



Enhancing Semi-Autonomous Higher Education Performance through Financial Management: A Systematic Review

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ABSTRACT

Purpose: Semi-autonomous higher education institutions face challenges in optimizing organizational performance due to the complexity of budget management, decision-making processes, and global competitiveness. **Methods:** This study uses a bibliometric analysis approach based on R and RStudio to identify research trends related to factors that contribute to the performance of semi-autonomous higher education organizations. Through co-occurrence analysis, co-word analysis, and factorial analysis, this study found that budget control has a strong correlation with operational efficiency, while flexibility in fund allocation is a determining factor for institutional sustainability. In addition, data-based decision-making processes and multi-stakeholder involvement are key elements in the effectiveness of academic and administrative policies. **Results:** The results also show that benchmarking with global institutions can improve competitiveness, although the challenge of adapting to local policies remains an obstacle. These findings strengthen the resource-based view (RBV) theory by highlighting the importance of

resource optimization and adding insight into data-driven university governance. **Implications for Theory and Practice:** The managerial implications of this study include the need to implement a performance-based budget system, evidence-based academic policies, and a study of benchmarking strategy so that semi-autonomous higher education can achieve higher performance sustainably.

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Introduction

Amidst the uncertain dynamics of the global economy, financial management plays a crucial role, causing financial uncertainty and complicating investment and retirement planning (Jahromi & Jahromi, 2021; Pradana & Hariastuti, 2023). Rapidly evolving financial technology adds complexity, while financial management becomes increasingly important (Christian et al., 2021). Effective financial management is crucial for higher education's stability and transformation within a semi-autonomous system, improving efficiency, accountability, and education quality (Waluyo, 2021). Semi-autonomous higher education systems use performance-based funding to encourage competition, innovation, and effective resource use to achieve goals (Jahromi & Jahromi, 2021; Saltzman & Roeder, 2012). The high realization of the revenue budget that exceeds the target, but still relies on government funding assistance, indicates inefficiency in financial management.

This is ironic when the performance of semi-autonomous universities is actually no better than state universities in the Asia Pacific region, which shows the need for performance-based governance strategies and policy reforms. The problem of budget realization revenues that have increased far beyond the target, but still depend on funding assistance from the government, reflects inefficiencies in the planning and utilization of financial resources in semi-autonomous universities. Ironically, the increase in fund allocation is not accompanied by an increase in institutional performance, either academically or managerially. This disparity is even more striking when compared to state universities in the Asia Pacific region that are able to show better performance with relatively more efficient budget support. This condition emphasizes the importance of performance-based financial governance system reform, increased transparency, and adaptive benchmarking strategies to global dynamics and local needs (Figure 1).

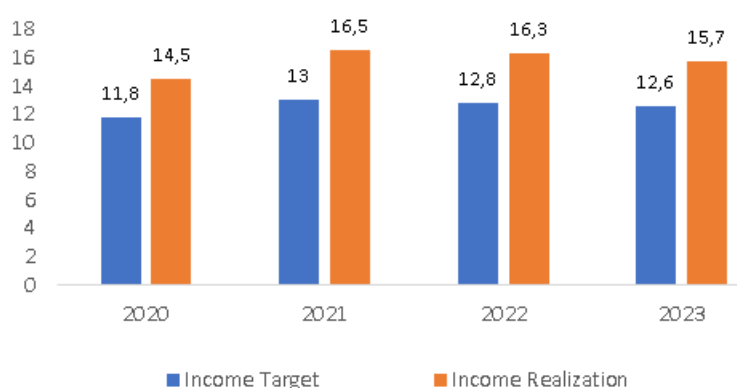


Figure 1: The realization of PTN revenue is still below the set target.

The main challenge faced is the mismatch between strategic and operational decisions, especially in terms of resource management, financial decision-making, and administrative functions. When the decision-making system is not data-based or does not involve adequate participation, the resulting policies risk losing relevance to real conditions in the field. In a higher education landscape that increasingly demands transparency, efficiency, and global competitiveness, this study aims to understand the academic factors that influence the effectiveness of policies and governance mechanisms in semi-autonomous

institutions. This approach is expected to produce a more adaptive and evidence-based governance model in supporting the sustainability of higher education institutions.

For instance, the mismatch between Revenue Target and Revenue Realization in Indonesian State Universities (PTN) – with a gap that can reach 15–25% or equivalent to IDR 7–10 trillion from the annual national target – indicates the weak effectiveness of educational institution asset monetization strategies, low diversification of revenue sources, and limited synergy with industry and the business world. A case study of one of the large PTNs in Java Island that only realized IDR 2.1 trillion from the target of IDR 2.8 trillion (75%) is an important reflection that data-based PTN financial governance reform, digital technology, and strategic partnerships are key to realizing the independence and competitiveness of national higher education.

This study also highlights how budget control in semi-autonomous higher education impacts organizational efficiency and performance. Factors such as financial management, cost effectiveness, and performance-based policies have been studied, but there is still a gap in understanding the extent to which budget control can impact academic flexibility and innovation. While studies have shown that budget control can improve financial efficiency, there are indications that overly restrictive policies can limit creativity and innovation in higher education institutions. This limited flexibility can have an impact on the quality of education and research, especially in an academic environment that requires adaptation to change. This phenomenon is increasingly relevant given the global trend towards increased financial transparency and accountability in higher education, especially in the post-pandemic era where many institutions are experiencing budget pressures. Furthermore, with the rise of performance-based funding models, it is important to understand whether these mechanisms actually improve efficiency without sacrificing academic quality. The main study of this research focuses on semi-autonomous higher education institutions, where there is a balance between public funding and autonomy in financial management.

The increasing relevance of semi-autonomous higher education institutions in the era of transformation highlights the need for effective budget control, decision-making, and benchmarking to improve competitiveness and institutional performance. As universities face financial challenges, understanding these mechanisms is crucial for ensuring sustainability. This study also explores how benchmarking with global higher education institutions can enhance sustainable performance in semi-autonomous organizations, focusing on transparent financial management. To deepen the understanding of financial and managerial practices within semi-autonomous higher education institutions, this study seeks to explore key aspects that influence institutional efficiency and strategic performance. In line with current trends emphasizing evidence-based policy and global competitiveness, the following research questions are proposed:

RQ1. What is the impact of budget control on the efficiency and performance of semi-autonomous higher education institutions?

RQ2. How does decision making contribute to the effectiveness of academic and administrative policies in semi-autonomous institutions?

RQ3. To what extent can benchmarking with global higher education institutions serve as a strategy to enhance performance in semi-autonomous organizations?

By understanding these three aspects – budgetary control, decision-making, and global benchmarking – this study aims to provide deeper insights into the key factors that

contribute to the success of the semi-autonomous higher education organization model in enhancing its efficiency, effectiveness, and competitiveness.

Previous studies have explored the implementation of budgetary controls in countries such as Flanders, Malaysia, and the US, but few studies have discussed its impact in semi-autonomous higher education studies in developing regions. While prior studies were reviewed to examine how budget control, decision-making, and benchmarking with global institutions can enhance the efficiency and performance of semi-autonomous higher education. It was found that prior research highlights role of benchmarking in improving academic competitiveness, but limited attention has been given to adapting it within resource-constrained, semi-autonomous systems. Few studies specifically assess the contribution of budget control mechanisms, decision-making processes, and benchmarking practices in improving performance within semi-autonomous higher education institutions, particularly in terms of both academic and administrative outcomes. The current research is conducted to address the gap between policy formulation and implementation in semi-autonomous universities, which is increasingly relevant in the context of global higher education transformation.

This research fills the gap by exploring how budget control impacts institutional efficiency, how decision-making improves academic and administrative effectiveness, and how benchmarking with global institutions can enhance competitiveness, thereby offering valuable insights for policy development in higher education. It explores performance-based funding strategies that support academic sustainability while maintaining flexibility.

The current study also compares benchmarking models from Europe, America, and Asia, showing that metrics-based funding systems can boost academic accountability and efficiency. However, challenges persist in developing countries due to infrastructure and academic capacity limitations. Therefore, this study plays an important role in providing insights and solutions to improve the performance of semi-autonomous higher education institutions amidst the ever-changing economic and social dynamics. It also aims to explore more deeply how performance-based funding and evaluation mechanisms play a role in improving efficiency, quality, and accountability in the higher education sector, as well as their impact on academic freedom and innovation in the university environment. In this way, the study aims to assist policymakers in designing adaptive financial models and help institutions develop effective benchmarking strategies, addressing the growing need for financial transparency. By comparing higher education systems across Europe, America, and Asia, the study offers recommendations for developing countries to improve efficiency and competitiveness.

Literature Review

Although various studies have addressed this topic in diverse geographical areas, many of them lack the linkage of their findings to global trends in higher education financing and governance (Heaton et al., 2022). Fund management in higher education institutions with financial autonomy allows flexibility in decision-making regarding budget allocation, curriculum, and academic programs, which contributes to improving organizational performance (Novak et al., 2011; Sangiumvibool & Chonglerttham, 2016). However, critical analysis of this literature is still limited, with a focus more on summarizing study results than on evaluating their theoretical and practical implications in depth (Jalali Aliabadi et al., 2019; Jiang, 2023). Budget management and internal control have a positive impact on

the performance of higher education institutions, but the relationship between these variables within the SAA theoretical framework needs further analysis (López, 2006; Sugioko, 2010).

To strengthen this literature review, a clearer mapping is needed regarding the relationship between theory and financial management with an emphasis on deeper analysis and a more organized structure (Kaló et al., 2013; Saltzman & Roeder, 2012). Several previous studies have shown that performance-based funding can improve university performance in research and innovation aspects (Luwel, 2021). However, major challenges arise when universities must balance the demands of maintaining academic freedom with the need to meet standards set by external parties (Alhasnawi et al., 2023; Vega, 2022). This concept of semi-autonomy raises questions about how much freedom should be given to universities to manage resources, without sacrificing accountability to the public and government as primary stakeholders. The funding and resource management systems in universities have become very important. Universities as semi-autonomous institutions are at the crossroads between state policy and their internal freedoms. This creates complex dynamics in resource management and decision-making that need to be further understood, given the important role of higher education in shaping the future of the nation (Strand, 2014; Waluyo, 2021).

In several studies, such as those conducted by (Frolich, 2010; Nguyen et al., 2024; Nia et al., 2022), it was revealed that despite efforts to improve efficiency and transparency, there are still concerns about how these policies affect the independence of universities in determining their research and teaching priorities. In addition, variations in funding structures – whether from the government, the private sector, or international grants – can affect university performance and strategies in adapting to changing demands (M.Hazem & Zehou, 2019).

In the last five years, semi-autonomous agencies or Public Service Agencies (BLU) have become the subject of increasing attention in public administration and financial management studies (Strand, 2014; Waluyo, 2021). This phenomenon occurs as more and more local and national governments face pressure to improve efficiency, transparency, and accountability in the management of public resources. BLUs offers a promising model for governments to deliver public services more efficiently while maintaining an adequate level of control over their operations and finances (Montt-Blanchard et al., 2023; Waluyo, 2021). In the study of globalization and increasing economic complexity, BLU becomes important because it can provide a more solid foundation for the transformation of public services that are more adaptive and effective, while still maintaining the necessary accountability to the community and regulators. Therefore, the emphasis on the role and performance of BLU continues to grow as an integral part of government efforts to improve the quality of life and sustainability of development in this modern era. Of course, financial management in semi-autonomous higher education institutions has become an increasingly important topic in recent years (Rosli & Rossi, 2016). Effective financial management not only impacts the financial health of the institution, but also directly affects its academic and administrative performance (Kuo & Ho, 2008). The complex relationship between financial policy, resource allocation, and the achievement of higher education goals (Mapulanga, 2013). Under pressure to optimize the use of limited funds while maintaining or improving academic and service standards. Other factors include funding fluctuations, changes in public policy, and demands for increased transparency and accountability in financial management.

There exists causal relationship between performance-based funding systems (PRFS) and increased research output. Some studies are also limited to small scales, such as universities in Malaysia, with sampling bias that may affect the generalizability of the results. In addition, there are shortcomings in explaining the impact of PRFS at the faculty and study program levels, and reliance on certain indicators that may not reflect the full picture. A study of financial management in higher education institutions using the Semi-autonomous Agency (SAA) theory approach, which explains how institutions with limited autonomy can manage themselves even though they still depend on external resources (Casper & Henry, 2001; Ponomarenko, 2022).

Semi-autonomous Agency Theory is a concept that highlights how entities that have a certain autonomy, such as universities or hospitals, manage themselves while maintaining a degree of freedom from external control. This theory is often associated with the management and governance of semi-independent entities, allowing them to act more flexibly and responsively to internal and external needs (Egeberg & Trondal, 2018). In university studies, Semi-autonomous Agency Theory is often used to understand how higher education institutions manage and direct themselves independently, even though they receive funding from the government or other bodies (Sukirno, 2017). Here are some key points:

1. Fund Management: Universities with autonomous status have the freedom to manage their funds. They can make decisions regarding budget allocation, including investment in facilities, research, and academic programs.
2. Academic Decisions: Autonomy allows universities to determine their curricula, new study programs, and research and development strategies. They can respond quickly to changing labor market needs and scientific developments.
3. Policies and Procedures: Autonomous universities have the freedom to determine their internal policies, such as student admissions, staff performance appraisals, and academic quality standards.
4. Leadership and Governance: With autonomy, universities can develop leadership and governance structures that better align with their vision and mission. This includes freedom to elect the chancellor and board of directors.

The study of Kasravi et al. (2017) indicates that in order for organizations to be active in a dynamic environment and maintain their survival, performance improvement is needed. Organizational capabilities are introduced as an important tool to improve the financial performance of organizations. Therefore, collecting and providing information is very important. Organizational managers must be continuous with the role of each variable and their impact on each other. In another study, Firdausi et al. (2023) shows that financial management behavior in the perspective of Wealth Management at STIE Indonesia. The study examined financial planning, implementation, and evaluation of all stakeholders and the academic community with the principles of fairness, efficiency, transparency, and public accountability. From this activity, satisfactory results were obtained for the development of STIE Indonesia, in terms of improving performance in education, research, and community service. In addition, public trust was also built towards the existence and sustainability of education and learning at STIE Indonesia Samarinda. This shows that financial management performance has been optimal and can create changes in a direction that is more in line with the expectations of all parties. Likewise, the study of Maulana et al. (2024) depicts how the financial performance in the education sector within the scope of higher education is a description of the extent to which an organization is successful or fails

in carrying out its main tasks and functions to realize its goals, objectives, missions, and visions. [Purba et al. \(2022\)](#) show how internal control positively affects the performance of profit organizations and non-profit companies. In this case, the researchers conclude that internal control is able to affect the performance of organizations specifically higher education foundations.

[Hartikayanti et al. \(2018\)](#) strongly advocate the role of managers and recommend the use of their knowledge, and the sophistication of information technology owned by private universities to be characterized in good conditions. The study made evident that the roles of managers and the sophistication of technology had a significant effect on the effectiveness of financial information systems while knowledge managers do not have a significant effect. The role of managers, manager knowledge, and technological sophistication also affect the effectiveness of financial information systems in private universities. According to [Segooa and Kalema \(2023\)](#), system factors like size, structure, leadership support, market, infrastructure and government regulations play an important role in predicting outcome-based funding (OBF) in South African public universities. Not only that, the introduction of REF 2014 had a positive impact on the quantity and quality of research in UK universities, but no effect on research productivity per capita. The impact was more heterogeneous across universities than across disciplines ([Banal-Estañol et al., 2023](#)).

The results of these previous studies show that a majority have stated that the budgeting process can affect organizational performance, but most researchers did not include all indicators of the budgeting process in measuring organizational performance. It is therefore concluded that the budgeting process can affect the performance of the University Foundation organization.

Research methodology

Research Design

This study adopted the Systematic Literature Review (SLR) approach by implementing the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) protocol ([Jameson et al., 2022](#); [Morfaki & Skotis, 2022](#)). The use of the PRISMA protocol ensures that the literature review process is carried out systematically, transparently, and standardized, thereby increasing the credibility and reproducibility of the study results. This approach includes identification, selection, quality assessment, and synthesis of relevant research, to provide a comprehensive picture of the topic being studied with relevant topics sourced from Scopus.com in the period 1996 - 2024. The PRISMA method allows for transparent, comprehensive, and structured selection and analysis of literature, providing more valid and reliable findings to understand financial management in semi-autonomous higher education institutions ([Casper & Henry, 2001](#); [Haddaway et al., 2022](#)).

Inclusion and Exclusion Criteria

To sharpen this study, the following inclusion and exclusion criteria were used ([Table 1](#)). This study used purposive sampling with inclusion-exclusion criteria to ensure that only relevant, quality, and semi-autonomous topic-appropriate literature was analyzed.

Table 1*Inclusion and Exclusion Criteria*

No.	Criteria	Inclusion	Exclusion
1	Intervention	Performance of higher education organizations with a semi-autonomous agency theory system	Elimination of manuscripts that do not have metadata
2	Measurement	Fund management	(document files are truncated, no author names listed, and
3	Research design	Descriptive analysis, literature review	articles that do not have publication information)
4	Year of publication	1996 - 2024	
5	Publication sources	Scopus.com	
6	Language	English	
7	Document type	Journal articles, book chapters, conference articles	
8	Journal topics	In relation to higher education organizations with a semi-autonomous agency theory system	

The sampling technique with inclusion and exclusion uses purposive sampling, so the number of documents used was 51 research journals. The advantage of this research model lies in the use of clear and structured inclusion and exclusion criteria, allowing the selection of relevant and high-quality documents. With the purposive sampling technique, this study ensures that only literature that is in accordance with the topic of "performance of higher education organizations with a semi-autonomous agency theory system" is taken. This strengthens the validity of the research results and ensures a focus on credible and recent sources, from Scopus-indexed publications between 1996 and 2024.

Research Instruments

This study uses Harzing Publish or Perish, VOSviewer, and PRISMA protocols in systematic literature review (SLR), supported by Scopus and CrossRef databases for journal data retrieval in RIS format. Harzing Publish or Perish analyzes bibliometric data, VOSviewer visualizes research networks, and PRISMA ensures the SLR process is systematic and transparent. This approach provides in-depth and comprehensive analysis, contributing significantly to the development of Funding for Organizational Performance.

Research Procedures

The PRISMA protocol on the topic "Funding for Organizational Performance" uses systematic steps to ensure transparency, identify relevant studies 1996-2024, screen, assess eligibility, and analyze high-quality study documents. The PRISMA procedure uses Harzing's Publish or Perish and VOSviewer for identification, analysis, and mapping of literature on funding for organizational performance 1996-2024. The Boolean formulas used include ("Semi-Autonomous Agency" AND "Higher Education" AND "Financial Management" AND "Governance") OR ("Financial Governance" AND "Semi-Autonomous Agencies" AND "Performance") OR ("Autonomous Institutions" AND "Public Administration" AND "Financial Transparency") OR ("Governance Structures" AND "Financial Decision Making" AND "Public Universities") OR ("Strategic Management" AND "Semi-Autonomous Agencies" AND "Budgeting") OR ("Financial Accountability" AND "Semi-Autonomous Agencies" AND "Higher Education") OR ("Resource Allocation"

AND "Autonomous Universities" AND "Public Institutions") OR ("Operational Performance" AND "Financial Management" AND "Autonomous Educational Institutions").

Results and Discussion

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) protocol on the topic of Funding for Performance of Higher Education Organizations semi-autonomous agencies. The data identification and analysis process begin with 1000 entries from various databases. Of these, 6 additional entries were found through the register, resulting in a total of 1006 entries. After removing 10 duplicate entries and automatically excluding another 15 entries, as well as 10 entries excluded for other reasons, a total of 971 records were further examined. In the screening stage, 400 records were removed, leaving 571 reports to be searched. However, of these reports searched, 400 reports were not retrieved, leaving only 171 reports for further assessment. Of these reports assessed, 120 reports were excluded for various reasons: 28 documents were truncated, 44 documents did not include author names, and 48 articles did not include publication information. This analysis resulted in 51 new studies that were included in the final report (Figure 2).

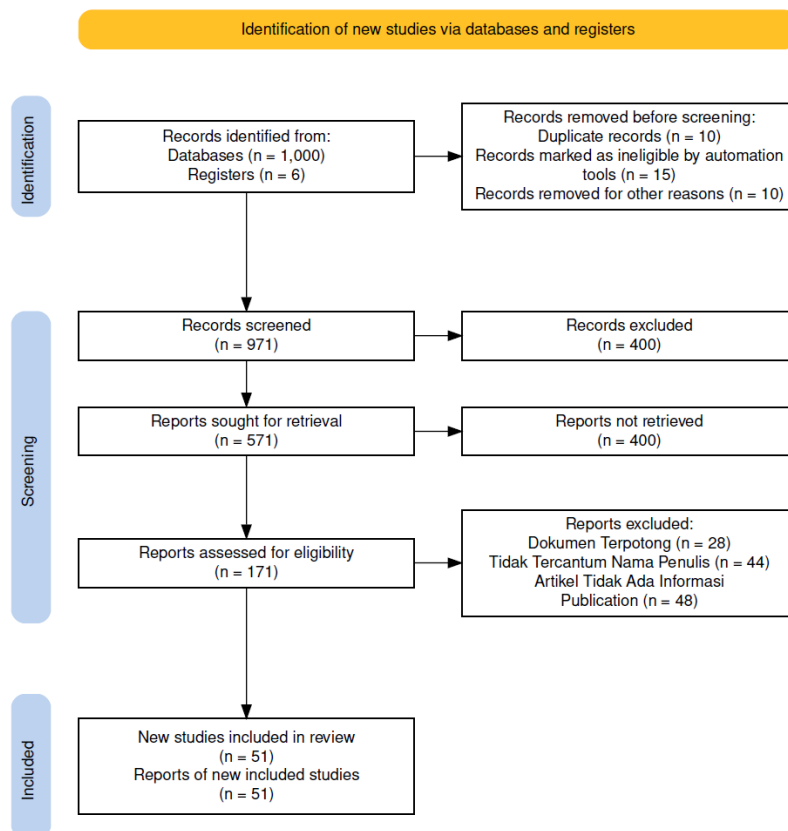


Figure 2: PRISMA Model. Source: (Haddaway et al., 2022)

Scientific production has experienced a fluctuating trend, but since 2010 it has increased steadily, peaking in 2019 and 2023 with six publications, reflecting positive growth and research consistency. The highest citation rates occurred in 1991 with a MeanTCperArt of 101 and a MeanTCperYear of 2.89 over 35 citation years. The year 2009 also stands out with a MeanTCperArt of 71 and a MeanTCperYear of 4.18 over 17 citation years. After 2018, MeanTCperArt tends to decline, with 2023 reaching only 4.5 and a MeanTCperYear of 1.5 over 3 citation years, reflecting a decline in the citation impact of recent publications. (Figure 3a and 3 b).

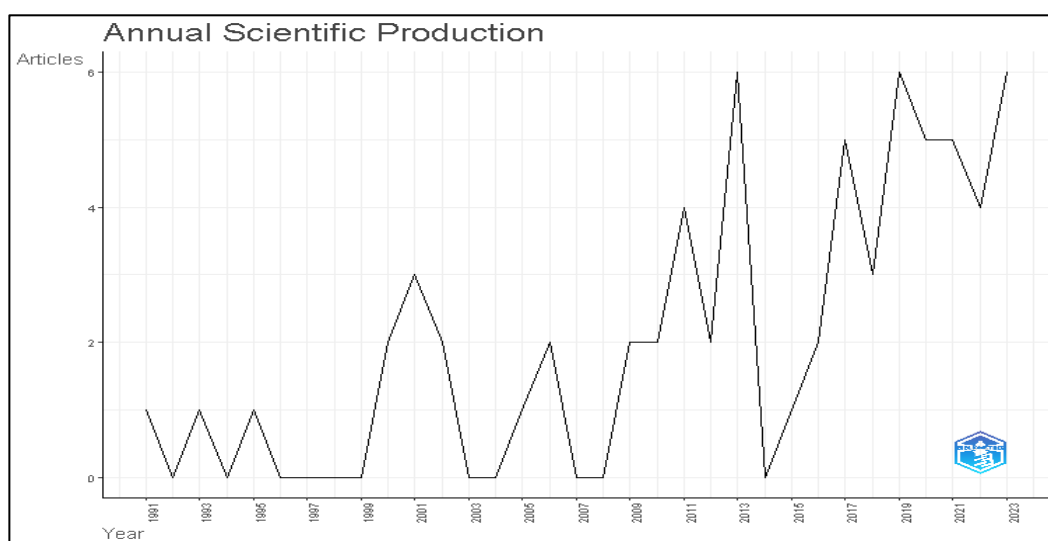


Figure 3a: Visualization of Annual scientific production

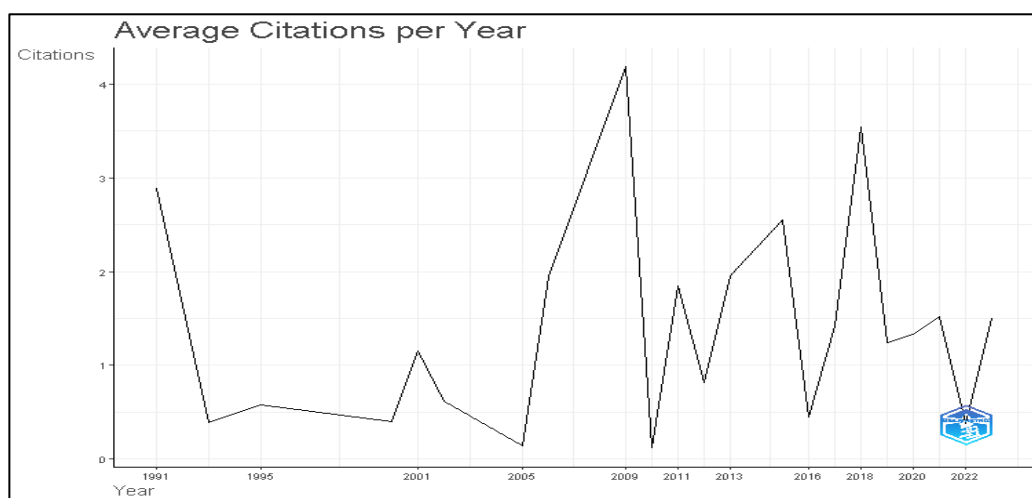


Figure 4b: Visualization of Average Citation per year

While measuring the local impact of resources by H index, the author's dominance has an h and g index of 1, with an m index ranging from 0.03 to 0.33. The authors' production over time reached highest total citations (TC) to 122 in their publications ranged from 1991 to 2023 (Figure 4a & 4b)

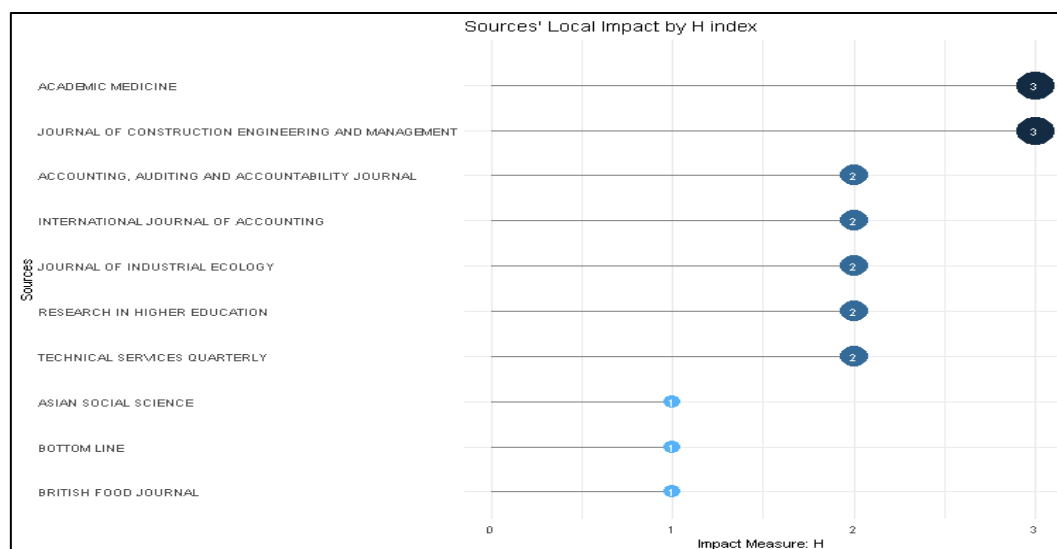


Figure 4a: Visualization of the Impact H-Index

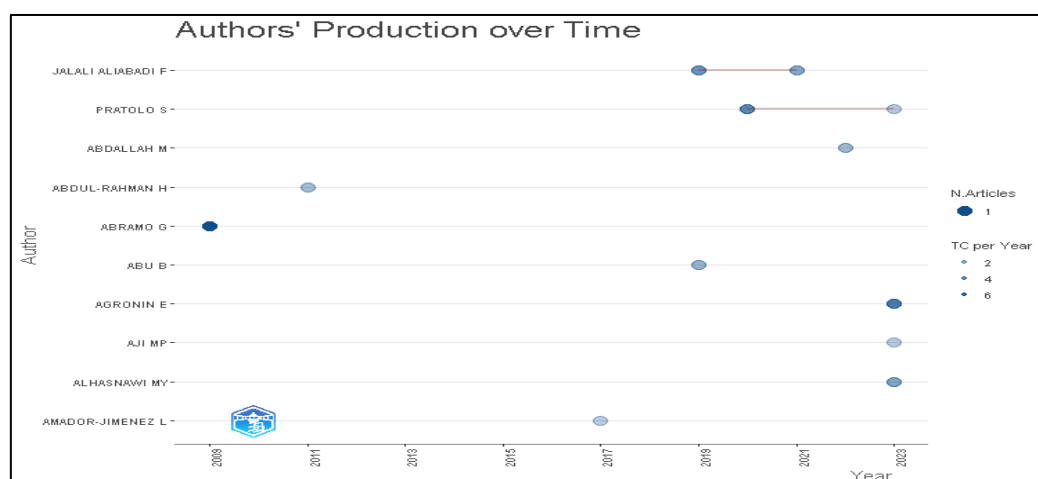


Figure 4b: Visualization of Authors' Production Over Time

Indonesia, despite having a high number of scientific documents (259,849), actually recorded the lowest citation ratio per document (3.01) compared to other Asian countries. This shows that Indonesia's scientific contribution has not had a significant impact globally,

even compared to countries with fewer publications such as Singapore (14.71) and Hong Kong (14.17). The low H-index (318) also indicates that Indonesia's scientific quality and influence are still lagging behind, reflecting the inefficiency of academic performance strategies in higher education (Table 2).

Table 2

Journal Ranking Performance Based on Asiatic Region Countries 2020 – 2023

No.	Country	Docs	Citable docs	Citations	Self-citation	Citations per docs	H index
1	China	4462885	4362794	38166370	25114733	8.55	1333
2	Japan	704393	651336	4838257	1084761	6.87	1301
3	South Korea	495322	476159	4402711	803262	8.89	934
4	India	1265151	1115607	7248757	2772894	5.73	858
5	Singapore	132984	119692	1956548	183451	14.71	806
6	Hong Kong	146787	136818	2080258	217500	14.17	800
7	Taiwan	217674	205872	1830070	273724	8.41	688
8	Malaysia	211253	197736	1583952	320458	7.50	504
9	Thailand	123565	117137	795276	141915	6.44	452
10	Pakistan	175742	165002	1656867	424099	9.43	428
11	Philippines	34727	31978	204806	29241	5.90	325
12	Indonesia	259849	253897	781100	299292	3.01	318

Source: www.scimagojr.com (2024)

Findings on the implementation of performance-based budgeting in universities indicate various factors that influence its effectiveness. A recent study in a private university in Indonesia highlighted how perceived organizational support influences the success of budget implementation, although it is still limited in the number of citations. Meanwhile, research in a public university in Iran discusses the balance between stability and change in public budgeting reform, with a significant influence in academic discussions. Furthermore, an analysis of higher education institutions shows that determinants in the implementation of performance-based budgeting can have a direct impact on quality improvement (Figure 4).



Budget control (Betweenness: 256.57, PageRank: 0.0968) and budget (Betweenness: 391.64, PageRank: 0.1122) dominate, reflecting the urgency in financial management. Cost-benefit analysis (Betweenness: 47.65) and decision making (Betweenness: 13.23) show the importance of budget efficiency (Figure 5).



In addition, budget (2783.59) and cost-benefit analysis (3212.15) show that financial decisions related to resource allocation, efficiency, and cost-effectiveness are key issues in

various sectors, including higher education, health, and the construction industry. The close association with sustainable development (825.18) and energy efficiency (1928.44) underlines its relevance in sustainable policies. The dominance of budget control in this network metric confirms that the financial management aspect is not only a technical issue but also a strategic one in cross-sectoral decision-making. The Callon Centrality and Callon Density metrics reveal that budget has the most central role (26.87) and also the highest density (153.12), confirming that this concept is very influential in the research structure and has broad associations with various fields.

Budget control occupies a strategic position with a Callon Centrality value of 6.12, indicating that budget management is a major factor in the research network, although its Callon Density (86.30) is slightly lower than the budget, meaning that this aspect is more specific in the scope of the study. Health care delivery has the highest Call Density (243.75), indicating that the efficiency of financial management in health services is a highly developed and research-dense topic. Meanwhile, cost effectiveness (1.25; 73.67) and construction industry (1.86; 77.08) have quite high densities, but with lower centralities, indicating that although important, they are more specific and not as complex as the budget. Meanwhile, fields with Callon Centrality close to zero, such as energy utilization, roads and streets, and education computing, indicate that these fields are still marginal in the broader research network. Thus, this analysis confirms that budget-related topics, especially in cost control and effectiveness, are the main focus and center of influence in various disciplines, especially in the health, education, and construction sectors.

Budget control mapping, budget, and cost control are closely related to various aspects in the research cluster, especially in the study of financial management, cost-benefit analysis, and decision making (Figure 7). The first dimension (Dim1) shows the relationship of variables to economic and efficiency aspects, with cost control (3.59, 1.36), economics (3.59, 1.36), and financial management (2.84, -0.3) having high values, indicating that these topics play an important role in budget management and resource efficiency. Health care delivery (2.47, 0.75) is also a major focus, highlighting the importance of spending efficiency in health services. Meanwhile, educational aspects such as higher education (-0.46, 0.64) and students (-0.54, 0.55) also have relevance in academic resource management. Keywords such as sustainable development (-0.5, 0.48) and energy efficiency (-0.41, 0.4) show a relationship with sustainability policies and energy efficiency. These findings suggest that financial aspects, especially budget control and cost effectiveness, are very influential in various fields such as health, education, construction, and public policy.

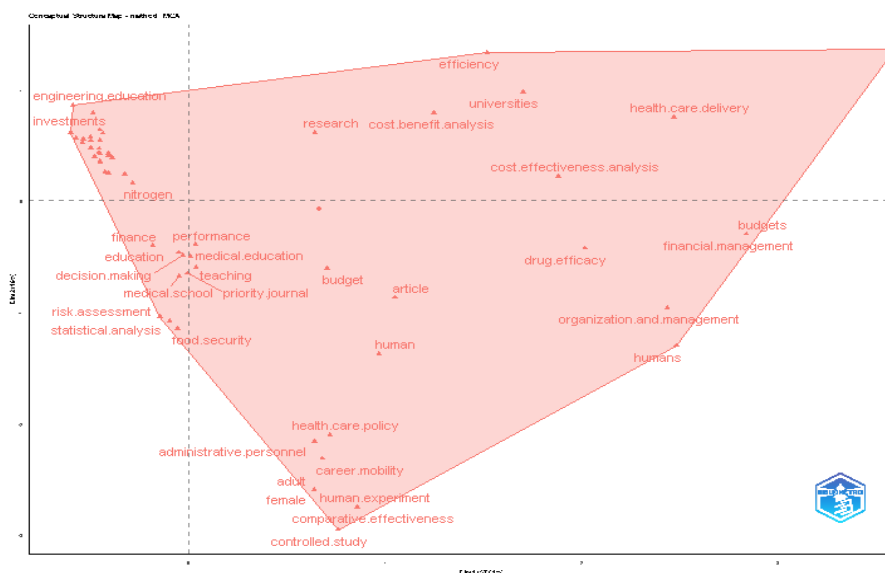


Figure 8: Factorial Map

Impact of budget control on the efficiency and performance of semi-autonomous higher education

While studying the impact of budget control on the efficiency and performance of semi-autonomous higher education, the factorial Analysis findings show that "budget", "budget control", and "financial management" have significant factor dimensions on the efficiency and performance of semi-autonomous higher education organizations. The keyword budget control has a score of Dim1 = -0.46, Dim2 = 0.43, indicating that this concept is in the spectrum of analysis that reflects financial control as a major element in the structure of semi-autonomous higher education organizations. Meanwhile, the keywords cost-effectiveness (Dim1 = -0.46, Dim2 = 0.35) and cost-benefit analysis (Dim1 = 1.25, Dim2 = 0.79) play a role in linking budget control to the effectiveness of academic policies. A higher value of Dimension 1 (Dim1) indicates that financial efficiency-based policies have a direct impact on optimal resource allocation in semi-autonomous institutions. In some cases, excessively tight budget control can hinder operational flexibility and academic innovation.

However, if implemented with an adaptive strategy, budget control can improve performance by balancing aspects of expenditure and academic output. The implications of the Factorial Analysis show that institutions with strong budget control policies tend to have better cost efficiency, but face challenges in maintaining academic flexibility. Therefore, a more dynamic budget management mechanism is needed, for example by implementing a performance-based budgeting strategy, which allows institutions to adjust budgets based on academic and administrative achievements.

Role of decision making in improving the effectiveness of academic and administrative

policies

Factor analysis study, the keyword “decision-making” is closely related to “cost-effectiveness”, “financial management”, and “resource allocation”. The keyword decision-making itself has a factor distribution pattern that is close to budgeting, indicating that in semi-autonomous higher education institutions, the decision-making process is heavily influenced by financial factors. This can be seen in the results of keyword dominance, where resource allocation (Dim1 = -0.41, Dim2 = 0.24) and financial management (Dim1 = 2.84, Dim2 = -0.3) are the main factors in the strategic decision-making process. In this study, data-based decision-making is essential so that academic and administrative policies can run more effectively. One of the main challenges identified in the factor analysis is the gap between policies at the strategic level and operational execution. This can be seen from the factor distribution in the keyword administrative personnel (Dim1 = 0.64, Dim2 = -2.17) which shows that administrative personnel in semi-autonomous higher education have a less dominant position in decision-making. In other words, policies are often made at the management level without the full involvement of the administrative parties responsible for policy implementation (Ponomarenko, 2022; Sa’diyah et al., 2022; Sarnoto et al., 2022). The implication of this result is the need for a more participatory and collaborative decision-making system, where all stakeholders—both academic and administrative—are involved in the policy formulation process. In addition, a data-based approach through budget efficiency and policy effectiveness analysis needs to be further optimized to avoid imbalances in strategic planning and operational implementation.

The study concluded that the effectiveness of academic and administrative policies is greatly influenced by various factors in decision-making, including resource allocation, operational efficiency, research funding, and technical and infrastructure support. A combination of sustainable funding strategies and data-driven policies is needed to ensure the sustainability and competitiveness of higher education institutions.

Benchmarking with global higher education institutions as a performance improvement strategy for semi-autonomous organizations

Factor analysis shows that benchmarking with global institutions has a strong correlation with increasing academic competitiveness. The priority journal keyword (Dim1 = -0.01, Dim2 = -0.65) shows that publication in a highly reputable journal is one of the main indicators in benchmarking higher education institutions. However, the lower factor value in Dimension 2 (Dim2) shows that the main challenge in benchmarking is the adaptation of strategies to local studies. In the analysis of the results, the keyword comparative effectiveness (Dim1 = 0.86, Dim2 = -2.75), is an indicator that benchmarking is often used as a tool for comparing the effectiveness of policies between institutions. However, the results also show that the implementation of benchmarking does not always have a direct impact on improving performance, especially if there is no clear adaptation strategy in implementing global policies into local studies.

Furthermore, the keywords higher education institutions (Dim1 = -0.5, Dim2 = 0.58) and academic libraries (Dim1 = -0.41, Dim2 = 0.42) show that access to global literature and collaboration with other higher education institutions are important factors in benchmarking (Ponomarenko, 2022; Shin et al., 2021; Suyadi et al., 2022; Wibawa et al., 2022). However, the biggest challenges faced are the lack of supporting infrastructure, low capacity of lecturers in international publications, and limitations in academic exchange

policies. There is a need for a more structured and adaptive benchmarking strategy, where semi-autonomous higher education institutions can adopt best practices from global institutions by considering the unique characteristics of each institution. In addition, increasing academic capacity in international publications, research collaboration, and using global academic data are also top priorities in a more effective benchmarking strategy (Alhasnawi et al., 2023; Gooptu & Mukherjee, 2022).

Semi-autonomous agencies in higher education are highly relevant to the topic of financial management and performance. Study by Luwel (2021), shows that the metrics-based funding system in Flanders has been successful in improving accountability for science and innovation. However, although this improvement in accountability is evident, further research is needed to understand the causal relationship between the system and increased research output. The visualization showing the terms "profitability" and "performance" emphasizes that good financial performance plays a significant role in achieving university profitability. This underlines the importance of appropriate and optimal resource allocation, as demonstrated by the closeness of the terms "funding," "resources," and "allocation." The study Ahmad and Yee (2020), stated that Performance-Based Funding (PBF) can be implemented in Malaysian public universities to improve the quality and efficiency of education. The contribution of transparent and accountable financial management, as indicated by terms like "accountability" and "transparency," is key to building trust among stakeholders and ensuring efficient use of funds.

Additionally, autonomy in financial decisions, represented by the term "autonomy," allows universities to respond to changes more flexibly. However, not all funding policies have positive implications, as found in the study (Duncan, 2008), in New Zealand. The country's Tertiary Education Strategy (TES) and Performance-Based Research Fund (PBRF) policies may undermine academic values and freedom, suggesting that a more in-depth ethical review is needed. In any activity, funding is critical, as implied by the terms "limited resources" and "funding challenges," which emphasize the need for efficient funding management strategies. Effective financial management is a cornerstone of successful performance for universities, reflecting the need for semi-autonomous institutions to manage resources efficiently, transparently, and accountably, while balancing multiple stakeholder priorities (Onken et al., 2019). The relationship between effective financial management and the performance of semi-autonomous higher education institutions is clear, given that good management not only improves academic and operational performance but also ensures that resources are used in the most effective and efficient manner. This is a very important topic area to be explored further in the study of financial management in semi-autonomous higher education, given its far-reaching impact on the quality of education, research and innovation.

Benchmarking with global higher education institutions as a performance improvement strategy for semi-autonomous organizations must consider various aspects, including performance-based funding models, governance structures, operational efficiency, and the impact of academic collaboration with industry. Lessons learned from various countries show that although performance-based funding can drive academic output, this approach also has risks such as increased administrative burden, pressure on academic freedom, and efficiency gaps between institutions. Therefore, performance improvement strategies need to be carefully designed by considering the balance between efficiency, innovation, and sustainability of higher education institutions.

Discussion

This descriptive systematic review shows a rising trend in scientific publications since 2010, peaking in 2019 and 2023. The highest citation impact occurred in 1991, MeanTCperArt 101, but declined after 2018. The term "budget control" appeared most frequently (frequency 16), reflecting a strong focus on financial efficiency. Network analysis identified "budget" and "cost-benefit analysis" as central influences across sectors like health, education, and construction. Thematic and factorial maps reveal strong links between budget management, cost efficiency, and sustainability, emphasizing the strategic importance of financial control in cross-sectoral decision-making. Budget control in semi-autonomous higher education has various impacts on the efficiency and performance of institutions. Various studies have shown that performance-based funding (PBF) can improve accountability and quality of education, as implemented in Flanders (Luwel, 2021) and Malaysia (Abd Rahman Ahmad & Yee, 2016). However, its effectiveness depends on the policy design and implementation. For example, several countries in Europe have performance-based funding schemes with different characteristics. (Zacharewicz et al., 2018).

In the US, similar policies are often concentrated in just a few areas (Onken et al., 2019). Other studies have also found that PBF mechanisms can help improve the efficiency of higher education institutions, but in some cases actually hinder academic freedom and lead to a more transactional approach to education (Duncan, 2008). In addition, there are indications that excessive government funding does not always increase the efficiency of non-profit universities, and in some cases, actually decreases the efficiency of public universities (Coupet, 2018). Several studies also show that performance-based funding allocation can increase research output, but tends to encourage an increase in quantity rather than quality (Pisár & Šipikal, 2017). Furthermore, the decline in government funding has encouraged universities to seek alternative sources of funding, but this may also increase operational pressures and change institutional management patterns (Hagermann, 2009). Thus, although budget control can be an instrument to improve efficiency and performance, its implementation must consider various factors such as policy design, the balance between incentives and pressures, and its impact on the academic and operational sustainability of higher education institutions.

Table 4*Relevant Articles*

No.	Author Name and Year	Publisher	Title	Variables	Findings	Weaknesses
1.	(Luwel, 2021)	Scholarly Assessment Reports	Performance-based institutional research funding in Flanders, Belgium	The variables in this study are: (1) University funding foundation, (2) Research performance, (3) Valorization activities, (4) Mobility and diversity of academic staff, (5) Quantitative indicators, (6) R&D costs, (7) BOF and IOF budgets.	The study found that Flanders uses a metrics-based research funding system to improve and provide accountability for the science and innovation system. The system has been developing for 30 years and has attracted attention as a unique example in Europe.	Some weaknesses in the research on the performance-based research funding system in Flanders include the difficulty of demonstrating a causal relationship between the system and increased research output, and the need for more studies to understand the unintended consequences of the system.
2	(Luwel, 2021)	Research Policy	Performance-based university research funding systems	The variables taken into account in the study were the Performance-Based Research Funding System (PRFS), the role of professional elites, and values such as equality and diversity.	The study found that the merit-based research funding system (PRFS) is a complex system that balances review by work and indicators, adjusts for differences between fields, and involves extensive consultation with the academic community and transparency in data and results.	The study found that the merit-based research funding system (PRFS) can influence the control of professional elites and sacrifice other values such as equality and diversity in the research process.

3.	(Ahmad & Yee, 2020)	Journal of Education and e-Learning Research	The applicability factors on the implementation of performance based funding mechanism at Malaysian public universities	The variables studied in the above research are 3 factors of the applicability of the Performance Based Funding (PBF) mechanism in Malaysian public universities, namely government objectives, level of understanding, and level of autonomy.	This study found that government objectives, level of understanding, and autonomy have a positive and significant relationship with the implementation of PBF mechanisms in Malaysian public universities. The quantitative results show that government objectives act as strategic planning that complements institutional objectives with government objectives.	Some weaknesses that are seen in the study are: (1) sampling bias because it only involved 20 public universities in Malaysia, so the results cannot be generalized to all universities in Malaysia; (2) the use of survey methods as a data source that can experience respondent bias; (3) lack of explanation of the indicators used to analyze the relationship between research variables.
4	(Segooa & Kalema, 2023)	International Journal of Service Science, Management, Engineering, and Technology	Big Data Analytics Artifact for Outcome-Based Funding Prediction in South African Public Universities	The variables presented in the study are systems, size, structure, top management support, markets, infrastructure, and government regulations.	The study found that several system factors, size, structure, leadership support, market, infrastructure and government regulations play an important role in predicting outcome-based funding (OBF) in South African public universities.	Some of the weaknesses of this research include that the research only focuses on big data analysis and does not consider other broader factors, such as organizational culture and human resources.

5	(Banal-Estañol et al., 2023)	Research Policy	Performance-based research funding: Evidence from the largest natural experiment worldwide	In this study, the variables used are: quality and quantity of research, research production per author, research focus, and distribution of research success among universities.	The study found that the introduction of the REF 2014 had a positive impact on the quantity and quality of research at UK universities, but no impact on research productivity per capita. The impact was more heterogeneous across universities than across disciplines.	Weaknesses in the research included lack of research on the effects of PRFS on the overall quality and quantity of research, as well as the lack of measurement of its impact at the faculty and study program levels.
6	(Pölönen & Auranen, 2022)	Scientometrics	Research performance and scholarly communication profile of competitive research funding: the case of the Academy of Finland	Publication data from CRIS (Current Research Information System) of 13 Finnish universities was used to compare the research performance produced by the Academy of Finland (AKA) with the university output as a whole.	The study found that research funded by Academy of Finland outperformed the output of Finnish universities. This showed that the funded research was more focused on using journal publications, English language, foreign publishers, and open access.	Weaknesses in this study are the lack of knowledge about data quality and coverage of the Current Research Information System (CRIS) and the limited use of WoS indicators which do not show the same results as the JUFO indicators.

Academic and administrative policy decision-making plays an important role in improving the effectiveness of higher education, especially in the study of resource allocation, operational efficiency, and academic performance (Table 4). Pölönen and Auranen (2022) found that research funded by the Academy of Finland performed better than the overall output of Finnish universities. This shows that an appropriate funding system can improve academic productivity. However, Sav (2016) study revealed that the decline in government funding actually led to lower efficiency in higher education management in the US, which shows the importance of sustainable financial support in academic policy decision-making. Funding sources also affect university innovation performance.

Zhou et al. (2016) found that Taiwanese vocational and technological universities rely heavily on the number of patents and scientific publications as indicators of their funding success. Other factors such as the age and academic level of lecturers also contribute to the return of funding from the government, industry, and other organizations. Meanwhile, (Yingchun & Wenjuan, 2011) found that increasing government R&D funding significantly increased the number of patents in Jiangsu Province, indicating that research-based funding policies can strengthen the innovation capacity of academic institutions. The effectiveness of academic and administrative policies is also influenced by technical support and mentoring. Xiao and North (2016) shows that technical assistance from technology business incubators (TBIs) has a positive effect on the early development of new technology firms, although the impact varies depending on the location of the university. In addition, Wang et al. (2020) used the Malmquist Productivity Index to show that the average efficiency of New Zealand universities stagnated in the period 2013–2018, highlighting the need for improvements in internal factors such as human resources, facilities and student services.

Changes in funding policies can also have negative impacts on academics. Waitere et al. (2011) found that the Performance-Based Research Funding (PBRF) system in Aotearoa New Zealand is causing greater stress for academics, which can affect their well-being and the quality of research output. Meanwhile, Mapulanga (2013) shows that the University of Malawi (UNIMA) still relies heavily on government subsidies for its library operations, indicating that dependence on external funding can be a constraint on strategic decision-making in higher education institutions.

This study underlines the importance of more flexible budget management mechanisms, such as the performance-based budgeting approach, so that resources can be allocated optimally based on academic and administrative achievements. In addition, decision-making involving various stakeholders, including academic and administrative staff, can improve policy effectiveness and reduce the gap between strategy and operational implementation. In terms of benchmarking, semi-autonomous higher education institutions need to build a more systematic and adaptation-oriented evaluation system, so that best practices from global institutions can be applied by considering local characteristics and needs.

Performance-based funding has become a key strategy in improving the competitiveness and efficiency of higher education institutions globally. A study by Luwel (2021) shows that the metrics-based research funding system in Flanders has been

developed over 30 years and has attracted attention as an accountable and effective model for managing science and innovation. This is in line with the findings [Abd Rahman Ahmad and Yee \(2016\)](#) and [Ahmad and Yee \(2020\)](#), which identified Performance-Based Funding (PBF) as a potential approach to be implemented in Malaysian public universities, where this mechanism can improve the quality of education while optimizing the efficiency of fund use. The implementation of this policy was also examined in a European Union study by [Zacharewicz et al. \(2018\)](#), which highlights the variations in performance-based research funding (PBRF) schemes across countries, both in terms of funding volume and the valuation assumptions used.

On the other hand, the funding-based approach also has challenges that need to be considered in the benchmarking strategy. [Duncan \(2008\)](#) criticizes how PBRF policy in New Zealand applies the theory of "commodification of knowledge", which has the potential to undermine academic values and intellectual freedom. [Umbricht et al. \(2015\)](#) found that performance-return funding in Indiana did not increase the number of college graduates, but instead decreased the admissions rate and selectivity of universities. Meanwhile, research by [Sav \(2012\)](#) and [Sav \(2016\)](#) highlight how declining government funding has led to a decline in the efficiency of public higher education management in the United States, while revenues from private donations and educational assistance viz., Pell Grants, have had no significant impact on increasing efficiency.

Benchmarking of funding models also needs to consider the role of policy actors and the governance structure of educational institutions ([Harris & James, 2009](#)), emphasizing the importance of student experience surveys and graduate destination surveys as strategic performance indicators in national education fund allocation. Additionally, [Frolich \(2010\)](#) revealed that differences in perceptions between stakeholders regarding accountability, transparency, and performance-based fund growth influence funding policies. [Gandara et al. \(2017\)](#) further highlights the important role of intermediaries in policy dissemination that influences the successful implementation of performance-based funding systems at the national level.

In addition, [Bolli et al. \(2016\)](#) show that competition in international public funding can have a negative impact on the productivity of leading universities due to increased administrative burdens. This was also found by [Birdsall \(2019\)](#), who identified rising public education costs and reform of higher education structures as significant factors in merit-based funding policies. [Komissarova and Zenin \(2016\)](#) highlight that the performance appraisal system in the higher education sector can be a control tool that is often associated with legal disputes, especially when used in decisions to terminate academic contracts. As part of benchmarking, performance improvement strategies can also be adapted from the university diversification and specialization model. [Sörlin \(2007\)](#) highlights how merit-based funding is used by governments to increase vertical diversification and specialization among higher education institutions, without sacrificing horizontal diversity and pluralism in the higher education system. The study by [Pölönen and Auranen \(2022\)](#) revealed that research funded by the Academy of Finland outperforms the average output of Finnish universities as a whole, especially in English-language journal publications and open access.

From the perspective of higher education institutions' efficiency, [Curtin and Nelson \(1999\)](#) show that donor loan policies that limit public spending in the education sector can have negative impacts on socio-economic development, especially for vulnerable groups such as women. A study [Sav \(2012\)](#) explained that private universities tend to be more efficient than public universities in resource allocation, although both experience challenges in maintaining productivity. [Mamun and Rahman \(2015\)](#) also found that public universities in Australia are facing efficiency pressures due to government funding cuts, forcing them to seek alternative funding sources. Furthermore, performance improvement strategies through benchmarking can also be enriched with quantitative analysis-based approaches. [Sexton et al. \(2012\)](#) used the Data Envelopment Analysis (DEA) model to show that public universities in the US could reduce state spending by up to 9.0% or \$8.72 billion through optimizing operational efficiency.

[Glass et al. \(2006\)](#) argue that by using the three-stage analysis approach, universities can develop more integrated efficiency indicators between financial audits and academic output quality. From the perspective of academic and industry collaboration, [Chen et al. \(2012\)](#) highlighted that the relationship between government and industry funding on university innovation performance in the University-Industry-Government (UIG) system in Taiwan is very complex. [Hou et al. \(2018\)](#) found that collaboration between research institutions and industry can improve the innovation efficiency of firms, but collaboration between universities and industry tends to hinder innovation efficiency. [Zhou et al. \(2016\)](#) also shows that funding sources in Taiwan's technological and vocational universities are closely correlated with the number of patents and scientific publications.

Conclusion

One of the major conclusions of this study is that the trend of scientific publications on budget control has increased significantly since 2010, with two highest peaks occurring in 2019 and 2023. The term "budget control" is the dominant keyword (frequency 16), indicating great attention to financial efficiency in the semi-autonomous higher education sector. In addition, the concept of "decision making" also plays a key role in the effectiveness of academic and administrative policies, as reflected in the bibliometric network analysis. These findings are in line with the first two research questions of this study which highlight the importance of budget control and the quality of decision-making in improving institutional efficiency and performance. The thematic map shows a close relationship between benchmarking practices and the adoption of global policies as performance improvement strategies, supporting the answer to the third research question. Thus, this study reinforces the urgency of developing a data-based financial and policy management system in semi-autonomous higher education institutions.

This study faced a few limitations in temporal coverage, where citation data tends to decline after 2018. In addition, the low H and G indices of most publications indicate the need to strengthen the quality of related literature. The geographical dominance of studies from certain regions also indicates a global representation bias. For further research, it is recommended to explore the context of budget control implementation in the education sector of developing countries by considering social and environmental factors. The use of advanced bibliometric approaches and a combination of qualitative and quantitative methods (mixed-methods) are expected to enrich contextual analysis. This

recommendation aims to open up space for interdisciplinary studies in budget management and higher education policies.

However, different measures of organizational characteristics are used as indicators. In further research, researchers will create complete indicators of organizational characteristics, namely size, age, leadership style, technology, and involvement in budgeting higher education foundations. Specifically for organizational characteristics, researchers can make it a moderating variable because previous studies rarely use it as a moderating variable. Because researchers believe that organizational characteristics can strengthen the relationship between internal control and the budgeting process on the performance of higher education organizations.

The practical implications of these findings emphasize the importance of performance-based financial governance in supporting the efficiency and effectiveness of semi-autonomous institutions, both in the public and private sectors. This study also suggests the need to strengthen the decision-making structure that is adaptive and responsive to the dynamics of the external environment. From a policy perspective, the integration of budget control and global benchmarking can be a key strategy to accelerate institutional performance. The theoretical implications support the development of a new conceptual model in budget management that prioritizes not only efficiency, but also sustainability and policy innovation. This creates a new space in the literature of public management and higher education that is more integrative and transformative. Thus, this study contributes to the development of theory and practice in the management of semi-autonomous higher education institutions in the global era.

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