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Article

Education Laboratory at PTN-BLU: A Review Study on Policy and Institutional Political Implications

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Abstract. Educational laboratories at State Universities Public Service Agency (PTN-BLU) play a strategic role as academic nodes and institutional business units in supporting the tridharma of higher education. This study examines the dynamics of educational laboratory governance in the context of institutional politics and financial autonomy of PTN-BLU during 2015–2024. Using a qualitative descriptive approach and a literature study design, this study analysed policy documents, institutional reports, and accredited national publications. The main findings reveal four dominant patterns that hinder laboratory performance: internal policy discontinuity, inequality in resource allocation, political intervention in decision-making, and weak integration of digital systems. The fragmentation of SOPs and the dominance of bureaucracy worsen operational efficiency, while laboratories with higher commercial potential benefit from performance-based financing models. The study also shows that basic and social science laboratories are increasingly marginalized, widening the inequality gap. However, initiatives such as the digitization of laboratory management information systems, the establishment of multistakeholder advisory boards, asnd performance-based incentives showcase the potential for institutional reform. This research suggests the importance of adaptive internal policy design, fair budget distribution, and strengthening human resource capacity and digital accountability. Thus, the PTN-BLU laboratory can become a center of innovation and quality of education if it is carried out within an integrative and transformative governance framework.

Keywords: educational laboratory, PTN-BLU, campus governance, financial autonomy, institutional reform.

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1. Introduction

In the higher education ecosystem in Indonesia, educational laboratories occupy a very important position as the main means in supporting the tridharma of higher education, namely education, research, and community service. Within the Public Service Agency State University (PTN-BLU), the laboratory is not only a place to carry out academic activities but also functions as a business unit that contributes directly to the institution's acceptance through scientific and technical services. This flexibility of role makes the laboratory a strategic node between academic interests and the encouragement of institutional financial performance (Yuliana & Siregar, 2020; Government of the Republic of Indonesia, 2005).

The dual role of laboratories in the framework of PTN-BLU is influenced by the dual-track financial autonomy policy, which allows institutions to manage their budgets independently. This is based on two main regulations: Regulation of the Minister of Education and Culture No. 3 of 2020 concerning National Standards of Higher Education, which sets minimum quality benchmarks for laboratories, and Government Regulation No. 23 of 2005 concerning Financial Management of Public Service Agencies, which provides managerial autonomy to units on campus (Government of the Republic of Indonesia, 2005; Ministry of Education and Culture, 2020). Therefore, laboratories within PTN-BLU are now positioned

as revenue centers, with a mandate to provide testing, training, and certification services that can be sold to the public and industry.

However, expectations for the financial contribution of laboratories have not been fully realized. A study by Yuliana and Siregar (2020) shows that the average income from laboratories only contributes around 12% to the Non-Tax State Revenue (PNBP) of PTN-BLU institutions. This figure indicates that there is potential that has not been optimally exploited, which is caused by weak asset management systems and inefficient marketing methods of laboratory services (Sembiring, 2020). The gap between policy design and operational implementation is a crucial point that is often overlooked in the development of educational laboratories in this institution.

The problem becomes more complex when attention is directed to the internal dynamics of laboratory management. Prasetyo (2021) highlights the conflict of interest between the academic division and the business division, especially when laboratories are forced to pursue ambitious commercial targets. In many cases, the influence of the faculty's internal bureaucracy leads to inequality in resource allocation and managerial decisions, as confirmed by Sembiring (2020). This imbalance has a direct impact on service quality, operational efficiency, and public accountability.

A concrete example of this problem is reflected in the Strategic Plan of the Batam State Polytechnic (Polibatam) for 2025–2029, where it is stated that the imbalance of the laboratory budget for research activities is a factor causing the failure to achieve performance targets in 2023. A similar situation was also reported at the National Development University (UPN) "Veteran" Jakarta, where the Vice Chancellor II emphasized the importance of increasing the capacity of laboratory human resources to be able to answer the expectations of external services (UPNVJ, 2021).

Several PTN-BLUs have taken the initiative to design a more systematic institutional structure and Standard Operating Procedures (SOPs) in response to these challenges. For example, the Sepuluh Nopember Institute of Technology (ITS) issued Rector Regulation No. 10 of 2020, which contains a full-fee-based tariff policy and requires annual equipment audits as a form of financial accountability (ITS, 2020). This practice shows that measurable and structured internal regulations can improve the efficiency of laboratory management.

However, the success of implementing the policy is highly dependent on the readiness and competence of human resources. In the transition process of FISIP Universitas Brawijaya to a Legal Entity State University (PTN-BH), for example, there is a need to increase the managerial capacity of laboratory staff in the fields of digitalisation, service marketing, and occupational safety (Universitas Brawijaya, 2024). This emphasizes that policies without increasing the implementation capacity will only be a formality without substance.

Laboratory digitization is also one of the important strategies that has begun to be adopted by various PTN-BLU. The integration of online scheduling systems, digital inventory, and billing platforms not only speeds up work processes but also increases the transparency of service costs. The collaboration between Gadjah Mada University (UGM) and Lambung Mangkurat University in managing the Integrated Research Laboratory is an example of the success of inter-institutional synergy in building a laboratory digital ecosystem (Gadjah Mada University, 2024). This kind of digital platform is proven to reduce equipment downtime as well as improve resource use efficiency.

In addition, external partnerships have opened opportunities for laboratories to act as regional innovation nodes. Indonesia's Knowledge-Based Economy Vision places laboratories as an applied experimentation space that not only supports academics but also meets industry needs. UGM's collaborative scheme shows that laboratories do not have to be limited to technical service functions but can develop into a center for downstream research and cross-sector innovation.

However, all these developments still face fundamental obstacles. The gap between policies and practices, weak coordination between units, and uneven distribution of resources and access to technology are the main inhibiting factors in optimising the laboratory function of PTN-BLU. Sembiring (2020) and Yuliana & Siregar (2020) emphasise that efforts to bridge this gap require governance restructuring, alignment of internal regulations, updating funding models, and strengthening human resource competencies.

Thus, this study is intended to systematically explore the political dynamics of institutions and policies that affect the performance of educational laboratories within PTN-BLU during the period 2015 to 2024. This research emphasises the importance of an integrative approach that combines open internal policies, budget transparency, digitisation of service processes, and a multi-stakeholder accountability system in strengthening the strategic function of the laboratory. This study focuses on identifying structural and political obstacles that have been hindering the achievement of laboratory goals as the main driver of innovation and quality of higher education in Indonesia.

2. Research Methods

This research was carried out using a qualitative descriptive approach and library research design, which was chosen because of its characteristics that allow in-depth exploration of institutional phenomena without relying on primary data collection in the field (Creswell & Creswell, 2018; Patton, 2015). This approach is considered appropriate to identify and conceptualise contemporary empirical trends and understand the theoretical foundations that shape the governance practices of educational laboratories within State Universities with the status of Public Service Agencies (PTN-BLU).

In data collection, researchers purposively access various relevant and credible secondary literature sources, including institutional reports from PTN-BLU released throughout the period 2015 to 2024, policy documents from relevant ministries, proceedings from national scientific forums, and articles indexed in the SINTA national indexing system, levels 1 to 3. These sources were selected based on several selection criteria, such as the legitimacy of the publisher, the completeness of the metadata, and the relevance of the content to the focus of the research study. To strengthen the accuracy of the literature search process, the search was carried out through three main databases, namely Garuda, Google Scholar, and e-Resources owned by the National Library of the Republic of Indonesia (Arikunto, 2019).

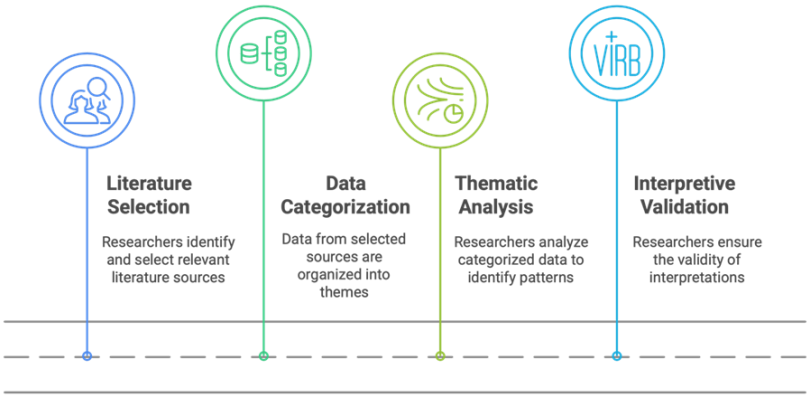

Figure 1. Workflow scheme of qualitative literature research methodology in this study

In the data analysis stage, conventional content analysis techniques are used as described by Krippendorff (2018). All documents were read repeatedly to identify units of meaning that were closely related to the three main themes of the research, namely: (1) institutional policies that affect the laboratory, (2) the structure and practices of internal campus governance, and (3) political dynamics in institutional decision-making. The open coding process is carried out to record every theme or subtheme that appears explicitly or implicitly from the text being analyzed.

Furthermore, the data reduction technique is carried out inducively to compile the initial codes into a broader conceptual category. This technique facilitates the preparation of thematic categorization maps that contain relationships between themes and subthemes that affect each other (Bengtsson, 2016; Sembiring, 2020). The results of this process are poured into Table 1, which contains the initial classification of the document, the dominant themes identified, and the frequency of the appearance of the unit of meaning in each document.

Table 1. Classification of documents and dominant themes based on content analysis results

No	Document	Dominan Theme	Reference Frequency
1	Damayanti et al. (2023)	SOP discontinuity	4
2	Kurniawan et al. (2021)	Digital Inventory Management	5
3	Yuliana & Siregar (2020)	Funding Inequality	6
4	Fadillah et al. (2025)	Efek Matthew	3
5	Prasetyo (2021)	Political Intervention	4
6	Marwah et al. (2024)	Digitalization & Accountability	5
7	Saragih & Sihombing (2021)	Governance Dualism	4
8	Rahmawati & Fauzan (2022)	Digital System Efficiency	3
9	Ditjen Dikti (2023)	Governance Reform	4
10	PPK-BLU Kemenkeu (2024)	Tariff & Incentive Model	3

To maintain the validity and reliability of the findings, this study was complemented by a peer debriefing process with two education management experts who acted as critical partners during the data processing process. In addition, source triangulation was carried out to verify the suitability between documents and assess the consistency of emerging thematic patterns (Saunders et al., 2018). The digital audit trail of the entire analysis and decision-making process is systematically documented to ensure methodological transparency and accountability.

As a final step in conceptual validation, member checking is carried out in the form of verifying initial findings against previous literature, especially studies that highlight conflicts of interest and bureaucratic dominance in laboratory management (Prasetyo, 2021). With this approach, it is hoped that the results of the research will not only reflect the diversity of the data analyzed but also have theoretical cruising power and high transferability to the context of other PTN-BLU in Indonesia.

3. Research Results

Through an in-depth review of national publications during the period 2015 to 2024, four main patterns that affect laboratory performance within PTN-BLU were identified, namely: internal policy discontinuity, inequality in resource distribution, political intervention in institutional decision-making, and weak transparency in digital management. These four patterns interact in a complex way and have a direct impact on the achievement of the academic and commercial functions of the laboratory.

Policy discontinuity is reflected in the absence of uniform and integrated standard operating procedures (SOPs) across laboratory units. This causes irregularities in the implementation of academic activities such as practicums, equipment borrowing, and equipment maintenance. A study by Damayanti et al. (2023) shows that each laboratory unit runs its own system which is highly dependent on the individual policies of the technical staff. When there are no standard SOPs, software maintenance and management of practicum tools become inconsistent, creating a risk of malpractice and prolonging students' waiting times in the practical learning process.

The real effect of these conditions can be seen in the decrease in the rate of laboratory utilization. For example, in the case of computer labs, the decrease in the use of tools reached

34% after the reservation and coordination systems between units were no longer functioning optimally (Damayanti et al., 2023). A visualization of this decline is shown in Figure 2, which shows a comparison of laboratory utilization levels before and after the fragmentation of SOP policies.

Figure 2. Decrease in the Use of Computer Laboratories due to SOP Fragmentation

(Source: Processed from Damayanti et al., 2023)

In addition to SOP problems, managerial fragmentation also occurs in laboratory information systems. Kurniawan et al. (2021) found that although the prototype Laboratory Information System (SILAB) has been developed by the Faculty of Engineering, University of Bengkulu (UNIB), this system is not adopted university-wide, resulting in most of the inventory still being done manually. This disintegration magnifies the possibility of asset loss and limits transparency in equipment distribution.

The second significant factor is the disparity in facility distribution and financing between laboratory units. A striking difference is seen between laboratories on the main campus of Java Island and institutions outside the region. Marwan et al. (2024) revealed that laboratories outside Java generally experience limitations in basic infrastructure such as proper practice rooms, test kits, and adequate internet networks. This inequality is exacerbated by the BLU tariff model that prioritizes the principle of full cost recovery, which tends to benefit units with high income potential, while strategic but less commercial units actually experience deficits in budget allocation (Dit. PPK-BLU Ministry of Finance, 2024).

Prolonged shortages of funds have a direct impact on limitations in equipment updates. Kurniawan et al. (2021) reported that only less than 60% of the equipment at the Faculty of Engineering UNIB can be used optimally. This directly inhibits the research productivity of young lecturers and the quality of the implementation of academic activities. This phenomenon reflects a "rich circle" pattern, where established units with high incomes tend to acquire more investment, while units with low incomes are increasingly lagging. The findings of Fadillah et al. (2025) reinforce this by showing a strong correlation ($r = 0.71$) between faculty PNBP volume and laboratory feasibility scores.

Third, institutional political dynamics play a significant role in shaping laboratory management policies. Although there are formal documents such as the Integrity Pact for Laboratory Heads (UM, 2021) that explicitly prohibit the practice of nepotism and collusion, the reality on the ground shows that personal closeness to university or faculty leaders is still often a determining factor in the selection of laboratory heads and priorities in the procurement of equipment. Setiawan, Prasetyo, and Saffudin (2021) emphasized that this tendency leads to the accumulation of needs in other units as well as duplication of procurement in privileged laboratories.

Marwah et al. (2024) highlighted the results of a survey of eight pharmaceutical laboratories which showed that as many as 37% of technicians felt that their authority was ignored because purchasing decisions were made top-down by faculty or university authorities. This has a negative impact on innovation and service efficiency, as strategic decisions are not based on actual needs at the operational level.

The fourth factor is the weak implementation of a transparent digital system in laboratory management. Kurniawan et al. (2021) noted that most PTN-BLU do not yet have an integrated Laboratory Management Information System (SIML), where only 12 out of 92 institutions have fully implemented it. As a result, laboratory inventory data is still spread out in an individual spreadsheet format without an automated validation mechanism. This makes it difficult to monitor assets and hinders the accountable reporting process.

However, there are good examples in efforts to digitize laboratory governance. The Jambi Health Polytechnic has successfully implemented a web-based laboratory management system that can increase the accuracy of inventory data and equipment loan transactions by up to 48% within six months (Marwah et al., 2024). This success confirms that digitalization is not only relevant in the context of administrative efficiency, but also crucial for transparency and public accountability, especially in the context of PTN-BLU that manages public funds and commercial services simultaneously.

Overall, these four patterns intertwine and create systemic barrier structures that hinder the optimization of educational laboratories. The inconsistency of SOPs and weak coordination between faculties limit the integration of the process. Inequality in resource allocation creates a deep quality gap between established and marginal units. Political intervention hurts the spirit of meritocracy and institutional accountability. Meanwhile, weak digital governance prolongs the administrative cycle and makes it difficult to make data-driven decision-making. To further understand these patterns, the categorical analysis in Table 2 below presents the thematic relationship between research findings and document sources.

Table 2. Thematic Category Mapping and Related Study References

Key Findings Categories	Related Study References
Policy Discontinuity	Damayanti et al. (2023); Kurniawan et al. (2021); Saragih & Sihombing (2021)
Inequality in Resource Allocation	Yuliana & Siregar (2020); Fadillah et al. (2025); PPK-BLU Kemenkeu (2024)
Institutional Political Intervention	Prasetyo (2021); Setiawan et al. (2021); Universitas Terbuka (2024)
Digital Governance and Accountability	Rahmawati & Fauzan (2022); Marwah et al. (2024); Kurniawan et al. (2021)

4. Discussion

The results of this study show that educational laboratories within PTN-BLU operate in tension between economic logic and academic logic. On the one hand, laboratories are required to contribute to institutional acceptance through testing, training, and certification services; on the other hand, they must continue to carry out their main function as a support for the quality education and research process (Saragih & Sihombing, 2021; Yuliana & Siregar, 2020). This tension is further strengthened when the financial autonomy provided by BLU status is not followed by comprehensive governance reforms, as expressed in the PTN Revitalization Program document (Directorate General of Higher Education, 2023). When internal policies are not standardized and are still sectoral between faculties, cross-unit collaboration becomes difficult to build, and laboratories are more easily trapped in institutional political dynamics than they are transformed into centers of academic innovation.

These findings reinforce the policy gap that has been previously described, including in Figure 1 which shows a significant decrease in the use of computer laboratories due to the absence of integrated SOPs (Damayanti et al., 2023). This fragmentation creates inconsistencies in academic services that should be universal and standardized in one institution. In the context of PTN-BLU that manages resources autonomously, fragmentation hinders allocation efficiency and leads to management practices that are not based on objective needs, but on structural power that is not accountable (Prasetyo, 2021; Marwah et al., 2024).

In terms of resource distribution, inequality between laboratories further clarifies systemic symptoms that resemble the "Matthew" effect—a dynamic described by Bourdieu (1988) as a tendency that reinforces the dominant position of established actors or units. Laboratories with high revenue potential get more investment, which in turn increases the competitiveness of their services and leads to higher revenues. Meanwhile, laboratory units oriented towards the development of basic or social sciences have stagnated due to a lack of incentives and institutional support. The study of Fadillah et al. (2025) supports this with empirical evidence that there is a strong correlation between faculty PNBP volume and laboratory feasibility score ($r = 0.71$), indicating that current allocation mechanisms have not considered equity and academic needs.

The implications of such inequality are not only structural but also epistemological. When laboratories are encouraged to prioritize services that can be sold to the market, academic missions such as basic research and curriculum development become marginalized. Marginson (2019) reminds that higher education orientation that is too pragmatic towards market demand can erode academic freedom and lower the quality of graduates. In the context of PTN-BLU, this is very relevant considering that the pressure to increase non-tax revenue is getting stronger from time to time (Ministry of Finance of the Republic of Indonesia, 2024).

Digital transformation has emerged as one of the strategic approaches to overcome inefficiencies and improve the integrity of laboratory governance. Several studies show that the implementation of an integrated Laboratory Management Information System (SIML) can have a significant impact on operational efficiency and data accuracy (Rahmawati & Fauzan, 2022; Kurniawan, Utama, & Hadi, 2021). The 45% reduction in recording errors and a 32% increase in asset utilization recorded in two separate studies indicate that digitalization is not just an administrative solution, but also able to facilitate more accurate data-driven decision-making. However, digitalization will not be effective without strengthening the capacity of the human resources who operate the system. The PR-PTN Manual (Directorate General of Higher Education, 2023) explicitly states that the training of technicians and laboratory assistants in data literacy, preventive maintenance, and cybersecurity are the main prerequisites for building a credible and sustainable digital system.

Governance reform should also include the formulation of integrated SOPs, not only as an administrative document, but also as a regulatory instrument that ensures accountability and efficiency. Guidelines from Hamzanwadi University (2020) emphasize the importance of elements such as equipment audit cycles, K3 risk matrices, and chemical destruction protocols to ensure that every laboratory activity is digitally recorded and can be held institutionally accountable.

In addition, stakeholder participation in decision-making systems needs to be strengthened. The proposal to establish a Laboratory Advisory Council by the FGD UNAND-UBB (2024), consisting of technicians, instructors, students, industry representatives, and SPI, is a concrete step to ensure social control over resource management. This model also strengthens cross-sector collaboration and opens space for laboratories to act as an innovation ecosystem based on triple-helix synergies.

The integrated laboratory concept implemented by Universitas Respati Indonesia (URINDO, 2017) provides a real example of how the merger of facilities across faculties can reduce overhead costs by up to 18% and spur multidisciplinary research collaboration. In the context of PTN-BLU, this integration will not only increase efficiency but also expand the range of services and diversify sources of income without sacrificing academic missions.

The performance-based incentive model is also worthy of being used as a reference in improving governance. The policy of the Sepuluh Nopember Institute of Technology through Rector Regulation No. 10 of 2020 shows that the association of performance bonuses with the level of use of tools and compliance with financial statements can strengthen operational discipline and encourage continuous service improvement. This model can be replicated in other state universities as part of broader institutional reforms.

By referring to Table 1 which maps the main findings and supporting literature sources, it can be concluded that improving the management of PTN-BLU laboratories requires a systemic approach that includes aspects of internal policy, resource distribution, strengthening human resource capacity, digitalization, and multi-stakeholder participation. When all these components run in an integrated manner, the laboratory will not only become an academic tool, but also a key driver in achieving the vision of higher education based on innovation and institutional independence.

5. Conclusion

This study reveals that education laboratories in the PTN-BLU environment face complex structural challenges, which arise from the interaction between inconsistent internal policies, inequality in resource allocation, political intervention in decision-making, and weak management digitalization systems. These findings show that laboratories play a role not only as academic instruments, but also as economic units that demand professional and responsive governance. Disintegration in SOPs and weak coordination across units have led to operational inefficiencies, while performance-based funding models without the principle of cross-subsidization exacerbate inequalities between laboratory units.

The uncontrolled dynamics of internal power on campuses have reduced the effectiveness of formal policies, and uneven digitalization has limited the laboratory's potential to develop as a center for academic innovation. However, good practices such as the integration of laboratory management information systems, the establishment of cross-stakeholder advisory boards, and the implementation of performance-based incentives show that institutional reform is not impossible. The main contribution of this study lies in the comprehensive mapping of systemic barriers and strategic opportunities in the management of PTN-BLU laboratories, as well as offering a conceptual framework for balanced governance between academic and economic orientations.

The implications of these findings emphasize the importance of adaptive and integrative internal policy design, human resource capacity renewal, and strengthening digital accountability systems. This research expands the scope of the discourse on the governance of higher education in Indonesia, especially in the context of the financial autonomy of PTN-BLU. For further research, a comparative study between integrated laboratory models and independent units is recommended, as well as an analysis of the effectiveness of digital interventions on service quality and decision-making. Longitudinal evaluation of laboratory reform is also needed to identify the long-term impact on the quality of education and research productivity in higher education.

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