State Universities Public Service Bodies can improve inventory data accuracy, speed up asset search processes, and ensure that assets are well-managed (Neupane, 2023). The application of location codes is not just an administrative step, but an integrated strategy that enhances operational efficiency, inventory accuracy, and provides a solid foundation for successful asset management (Hossen et al., 2020). Therefore, the application of location codes to assets can be a key to optimizing assets in State Universities Public Service Bodies (Sulastiana et al., 2023).

The findings of this study are consistent with previous research by (Neupane, 2023), which proved that asset inventory has a positive impact on asset optimization (Sulastiana et al., 2023). This study's results also confirm the basic concept of asset optimization in public or government entities, as outlined in Government Regulation No. 27 of 2014 on the Management of State-Owned Goods (Sulastiana et al., 2023). The regulation explains that activities such as data collection, recording, and reporting the results of state-owned goods data collection are closely related to efforts for asset optimization (Puswiartika et al., 2019). In this context, State Universities Public Service Bodies are expected to apply the same principles, where systematic asset inventory can support more efficient asset management and utilization (Hossen et al., 2020). Therefore, the application of accurate and structured inventory at State Universities Public Service Bodies is crucial for

achieving asset optimization goals, as described in the applicable government regulation (Sulastiana et al., 2023).

Supervision and Control act as a mediator between Asset Inventory and environmental performance towards Asset Optimization at State Universities Public Service Bodies. Asset inventory is a key step in efficient asset management, involving a systematic series of activities designed to manage an organization's assets. In the context of State Universities Public Service Bodies, asset inventory not only includes physical recording and data related to assets but also serves as the foundation for better supervision and control (Sulastiana et al., 2023). With accurate inventory data, State Universities Public Service Bodies can determine the types, quantities, locations, conditions, and values of the assets owned, enabling more efficient and optimal asset management (Neupane, 2023). Asset inventory improves transparency and data accuracy, which is crucial for decision-making regarding the maintenance, repair, or disposal of ineffective assets (Puswiartika et al., 2019). Supervision based on good inventory data allows for more effective control, minimizing waste and losses due to unclear asset usage (Ghlichlee & Bayat, 2021). With structured inventory, State Universities Public Service Bodies can identify unused assets and optimize their use, supporting more precise strategic decision-making (Sulastiana et al., 2023). Effective asset management integrates asset inventory throughout the entire asset lifecycle, helping to minimize waste and enhance overall organizational performance (Hossen et al., 2020). Therefore, the impact of asset inventory on asset optimization through supervision and control is crucial for the success of asset management in State Universities Public Service Bodies

CONCLUSIONS

This study examines the impact of Asset Inventory on the success of Asset Optimization by exploring the mediating role of Supervision and Control. The primary objective of this research is to elucidate how Asset Inventory can enhance Asset Optimization performance, while also emphasizing the critical role of Supervision and Control in addressing the needs of both Asset Inventory and Asset Optimization. The findings reveal a significant positive correlation between Asset Inventory and Supervision and Control, as well as between Supervision and Control and Asset Optimization. Moreover, a strong and significant relationship is observed between Asset Inventory and Asset Optimization. The indirect impact of Asset Inventory on Asset Optimization, mediated by Supervision and Control, is also statistically significant.

The novelty of this study lies in its integration of Supervision and Control as a mediating variable in the relationship between Asset Inventory and Asset Optimization. By positioning Supervision and Control as a mediator, the study demonstrates how the interaction between Asset Inventory and Asset Optimization drives the role of Supervision and Control. Furthermore, this research provides practical recommendations for higher education institutions to incorporate Asset Inventory into their Supervision and Control systems, thereby enhancing overall asset management effectiveness. Thus, this research establishes a solid foundation for future studies on effective and efficient asset management within higher education institutions. Specifically, the mediating role of Supervision and Control is crucial in reinforcing the relationship between Asset Inventory and Asset Optimization. These findings underscore the importance for state universities with public service agency status, as well as policymakers, to integrate Supervision and Control into asset inventory management. Such integration will strengthen commitments to achieving better Asset Optimization and promote sustainable growth. Clear policies and adequate funding are necessary for educational institutions to improve their asset management performance. The implementation of improved supervision and control systems will ensure more efficient resource utilization, enabling the achievement of long-term objectives more optimally.

Future research should focus on in-depth investigations of the specific mechanisms shaping the relationship between Asset Inventory and Asset Optimization across various private universities in Indonesia. Additionally, it is important to examine the influence of other potential mediating or moderating variables that may affect this process. These subsequent studies are expected to provide a more comprehensive understanding of the dynamics influencing Asset Inventory and Asset Optimization in the digital era.

AUTHORS' CONTRIBUTIONS

AS, Z, BM and NW collaboratively conducted the study, wrote the manuscript, and performed the editing. They developed the study's concept, formulated the theoretical framework, and supervised the entire investigation. They also managed the study's progress and ensured the soundness of its methodology. Finally, AS, Z, BM and NW critically reviewed the manuscript, made the necessary revisions, and approved it for submission. The authors declare that this work is free from any conflicts of interest or competing interests.

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