TINGKAT EFISIENSI PERGURUAN TINGGI NEGERI: PERAN OTONOMI KEUANGAN DI BLU DALAM SITUASI PANDEMI

Efficiency of Public Universities: The Role of Financial Autonomy at Public Service Agency in The Pandemic Situation

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Info Artikel

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Abstract

This study measures the efficiency of public universities in the context of financial autonomy. The study explores 138 higher education in Indonesia with different levels of financial autonomy, including 12 fully autonomous, 52 semi-autonomous, and 74 non-autonomous universities. Using Data Envelopment Analysis and Analysis of Variance, the study revealed that more financial autonomy facilitates higher efficiency. In a similar vein, universities with higher efficiency scores are financially better than those with lower efficiency. We found that 3% of the universities are inefficient, due to the Covid-19 pandemic challenges. However, 23% of them experienced an increase in output while reducing their input. From this, we propose initiatives to develop financial autonomy for public universities.

Keywords : *Data Envelopment Analysis, Efficiency.*

Abstrak

Penelitian ini mengukur efisiensi perguruan tinggi negeri yang berbentuk Badan Layanan Umum (BLU). Objek penelitian ialah 138 perguruan tinggi yang terdiri atas 74 perguruan tinggi berstatus satuan kerja kementerian, 52 perguruan tinggi berstatus satuan kerja BLU, dan 12 perguruan tinggi berstatus Perguruan Tinggi Negeri Berbadan Hukum (PTNBH). Penelitian ini menggunakan Data Envelopment Analysis (DEA) untuk mengukur efisiensi dan Analisis Varian untuk menguji perbedaan efisiensi tiap objek penelitian. Data yang digunakan adalah data tahun 2019-2020. Hasil penelitian menunjukkan bahwa perguruan tinggi dengan fleksibilitas keuangan yang lebih besar memiliki efisiensi yang lebih baik dibandingkan perguruan tinggi lain. Analisis DEA menunjukkan bahwa sebanyak 3% perguruan tinggi tidak efisien karena pandemi covid-19, akan tetapi 23% perguruan tinggi mengalami peningkatan efisiensi dengan mengurangi input yang digunakan. Dari hasil penelitian, pengambil kebijakan dapat meningkatkan fleksibilitas keuangan pada perguruan tinggi negeri melalui peningkatan status BLU untuk mendapatkan kinerja perguruan tinggi yang lebih baik.

**Kata kunci:** Data Envelopment Analysis, Efisiensi.

1. INTRODUCTION

Indonesia's state financial management reform has shifted the budgeting system from the traditional model to performance-based budgeting. It emphasizes that the funding or input provided to achieve outputs must have an impact on the community. Changes in the budgeting system are expected to provide the utilization of government resources more effective, efficient, and productive.

The government adopted the New Public Management (NPM) to improve services to the community. In this case, it is necessary to encourage organizations, and employees to be more flexible and have obvious goals and objectives thus enabling accurate performance measurement. It is recognized with the concept of enterprising the government, where there is a development of an entrepreneurial spirit in administering government. This concept is an enhancement of the concept of reinventing government (Osborne & Gaebler, 1992) named the Public Service Agency (PSA).

As an implementation of enterprising government, PSA has developed the concept "let the managers manage" which provides an opportunity for the executive of PSA to manage their institution in the most efficient way so that PSA can be designated as a government organization that produces performance in public services. The independence and flexibility provided allow PSA to fully manage revenues, expenditures, cash, investments, and assets.

In Indonesia, management of PSA is carried out by the Directorate of Financial Management of Public Service Agency (DFMPSA), Directorate General of Treasury, Ministry of Finance. To date, there are 244 PSA that provide services to the community from three clusters, delivery of goods/services (education and health), regional/areas management, and fund management.

Within the performance framework, DFMPSA has set up several types of performance measurements covering financial and service aspects. This arrangement was formalized in the Monitoring and Evaluation Working Paper of the Public Service Agency in 2018. Specifically, for measuring service performance, it is adjusted to the type of service clusters such as health, education, and others with due observance of minimum service standards.
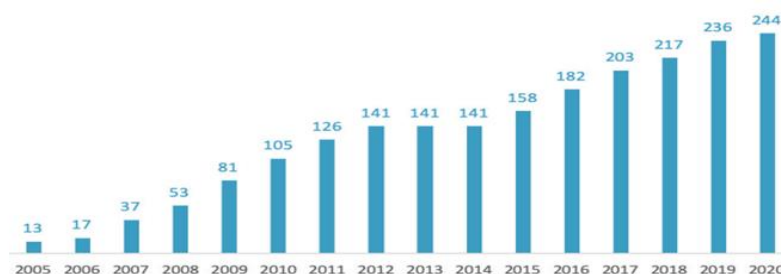
Source: Directorate of Financial Management of Public Service Agency, Directorate General of Treasury, 2021

Figure 1. Development of the Number of Working Units of Public Service Agencies Year 2005-2020

Measurement of financial performance at PSA has the same standard. It includes financial ratio assessment and PSA financial management compliance. Assessment of financial ratios includes cash ratio, current ratio, receivable collecting period, fixed asset turnover, return on

fixed assets, return on equity, inventory turnover, the non-tax revenue ratio to operations, and the ratio of subsidy costs. Meanwhile, PSA financial management compliance includes compliance with the preparation and submission of the Budget Business Plan (BBP), financial reports according to standards, PSA Ratification Order, service rates, accounting system, including procurement of goods/services, and inventory.

Performance assessment based on ratios is not sufficient for PSA that have many types of service inputs and outputs (Ozcan, 2014). Of the several forms of financial performance measurement mentioned above, there has not been a financial performance measurement on the efficiency aspect, which should be done on PSA performance measurement. For this reason, it is necessary to add another method to measure PSA performance through the efficiency level of the PSA. This measurement includes performance assessment on utilization of inputs to maximize outputs. The efficiency measurements will support PSA as an independent and flexible public service organization to have better performance compared to non-PSA institutions.

This research focuses on the PSA in the education sector, which has a portion of 41.39 percent of all existing PSA services. In many countries, the government has the responsibility for the costs of higher education (Zymelman, 1973). In addition, the government's focus to develop Indonesian excellent human resources makes the education sector a crucial thing to evaluate in terms of service delivery to the community. The role of PSA in this field needs to be defined so that it can become a competitive service provider facility both on a local and even global scale.

The education sector has 3 types of subjects that provide services regarding their fiscal autonomy. There are non-tax revenue institution units or non-autonomous universities, PSA units or semi-autonomous universities, and the Legal Entity State Universities units or fully autonomous universities. The existence of these three units in the education sector is interesting to discuss and analyze to obtain evidence of the units that provide the most efficient and optimal services to contribute to human resource development. So that after this research, the government can formulate policies related to PSA financial management in providing better services.

2. LITERATURE REVIEW

The Concept of Public Service Agency

The concept of PSA is regulated in Government Regulation Number 23 of 2005 concerning the financial Management of Public Service Agencies. Based on the regulation, PSA is a government agency formed to provide services to the community without prioritizing seeking profit and their activities based on the principles of efficiency and productivity. The financial management of the PSA is financial management that provides flexibility in applying business practices to improve services in order to promote the welfare and educate the nation. Financial management flexibility is provided in the context of budget execution, including budget and expenditure management, cash management, debt, and receivable management, investment, and procurement of goods/services.

The concept of PSA is inseparable from the massive wave of public management reform at the end of the 20th century, which brings out the various different terms but with the same nuance, including NPM, agencification, enterprising government, and so on. All of them are

forms of public service reform in order to realize good governance, by changing the way public services were originally conventional to be more responsive, effective, and efficient.

The Concept of Efficiency

According to the economic definition, efficiency is the ratio or comparison of successful effort or work and all the work or sacrifices put in to achieve these results. In other words, efficiency reflects the comparison between the output produced by an organization with the input used. In relation to PSA, the principles of efficiency and productivity is one of the special characteristics of PSA (Lukman, 2013). This is a new paradigm in public management, where traditional government agencies are imaged as sluggish organizations with low productivity. Efficiency is key, considering that needs are unlimited while resources to meet those needs are limited. Efficiency is an important element in a rapidly developing world, both in the context of competition with similar competitors and creating productivity.

The concept of efficiency refers to the concept of Pareto efficiency or Pareto optimal. Pareto optimal is defined as a condition in which it is no longer possible to change the allocation of resources to improve the welfare of economic actors (better-off) without sacrificing other economic actors (worse-off). In other words, the Pareto condition occurs when all economic actors are in optimal condition (Aditia & Waluyo, 2015).

The methods of measuring efficiency are discussed by comparing the techniques (Ozcan, 2014):

a. Ratio analysis

Ratio analysis is the simplest approach in the method of measuring performance, especially efficiency. It is conducted by dividing the output by the input. The lack of the method is that there are many ratios that must be calculated to provide an overview from various sides of the performance of several entities in different time periods.

b. Least-Square Regression (LSR)

LSR is a parametric efficiency measurement technique that can accommodate many inputs and outputs, and also takes into account the noise factor (symbolized by e). The disadvantages are, firstly, LSR uses an averaging technique which may not show efficiency. Second, LSR is not able to identify inefficient units and requires a predetermined production function, because its formulation is parametric.

c. Total Factor Productivity (TFP)

TFP overcomes the shortcomings of ratio analysis. With TFP, multiple inputs and outputs are accommodated to produce a single performance ratio. In more detail, TFP is measured using index numbers. Examples of popular TFP techniques include the Laspeyres , Pasche, Fisher, Tornqvist, and Malmquist indexes.

d. Data Envelopment Analysis (DEA)

The DEA method is one of the popular non-parametric approaches used to measure the relative efficiency of a group of organizational units that have identical input and output variables.

e. Stochastic Frontier Analysis (SFA)

SFA is a parametric technique which assumes that all units measured are inefficient. SFA also takes into account the noise factor. The drawback is that SFA requires a specific form of function as well as a distribution form for the measure of inefficiency.

Data Envelopment Analysis

Efficiency measurement is always related to the measurement of output compared to input, and how to make sure certain inputs can achieve maximum results (Farrell, 1957). The model/assumption used in DEA is divided into two types, Constant Return to Scale (CRS), and Variable Return to Scale (VRS) model (Muharam & Pusvitasari, 2007). The CRS model was pioneered by Charnes, Cooper, and Rhodes which assumes that a proportional change at all levels of input will result in the same proportional change at the level of output (Charnes et al., 1978). Furthermore, the VRS model or also called the BCC model assumes that all units measured will produce changes at various levels of output and there is an assumption that production scale can affect efficiency (Banker et al., 1984).

In addition to determining assumptions, it is also necessary to select input and output variables to be studied. The relationship between the number of Decision-Making Units (DMU) and the number of inputs and outputs is sometimes determined based on the " rule of thumb ", in examples; the number of DMUs is expected to be more than the number of inputs and outputs and the sample size should be two or three times greater than the total number of inputs and outputs.

Input and Output Variables

Efficiency measurement in DMU must pay attention to the homogeneity of the DMU so that the DMU used must be identical (Ramanathan, 2003). The selection of inputs and outputs as variables for evaluating the efficiency of a college or university is generally based on activities that are the main fields of education, such as education and research. Researcher using inputs from the number of students, the number of academic staffs, the amount of income, while the output used is the number of graduates and the number of publications (Wolszczak-Derlacz & Parteka, 2011). Not much different from them, (Sagarra et al., 2017) chose input and output variables based on the university's main activities (education and research), the number of faculties and the number of student admissions on the input side, and the output are scopus publications, and the number of graduates. Meanwhile, (Pietrzak et al., 2016) used inputs in the form of the number of researchers and grants from the government, and outputs in the form of the number of students, the number of publications, and grants from external universities.

Relevant Literature on efficiency

Research on efficiency was conducted (Saputra, 2018) by examining PSA universities that had semi-autonomous financial autonomy using the DEA method as the main analysis method, and the regression analysis method as a supporting analysis method to determine which variables had the most influence on efficiency. The variables used in the research are the number of lecturers, the number of students, and the number of realized expenditures for the input variables; and the amount of income from education services and the number of graduates are output variables. The results showed that the number of efficient and inefficient universities was almost the same. There are 11 efficient universities, while 10 inefficient universities. The most influential variable on the level of efficiency is the number of students' input variables.

At the local government level (Prasetyowati & Haryanto, 2018) state that government spending in the education and health sectors in East Java is relatively inefficient. Meanwhile, the examination of the efficiency of education in South Sulawesi province concluded that the efficiency of education and health spending in South Sulawesi Province has still not been

achieved, because the level of quality of health services and educational facilities has not been able to improve the level of public health and education (Rapiuddin & Rusydi, 2017).

Another study with the theme of DEA compared several universities using several input variables, like the number of academic staff, non-academic staff, and the value of non-current assets. Meanwhile, the outputs used are the number of students, the number of post-graduates and under-graduate applicants, the number of post-graduates and under-graduates, and the allocation for research (Abbott & Doucouliagos, 2003), (Johnes, 2006), (Johnes et al., 2017), (Thanassoulis et al., 2011). Other research at universities in Australia has operated efficiently from one university to another, although there are still some universities that still can improve their performance.

Another study at universities in Portugal showed that on average the universities in Portugal were at an efficient level between 0.728-0.828. It means that with the same number of inputs, the average university in Portugal produces an output of 27.2-17.2 percent, lower than what it should produce (Afonso & Santos, 2005). As for completeness, an efficiency calculation is carried out at the faculty level to see the efficiency of universities in Poland (Pietrzak et al., 2016).

Several findings related to efficiency indicate that a higher share of external funding and a larger composition of women in the academic staff will further increase efficiency (Wolszczak-Derlacz & Parteka, 2011). Efficiency research by combining the traditional ratio approach and DEA to the education modernization program in Mexico uses 33 variables from 55 universities (Sagarra et al., 2017).

From several previous studies, the input and output variables can be formulated as follows:

Table 1. Previous Studies

Author & Year	Input	Output
Wolszczak-Derlacz & Parteka, (2011)	number of students, number of academic staffs, total income	number of graduates and number of publications
Pietrzak et al., (2016)	Number of researchers, grants from the government	number of students, number of publications, external grants (showing collaboration with external units of the univ.)
Sagarra et al., (2017)	number of faculties, number of student admissions,	Scopus publications, number of graduates
Saputra, (2018)	used is the realization of spending, the number of lecturers, and the number of students	total income, and number of graduates

From some of these studies, the input and output variables used in this study are as follows:
1) The input variable is a combination of human resources factors, such as lecturer staff and education personnel, and financial factors such as the ratio of budget to revenue and expenditure realization.

2) The output variable, which is a combination of Education outputs such as Number of new students and number of graduates, Research output: publications and output of accreditation of state universities.

3. METHODOLOGY

This research uses quantitative research methods using parametric and non-parametric approaches. A non-parametric approach is used to obtain the results of the calculation of efficiency indicators of PSA using the Data Envelopment Analysis (DEA) technique. Furthermore, a parametric approach was conducted to test the differences in efficiency between groups using the Analysis of Variance (ANOVA).

Data were processed from population sampling of state universities with the financial autonomy categories of fully autonomous, semi-autonomous, and non-autonomous universities. This study used a sample of 138 state universities throughout Indonesia. The types of data in this research are secondary data obtained from the sources of stakeholders, such as the DFMPSA, Ministry of Finance, Data repository of the Ministry of Education, Culture, Research, and Technology, data collected from state universities website or report within the period of 2019-2020. The data collected was analyzed using the Win-DEAP software to assess the efficiency of each DMU. The results of the efficiency are used as a source to interpret a descriptive analysis of higher education efficiency from the non-autonomous, semi-autonomous, and fully autonomous universities.

The next stage is statistical testing using analysis of variance. Analysis of Variance is a statistical instrument to test whether there are differences in the efficiency of more than two groups of data studied. This difference analysis was continued to the Post Hoc Test analysis to see the level of efficiency difference between one group and another. The results of the analysis of these differences produce different levels of efficiency for each group of state universities studied.

Data Collection

Data were collected by an on-desk study of the results of previous studies in order to collect data related to the input and output indicators used to figure out the efficiency of state universities. Literature study materials were obtained from relevant sources, both studies conducted by the government bodies, universities, publications, and other sources related to measuring the effectiveness and efficiency of PSA.

Secondary data collection was carried out offline and online with the help of several stakeholders related to state universities such as the DFMPSA Ministry of Finance, Ministry of Religion, Ministry of Education, Culture, Research and Technology, and related state universities. Data collection is carried out optimally to obtain input and output data from a large number of samples in the three categories of universities.

4. RESULT AND DISCUSSION

Measuring the Efficiency of State Universities

Measurement of the efficiency of universities was carried out on 3 (three) groups of universities from the level of financial autonomy categories of fully autonomous, semi-autonomous, and non-autonomous universities. The measurement of efficiency uses the Variable Return to Scale (VRS) model with the assumptions:

a) If there is an increase in the input of x times, it does not cause the output to increase by x times. The output can be smaller or larger than x times;
b) Efficiency Scale measurement is used to see if the DMU is at the efficient level.

Table 2. Levels of Efficiency and Inefficiency of semi-autonomous PSA in 2019-2020

NO	PTN BLU	2019 crste_ind	2020 crste_ind	2019 vrste_ind	2020 vrste_ind	2019 scale_ind	2020 scale_ind
1	Universitas Negeri Jakarta	IE	E	E	E	IE	E
2	Universitas Negeri Semarang	IE	IE	E	E	IE	IE
3	Universitas Jenderal Soedirman	IE	IE	E	E	IE	IE
4	Universitas Negeri Yogyakarta	E	IE	E	E	E	IE
5	Universitas Halu Oleo	IE	IE	IE	IE	IE	IE
6	Universitas Negeri Surabaya	IE	IE	E	E	IE	IE
7	Universitas Brawijaya Malang	E	E	E	E	E	E
8	Universitas Negeri Malang	E	E	E	E	E	E
9	Universitas Syiah Kuala Aceh	E	E	E	E	E	E
10	Universitas Negeri Medan	E	IE	E	E	E	IE
11	Universitas Andalas	IE	IE	E	E	IE	IE
12	Universitas Negeri Padang	E	E	E	E	E	E
13	Universitas Riau	IE	IE	E	E	IE	IE
14	Universitas Negeri Jambi	IE	IE	IE	IE	IE	IE
15	Universitas Sriwijaya	E	IE	E	E	E	IE
16	Universitas Lampung	IE	IE	E	E	IE	IE
17	Universitas Tanjung Pura	E	E	E	E	E	E
18	Universitas Mulawarman Samarinda	IE	IE	E	E	IE	IE
19	Universitas Sam Ratulangi	IE	IE	E	E	IE	IE
20	Universitas Negeri Gorontalo	E	IE	E	E	E	IE
21	Universitas Tadulako	E	IE	E	IE	E	IE
22	Universitas Pattimura, Maluku	IE	IE	IE	IE	IE	IE
23	Universitas Udayana	IE	IE	E	E	IE	IE
24	Universitas Mataram	IE	IE	IE	IE	IE	IE
25	Universitas Nusa Cendana	IE	IE	IE	IE	IE	IE
26	Universitas Bengkulu	IE	IE	IE	IE	IE	IE
27	Universitas Terbuka	E	E	E	E	E	E
28	Universitas Pendidikan Ganesha	E	E	E	E	E	E
29	Politeknik Manufaktur Negeri Bandung	E	E	E	E	E	E
30	Politeknik Negeri Malang	E	E	E	E	E	E
31	Politeknik Negeri Semarang	E	E	E	E	E	E
32	Universitas Sultan Ageng Tirtayasa	IE	IE	E	E	IE	IE
33	Universitas Islam Negeri Alauddin Makasar	IE	IE	E	E	IE	IE
34	Universitas Islam Negeri Mataram	IE	IE	IE	E	IE	IE
35	Universitas Islam Negeri Syarif Hidayatullah Jakarta	IE	IE	E	E	IE	IE
36	Universitas Islam Negeri Sunan Gunung Djati Bandung	IE	IE	E	E	IE	IE
37	Universitas Islam Negeri Sultan Maulan Hasanuddin Banten	E	IE	E	E	E	IE
38	Universitas Islam Negeri Walisongo Semarang	E	IE	E	IE	E	IE
39	Universitas Islam Negeri Sunan Kalijaga Yogyakarta	IE	IE	E	E	IE	IE
40	Universitas Islam Negeri Sunan Ampel Surabaya	IE	IE	E	E	IE	IE
41	Universitas Islam Negeri Malang	E	IE	E	E	E	IE
42	Universitas Islam Negeri Ar Raniry Darussalam Banda Aceh	IE	IE	IE	E	IE	IE
43	Universitas Islam Negeri Sumatera Utara Medan	IE	E	IE	E	IE	E
44	Universitas Islam Negeri Imam Bonjol	IE	IE	IE	E	IE	IE
45	Universitas Islam Negeri Sultan Syarif Kasim Riau	IE	E	IE	E	IE	E
46	Universitas Islam Negeri Sulthan Thaha Saifuddin	IE	IE	E	IE	IE	IE
47	Universitas Islam Negeri Raden Fatah Palembang	IE	IE	IE	IE	IE	IE
48	Universitas Islam Negeri Raden Intan Lampung	IE	IE	IE	IE	IE	IE
49	Universitas Pembangunan Nasional Veteran Jawa Timur	E	IE	E	IE	E	IE
50	Universitas Negeri Makassar	IE	IE	E	E	IE	IE
51	Universitas Khairun	IE	IE	IE	IE	IE	IE
52	Universitas Jember	E	IE	E	IE	E	IE

Based on the table above, semi-autonomous state universities which had an increase in efficiency in 2019-2020 with the Variable Return to Scale (VRS) method are the State Islamic University of Mataram, State Islamic University of Ar Raniry Darussalam Banda Aceh, North Sumatra State Islamic University Medan, Imam Bonjol State Islamic University and Sultan Syarif Kasim State Islamic University Riau.

The semi-autonomous state universities in 2019-2020 that undergo a decrease in efficiency (IE) using the VRS method were Tadulako University, Walisongo State Islamic University Semarang, Sulthan State Islamic University Thaha Saifuddin, East Java Veterans National

Development University, and Jember University. The rest are semi-autonomous state universities that have no change relatively in efficiency level (remaining efficient and inefficient) as shown in table 2 above.

Table 3. Fully autonomous state universities Efficiency and Inefficiency Levels in 2019-2020

NO	PTNBH	2019 crste_ind	2020 crste_ind	2019 vrste_ind	2020 vrste_ind	2019 scale_ind	2020 scale_ind
1	Universitas Sebelas Maret Surakarta	E	E	E	E	E	E
2	Universitas Diponegoro Semarang	E	IE	E	E	E	IE
3	Universitas Padjadjaran Bandung	E	IE	E	E	E	IE
4	Universitas Hasanuddin	E	E	E	E	E	E
5	Institut Teknologi Sepuluh Nopember	E	E	E	E	E	E
6	Universitas Indonesia	E	E	E	E	E	E
7	Institut Teknologi Bandung	IE	IE	E	E	IE	IE
8	Institut Pertanian Bogor	IE	E	E	E	IE	E
9	Universitas Gadjah Mada	E	E	E	E	E	E
10	Universitas Pendidikan Indonesia	E	E	E	E	E	E
11	Universitas Sumatera Utara	E	E	E	E	E	E
12	Universitas Airlangga	E	E	E	E	E	E

Based on the table above, the efficiency at fully autonomous state universities in 2019-2020 using the VRS method shows that all fully autonomous state universities have carried out activities efficiently.

The next step is to measure the efficiency of universities with the status of non-autonomous state universities. The measurement results of universities with non-autonomous financial autonomy can be seen in table 4.

The table 4 shows the calculation of the efficiency value of the non-autonomous state universities using the VRS method which results that the non-autonomous state universities showing efficiency improvements (E) in 2019-2020 are 14 universities, such as Malikussaleh University, Palangkaraya University, Teuku Umar University, Bali State Polytechnic, State Polytechnic Balikpapan, Banyuwangi State Polytechnic, Fakfak State Polytechnic, Indramayu State Polytechnic, Jakarta State Polytechnic, Ketapang State Polytechnic, Madura State Polytechnic, Sambas State Polytechnic, Indonesian Cultural Arts Institute Tanah Papua, and the Surakarta Institute of the Arts. While the non-autonomous state universities that experienced a decrease in efficiency (IE) were 14 working units, namely Bangka Belitung University, Borneo Tarakan University, Manado State University, Timor University, Polytechnic Indonesian Maritime Affairs, Batam State Polytechnic, Lhokseumawe State Polytechnic, Padang State Polytechnic, Sriwijaya State Polytechnic, Subang State Polytechnic, Ujung Pandang State Polytechnic, Surabaya State Shipping Polytechnic, Yogyakarta Institute of the Arts, and Kalimantan Institute of Technology.

Table 4. Levels of Efficiency and Inefficiency of Non-autonomous state universities in 2019-2020

NO	PTN Satker	2019 crste_ind	2020 crste_ind	2019 vrste_ind	2020 vrste_ind	2019 scale_ind	2020 scale_ind
1	Universitas Bangka Belitung	E	IE	E	IE	E	IE
2	Universitas Borneo Tarakan	IE	IE	E	IE	IE	IE
3	Universitas Cendrawasih	E	E	E	E	E	E
4	Universitas Lambung Mangkurat	E	E	E	E	E	E
5	Universitas Malikussaleh	IE	E	IE	E	IE	E
6	Universitas Marintim Raja Ali Haji	IE	IE	IE	IE	IE	IE
7	Universitas Musamus Merauke	E	E	E	E	E	E
8	Universitas Negeri Manado	IE	IE	E	IE	IE	IE
9	Universitas Palangkaraya	IE	IE	IE	E	IE	IE
10	Universitas Negeri Papua	E	E	E	E	E	E
11	Universitas Pembangunan Nasional Veteran Jakarta	IE	IE	IE	IE	IE	IE
12	Universitas Pembangunan Nasional Veteran Yogyakarta	IE	IE	IE	IE	IE	IE
13	Universitas Samudra	IE	IE	IE	IE	IE	IE
14	Universitas Sembilanbelas November Kolaka	IE	E	E	E	IE	E
15	Universitas Siliwangi	E	E	E	E	E	E
16	Universitas Singaperbangsa Karawang	E	E	E	E	E	E
17	Universitas Sulawesi Barat	IE	IE	IE	IE	IE	IE
18	Universitas Teuku Umar	IE	E	IE	E	IE	E
19	Universitas Tidar	E	E	E	E	E	E
20	Universitas Timor	E	IE	E	IE	E	IE
21	Universitas Trunojoyo	E	E	E	E	E	E
22	Akademi Komunitas Negeri Aceh Barat	E	IE	E	E	E	IE
23	Akademi Komunitas Negeri Pacitan	E	IE	E	E	E	IE
24	Akademi Komunitas Negeri Putra Sang Fajar Blitar	IE	E	E	E	IE	E
25	Akademi Komunitas Negeri Rejang Lebong	E	E	E	E	E	E
26	Politeknik Elektronika Negeri Surabaya	E	E	E	E	E	E
27	Politeknik Manufaktur Negeri Bangka Belitung	IE	IE	IE	IE	E	IE
28	Politeknik Marintim Negeri Indonesia	E	IE	E	IE	E	IE
29	Politeknik Negeri Ambon	IE	IE	IE	IE	IE	IE
30	Politeknik Negeri Bali	IE	IE	IE	E	E	IE
31	Politeknik Negeri Balikpapan	IE	E	IE	E	IE	E
32	Politeknik Negeri Bandung	E	E	E	E	E	E
33	Politeknik Negeri Banjarmasin	IE	IE	IE	IE	IE	IE
34	Politeknik Negeri Banyuwangi	IE	E	IE	E	IE	E
35	Politeknik Negeri Batam	E	IE	E	IE	E	IE
36	Politeknik Negeri Bengkalis	E	E	E	E	E	E
37	Politeknik Negeri Cilacap	IE	IE	IE	IE	IE	IE
38	Politeknik Negeri Fakfak	IE	E	IE	E	IE	E
39	Politeknik Negeri Indramayu	IE	E	IE	E	IE	E
40	Politeknik Negeri Jakarta	IE	E	IE	E	E	E

Description: E=Efficient, IE= Inefficient

Based on the data mentioned in the tables above, it can be concluded in Figure 2 that during 2019-2020 there were 14 non-autonomous state universities that experienced a decrease or increase in efficiency, and 5 semi-autonomous state universities that experienced a decrease or increase in efficiency.

Simultaneous university efficiency testing shows the fact that the average efficient working unit for the 2019-2020 period is 25.3 percent. Meanwhile, the rate of the inefficiency of the universities in the 2-year period is 3 percent. The increased output accompanied by input efficiency during the 2-years period was 52 percent in 2019 and 49 percent in 2020.
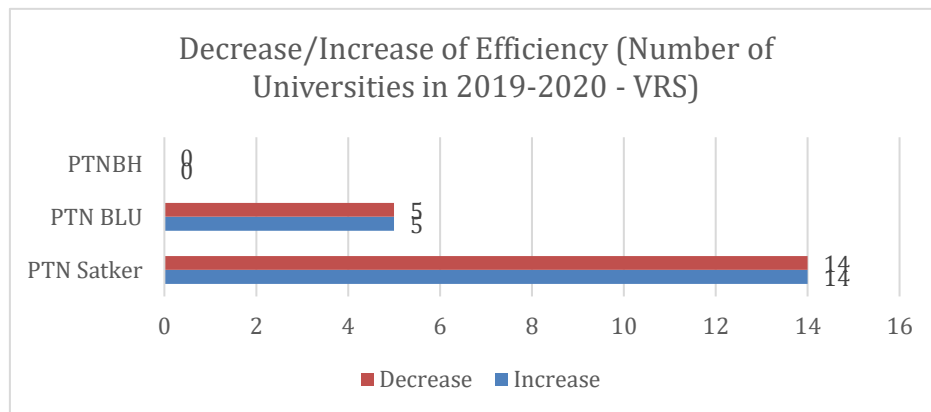
Figure 2. Decrease/increase in State Universities Efficiency in 2019-2020

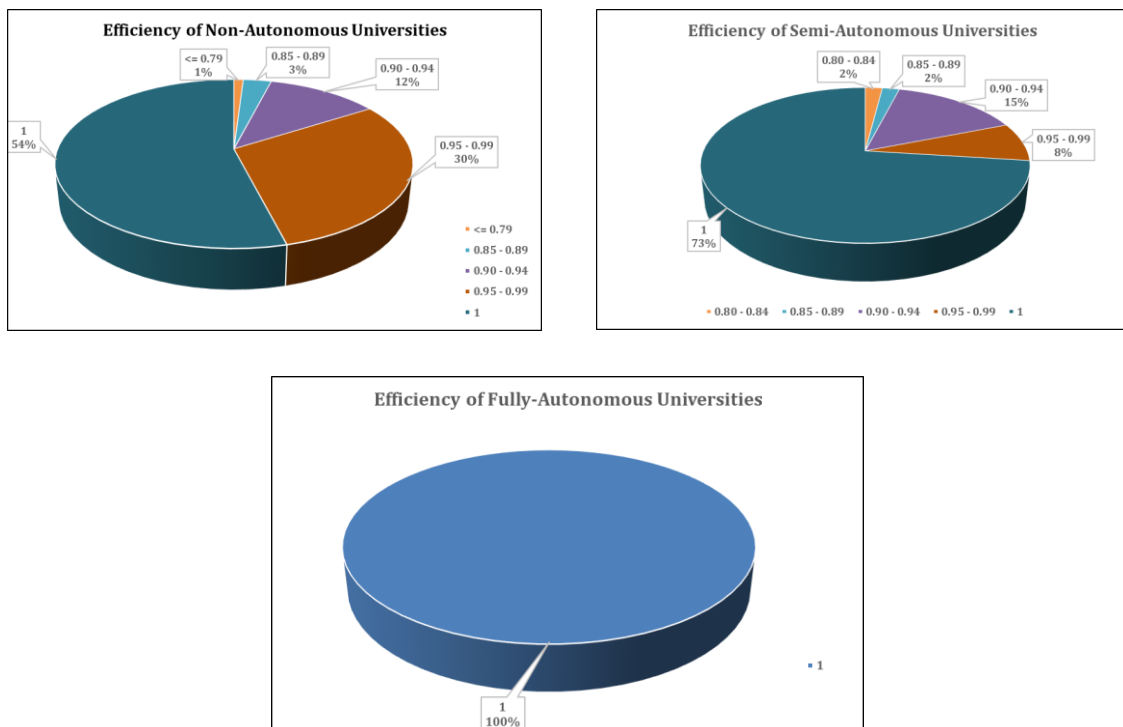**Comparison of State Universities Efficiency Levels**

The evaluation of the efficiency of state universities in this study includes universities of three types: official universities, religious universities at the Ministry of Religion, and state universities at the Ministry of Education, Culture, Research, and Technology.

The value obtained from the results of data processing using DEA produces the coefficient value of each DMU. DMU, which has a coefficient with a value less than 1 indicates that the unit is not yet efficient, while a unit with a coefficient value of 1 means that the unit has been efficient in terms of the inputs used and the outputs produced in accordance with the conceptual framework of this research.

Table 5. Efficiency Distribution using VRS

Efficiency Value	Semi-autonomous	Fully autonomous	Non-autonomous
<= 0.79	-	-	1
0.80 - 0.84	1	-	-
0.85 - 0.89	1	-	2
0.90 - 0.94	8	-	9
0.95 - 0.99	4	-	22
1	38	12	40
TOTAL	**52**	**12**	**74**

If using the VRS method, the efficiency value of universities with fully autonomous status is still the highest compared to other college clusters with 100 percent efficiency, while universities with semi-autonomous with efficient predicates are 73 percent, followed by non-autonomous universities with a score of efficiency 54 percent.

Figure 3. Comparison distribution of efficiency values between colleges/universities using VRS

From the picture above, the fully autonomous universities dominate the efficiency of higher education with all universities or 100% already efficient. Furthermore, the efficient semi-autonomous universities are 73 percent, and the efficiency of non-autonomous universities is only 54 percent.

This difference can be explained because, in terms of the budget and realization of higher education expenditures that are used as inputs, universities with non-autonomous universities generally have smaller allocations compared to other college clusters. With the limited budget allocation, the organization also has constraints in restriction of the implementation of activities to produce outputs in accordance with the specified goals.

Higher education or university accreditation scores also have an influence on achieving efficiency, because higher education clusters with non-autonomous generally have lower accreditation scores than other higher education clusters. On average, the number of education personnel and lecturers owned by the non-autonomous institutions is also less compared to other clusters.

Testing the Efficiency Differences in Higher Education State Universities

The analysis of differences in the measurement of higher education efficiency aims to examine the differences between two or more populations or sample groups under study. Testing the difference in efficiency will use the Analysis of Variance (ANOVA) which examines the difference in the mean of data for more than two groups. In this study, the samples tested were three groups of universities with their financial autonomy: non-autonomous state universities, semi-autonomous state universities, and fully autonomous state universities. The different tests used the ANOVA method to see the difference in VRS efficiency between DMUs during the 2019-2020 research period. In this case, using the entire DMU VRS.

ANOVA testing is used as an analytical tool to test research hypotheses that want to assess whether there is a difference in the mean between the groups of state universities being tested. The final result of the ANOVA analysis is the value of the F test or calculated F. The value of this calculated F is then compared with the value in table f. If the value of f arithmetic > f-table, it can be concluded that accepting the alternative hypothesis (H1) and rejecting the null hypothesis (H0) or it can be interpreted that there is a significant difference in the average efficiency of VRS in all groups of state universities.

The test results on the entire sample in three groups of state universities in 2019-2020 show that there are differences in VRS efficiency between groups where non-autonomous state universities are greater towards efficient than semi-autonomous state universities and fully autonomous state universities. The test results show the value of f arithmetic > from the f-table, where the value of h count is 13.80. Furthermore, to find out the difference in the mean efficiency of VRS in the 3 groups of universities, a post hoc test was carried out so that it could be seen which groups were different.

```
                            Analysis of Variance
        Source            SS        df       MS           F      Prob > F

Between groups         .033500631      2   .016750316     3.38     0.0354
 Within groups        1.35207922     273   .004952671

    Total             1.38557986     275   .005038472

Bartlett's test for equal variances:  chi2(1) = 117.4032  Prob>chi2 = 0.000
```

Figure 4. Post Hoc Test

Before continuing to look at the differences between the groups, it is necessary to ascertain whether the variance being tested is the same (homogeneous), so we need to do a homogeneity test. The picture above shows that the tested variance has the same variance, which can be seen from Bartlett's test which shows that the calculated chi2 value is greater than the table value. Thus, we can perform the Bonferroni test to see further differences in the mean VRS efficiency.

```
                           Comparison of vrste_all by Kode
                                     (Bonferroni)
Row Mean-
Col Mean              1                2

        2        .017452
                   0.883

        3       -.042312        -.059764
                   0.000           0.001
```

Figure 5. Bonferoni Test

The Post Hoc Bonferroni test can be used to analyze the same or different samples (equal and unequal) in each treatment. The Bonferroni Post Hoc Test allows making comparisons

between treatments, between treatments and treatment groups, or between treatment groups. In this study, the results of the Bonferroni Post Hoc Test showed that the fully autonomous state universities had better VRS efficiency than the semi-autonomous state universities and non-autonomous state universities. Furthermore, the universities group with semi-autonomous state universities has better efficiency than the universities group with the non-autonomous state universities. Overall, we can conclude that universities have fully autonomous state universities > semi-autonomous state universities > non-autonomous state universities.

The results of this analysis show that the state universities management policy is appropriate where the fully autonomous universities scheme is an ideal scheme for universities in improving the quality of students, publications, and accreditation of state universities. On the other hand, the scheme with semi-autonomous state universities is a level that must be passed by non-autonomous state universities to go to the fully autonomous state universities level. In this case, DFMPSA implements the right policies in ensuring that the selection of universities with non-autonomous state universities is promoted to semi-autonomous state universities and ensures the quality of semi-autonomous state universities is upgraded to fully autonomous state universities.

5. CONCLUSION AND RECOMMENDATION

Conclusion

The measurement of the efficiency of state universities in this study compares three groups consisting of non-autonomous state universities, semi-autonomous state universities, and fully autonomous state universities. The results of the study of literature and following the national standards of higher education in Indonesia can be identified as input variables in the form of lecturers, education staff, the ratio of expenditures to revenues, and the realization of expenditures. Meanwhile, the output variables used are the number of new students, the number of students who graduate, research publications, and university accreditation.

The method used is the variable return to scale method because the output generated from the number of inputs used does not increase constantly. From the results of data analysis using DEA, fully autonomous state universities have the highest level of efficiency. Furthermore, universities with efficient status are mostly owned by semi-autonomous state universities and then followed by non-autonomous state universities. From calculating the efficiency of the three types of universities' financial autonomy using data from 2019 and 2020, it is known that all fully autonomous state universities have been operating efficiently. The calculation of the efficiency of universities with non-autonomous state universities status resulted in the fact that there were 14 universities that experienced a decrease and also an increase in the level of efficiency. Meanwhile, universities with semi-autonomous state universities showed that there were 5 universities that experienced a decrease and also an increase in the level of efficiency. Universities that increased efficiency in 2019-2020 can be used as benchmarks by them that are not efficient yet or have decreased efficiency levels.

Overall, there is an inefficiency rate of universities for the period 2019-2020 of 2.94%. This could be due to the impact of the Covid-19 pandemic on the higher education sector. There are still more than 75% of universities that are less efficient. Especially for state universities with semi-autonomous financial autonomy, 67% of the universities are still less efficient, however, on average there are 23.07% have an increase in average output followed by input efficiency.

The results of the different tests show that universities with fully autonomous financial autonomy are more efficient than universities with semi-autonomous financial autonomy and non-autonomous financial autonomy. Furthermore, universities with semi-autonomous financial autonomy have better efficiency than universities with non-autonomous financial autonomy.

Policy Recommendations

Some of the policy recommendations presented in this research are as follows:

a) DFMPSA needs to strengthen the quality of universities with semi-autonomous state universities by compiling performance criteria on the efficiency aspect in accordance with the higher education business model. Strengthening these performance criteria is useful for ensuring the readiness of semi-autonomous state universities to upgrade to fully autonomous state universities.

b) The Ministry of Education, Culture, Research, and Technology needs to develop efficiency guidelines for state universities with the status of non-autonomous state universities, which according to this study has low efficiency in education, publication, and accreditation. This efficiency guideline is useful for non-autonomous state universities to upgrade to semi-autonomous state universities.

c) DFMPSA and the Ministry of Education, Culture, Research, and Technology together need to evaluate the efficiency of fully autonomous state universities. Although in this study the group universities had the highest efficiency compared to other group universities, it is necessary to monitor the performance of fully autonomous state universities within the framework of financial management and education quality development.

Limitation

This research was conducted over a period of 2019-2020 because the dataset obtained and collected for analysis from various universities is only covering data for 2 years. The situation of the Covid-19 pandemic will also affect the implementation of the educational process at universities with changes in methods and ways of working during the pandemic breakout. Improvements in the provision of a database of each university in the future will provide more reliable results for further research.

REFFERENCE

Abbott, M., & Doucouliagos, C. (2003). The efficiency of Australian universities: a data envelopment analysis. *Economics of Education Review*, *22*(1), 89–97.

Aditia, & Waluyo, B. (2015). Agensifikasi (Agencification) dan Efisiensi: Analisis pada Badan Layanan Umum Rumah Sakit. *Info Artha*, *1*, 1–23.

Afonso, A., & Santos, M. (2005). Students and teachers: A DEA approach to the relative efficiency of portuguese public universities. *ISEG-UTL Economics Working Paper*, *07*, 1–32.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, *30*(9), 1078–1092.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research*, *2*, 429–444.

Farrell, M. J. (1957). The Measurement of Productive Efficiency. *Journal of the Royal Statistical Society*, *120*(3), 253–290.

Johnes, J. (2006). Data envelopment analysis and its application to the measurement of efficiency in higher education. *Economics of Education Review*, *25*(3), 273–288. https://doi.org/10.1016/j.econedurev.2005.02.005

Johnes, J., Portela, M., & Thanassoulis, E. (2017). Efficiency in education. *Journal of the Operational Research Society*, *68*(4), 331–338. https://doi.org/10.1057/s41274-016-0109-z

Lukman, M. (2013). *Badan layanan umum: dari birokrasi menuju korporasi*. Bumi Aksara.

Muharam, H., & Pusvitasari, R. (2007). Analisis perbandingan efisiensi bank syariah di Indonesia dengan metode data envelopment analysis (Periode tahun 2005). *Jurnal Ekonomi Dan Bisnis Islam*, *2*(3), 80–166.

Osborne, D., & Gaebler, T. (1992). *Reinventing Government : How The Entrepreneurial Spirit is Transforming The Public Sector*. Plume.

Ozcan, Y. A. (2014). Performance measurement using data envelopment analysis (DEA). In *Health care benchmarking and performance evaluation* (pp. 15–47). Springer.

Pietrzak, M., Pietrzak, P., & Baran, J. (2016). Efficiency assessment of public higher education with the application of data envelopment analysis: The evidence from Poland. *Online Journal of Applied Knowledge Management*, *4*(2), 59–73. https://doi.org/10.36965/ojakm.2016.4(2)59-73

Prasetyowati, Y. W., & Haryanto, T. (2018). Determinan Efisiensi Teknis Belanja Pemerintah Sektor Pendidikan dan Kesehatan Kabupaten/kota di Provinsi Jawa Timur. *ASSETS : Jurnal Ilmiah Ilmu Akuntansi, Keuangan Dan Pajak*, *Vol.2*(No.2), 47–55.

Ramanathan, R. (2003). *An introduction to data envelopment analysis: a tool for performance measurement*. Sage.

Rapiuddin, R., & Rusydi, B. U. (2017). Efisiensi Belanja Pemerintah Sektor Pendidikan dan Kesehatan di Provinsi Sulawesi Selatan. *EcceS (Economics, Social, and Development Studies)*, *4*(1), 23–39.

Sagarra, M., Mar-Molinero, C., & Agasisti, T. (2017). Exploring the efficiency of Mexican universities: Integrating data envelopment analysis and multidimensional scaling. Omega, 67, 123-133. *Omega*, *67*, 123–133.

Saputra, R. O. (2018). Efisiensi Universitas Badan Layanan Umum dengan Metode Data Envelopment Analysis. In *Indonesian Treasury Review: Jurnal Perbendaharaan, Keuangan Negara dan Kebijakan Publik* (Vol. 3, Issue 1, pp. 35–42).

Thanassoulis, E., Kortelainen, M., Johnes, G., & Johnes, J. (2011). Costs and efficiency of higher education institutions in England: A DEA analysis. *Journal of the Operational Research Society*, *62*(7), 1282–1297. https://doi.org/10.1057/jors.2010.68

Wolszczak-Derlacz, J., & Parteka, A. (2011). Efficiency of European public higher education institutions: A two-stage multicountry approach. *Scientometrics*, *89*(3), 887–917. https://doi.org/10.1007/s11192-011-0484-9

Zymelman, M. (1973). *Financing and Efficiency in Education: Reference for Administration and Policymaking*. Agency for International Development.