http://dx.doi.org/10.18623/rvd.v22.n5.3655

EFFICIENCY OF PUBLIC SERVICE AGENCY HOSPITALS IN INDONESIA POST-COVID-19 PANDEMIC

EFICIÊNCIA DOS HOSPITAIS DE AGÊNCIAS DE SERVIÇO PÚBLICO NA INDONÉSIA PÓS-PANDEMIA DE COVID-19

Article received on: 9/3/2025
Article accepted on: 11/3/2025

Syahri Azda Putra*
*Universitas Negeri Jakarta, Jakarta Pusat, Indonesia
syahriap@gmail.com

Etty Gurendrawati*
*Universitas Negeri Jakarta, Jakarta Pusat, Indonesia
egurendra@unj.ac.id

Indra Pahala*
*Universitas Negeri Jakarta, Jakarta Pusat, Indonesia
indrapahala@unj.ac.id

The authors declare that there is no conflict of interest

Abstract
This study aims to enhance the efficiency of Public Service Agency (BLU) hospitals to improve the quality of public health services, aligning with the Sustainable Development Goal of "Good Health and Well-Being." It evaluates the performance of 96 BLU hospitals during the post-COVID-19 period (2022–2024) and identifies key factors influencing efficiency. Secondary data were collected from the Ministry of Finance, Ministry of Health, Ministry of Defense, National Police, Statistics Indonesia (BPS), and the Social Security Agency for Health (BPJS). The research employs Data Envelopment Analysis (DEA), the Malmquist Productivity Index (MPI), and Tobit regression. Input variables include medical personnel, health workers, support staff, number of beds, total expenditure, and government funds, while output variables comprise inpatient, outpatient, and emergency visits, as well as operational income. Efficiency determinants analyzed are BPJS patients, Bed Occupancy Rate (BOR), leaders' financial literacy, GDP per capita, hospital level, and number of hospitals. Three models are assessed: service efficiency, financial efficiency, and POBO ratio. Results show that BPJS patients, BOR, GDP per capita, and hospital level significantly affect efficiency. Policy implications emphasize optimizing service quality, cost control, efficiency dashboards, strengthened financial and BPJS claims units, and regular capacity building in financial literacy and hospital management.

Resumo
Este estudo visa aprimorar a eficiência dos hospitais da Agência de Serviço Público (BLU) para melhorar a qualidade dos serviços de saúde pública, em consonância com o Objetivo de Desenvolvimento Sustentável de "Saúde e Bem-Estar". Avalia o desempenho de 96 hospitais da BLU durante o período pós-COVID-19 (2022–2024) e identifica os principais fatores que influenciam a eficiência. Os dados secundários foram coletados do Ministério da Fazenda, Ministério da Saúde, Ministério da Defesa, Polícia Nacional, Instituto Nacional de Estatística da Indonésia (BPS) e Agência de Seguridade Social para a Saúde (BPJS). A pesquisa utiliza Análise Envoltória de Dados (DEA), Índice de Produtividade de Malmquist (MPI) e regressão Tobit. As variáveis de entrada incluem pessoal médico, profissionais de saúde, equipe de apoio, número de leitos, despesas totais e recursos governamentais, enquanto as variáveis de saída compreendem internações, atendimentos ambulatoriais e atendimentos de emergência, bem como receita operacional. Os determinantes de eficiência analisados são pacientes da BPJS, Taxa de Ocupação de Leitos (TOL), alfabetização financeira dos gestores, PIB per capita, nível do hospital e número de hospitais. Três modelos são avaliados: eficiência do serviço, eficiência financeira e índice POBO (Ponto de Benefício Operacional). Os resultados mostram que pacientes do BPJS (Sistema Único de Seguro de Saúde), BOR

Keywords: DEA. MPI. Tobit. Efficiency. Finance. Performance. Hospital. Financial Literacy.

(Índice de Benefício Operacional), PIB per capita e nível do hospital afetam significativamente a eficiência. As implicações políticas enfatizam a otimização da qualidade do serviço, o controle de custos, os painéis de indicadores de eficiência, o fortalecimento das unidades financeiras e de sinistros do BPJS e o desenvolvimento contínuo de capacidades em educação financeira e gestão hospitalar.

Palavras-chave: *DEA. MPI. Tobit. Eficiência. Finanças. Desempenho. Hospital. Educação Financeira.*

1 INTRODUCTION

The healthcare industry, particularly hospitals, is a vital tool in meeting the public's health needs. Hospitals compete to provide excellent service to assure patients of the quality of their services. However, various obstacles such as neglected accreditation processes, inefficient human resource management, and weak marketing often hamper performance and even lead to bankruptcy. According to Caballer *et al*. (2010) and Rowena *et al*. (2006), the primary goal of a healthcare system is to achieve optimal efficiency, given that hospitals are cost-intensive institutions that absorb 50–89% of healthcare sector funding (Lotfi *et al*., 2014). The WHO, through its Europe Path Project (Veillard *et al*., 2005), also established efficiency as a key indicator of hospital performance. In Indonesia, efficiency is a central issue in healthcare development. Law Number 17 of 2023 concerning Health emphasizes the importance of transparent, effective, and efficient healthcare funding management.

In Indonesia, hospitals are currently facing the challenge of policy changes, particularly with the implementation of the National Health Insurance (JKN) program. The payment system, previously fee-for-service based, has shifted to a prospective payment system. Currently, payments to hospitals use the INA-CBGs package method. With this package payment system, hospitals are required to increase efficiency without sacrificing service quality. Because the amount of fees paid is predetermined, hospitals must be able to manage these costs to ensure they are sufficient to provide care until the patient recovers.

During the COVID-19 pandemic (2020–2021), hospital efficiency, particularly Public Service Agency (BLU) hospitals, has become a concern. According to Kaji &

Lewis (2006) and Rebmann *et al*. (2009), organizational flexibility and institutional support determine hospital success in crisis situations. Organizational resilience, the ability to maintain function despite adversity (Meyer, 1982) is a key factor during the crisis (Son *et al*., 2020). In the context of BLU, efficiency assessment is a key decision-making tool, one of which is through the POBO (Operating Income to Operational Expenditure) ratio as stipulated in regulations of the Director General of the treasury Number PER-11 year 2021. The purpose of the efficiency assessment is to assess the cost management capability of a Public Service Agency (BLU) in generating service outputs, as reflected in operating revenue. A higher efficiency score indicates improved cost management capability in generating service outputs, as reflected in operating revenue. Conversely, a lower efficiency score indicates suboptimal cost management capability and opportunities for cost management improvement.

BLU performance assessment is mandated by Government Regulation Number 23 of 2005 concerning Financial Management of Public Service Agencies (BLU), where BLU is a prominent concrete example of the implementation of performance-based financial management. BLU is an agency within the Government established to provide services to the public in the form of providing goods and/or services sold without prioritizing profit-seeking and in carrying out its activities based on the principles of efficiency and productivity. In carrying out its activities, BLU applies the Public Service Agency Financial Management Pattern (PPK-BLU), namely a financial management pattern that provides flexibility in the form of freedom to apply healthy business practices to improve services to the public, as an exception to the provisions of state financial management in general.

Since the first BLU was established in 2005, the development of BLU has been very rapid, based on data as of February 3, 2025, the number of BLUs currently reaches 338.

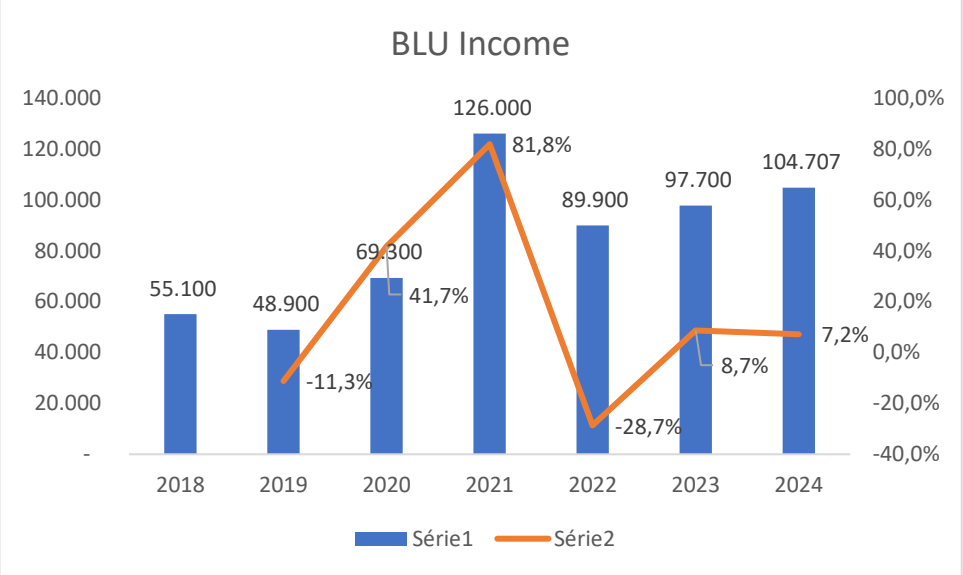
Of the 338, BLU in the education group is the BLU with the most, reaching 151 BLU, second is the Health group with 127 BLU, third is the other goods and services group with 44 BLU, fourth is the fund management group with 9 BLU, and the Regional group with 7 BLU.

With the increasing number of Public Service Agencies (BLU), the contribution of BLU to the APBN posture is significant, in 2024, BLU revenue reached 104.7 trillion with a growth of 7% compared to 2023. BLU revenue shows an increasing trend every

year as seen in Graph 1.2., even though in 2020 and 2021, Indonesia experienced the Covid-19 pandemic. This occurred in the Health BLU group, because from 2020 to 2021, the Health BLU group received revenue from Covid-19 claims, resulting in increased hospital revenue. Covid-19 claim revenue was also received in 2022, but the amount was not as much as in 2020 and 2021, resulting in hospital revenue also experiencing a decrease of 8.98% as seen in the graph below.

Figure 1

BLU Income

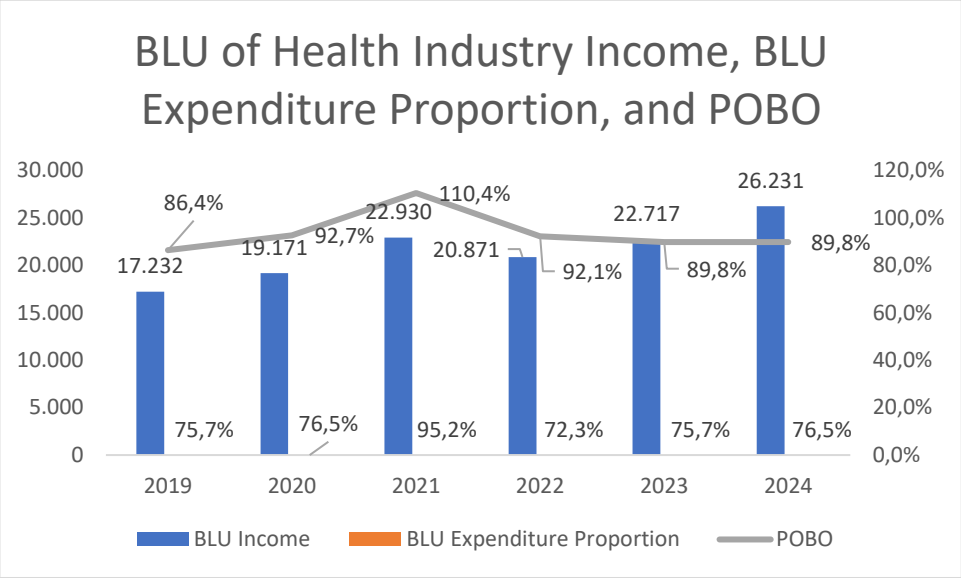


Revenue received by BLU is used to finance the operations of BLU hospitals. Based on existing data, in the last six years, an average of 79% of BLU hospital expenditures have been funded by BLU revenues, while the remainder is funded by the State Budget (APBN). Expenditures from the APBN are typically used to finance personnel and goods expenditures, as well as capital expenditures. The presence of expenditures funded by the APBN, particularly for personnel and goods expenditures, results in a low POBO ratio. Based on existing data, the average POBO ratio over the last six years has reached 93.5%, which is considered adequate. This indicates that BLU hospitals need to increase revenue, both operational and non-operational income, such as income from asset optimization, and implement operational spending efficiencies, specifically reducing operational spending funded by the government.

The POBO ratio, as an indicator for calculating BLU efficiency, needs to be examined for its effectiveness in assessing hospital efficiency. Existing research indicates that hospital performance can be measured by efficiency (Cahyani *et al*., 2012). Measuring and improving efficiency are important and crucial for any organization's future development (Kao C., 2014).

Figure 2

BLU of Health Industry Income, BLU Expenditure Proportion, and POBO



A hospital as an organization is a system; therefore, efficiency analysis must examine the entire system. A hospital's efficiency cannot be measured solely by its output, as its output is largely determined by the inputs used in its processes. According to Kounetas and Papathanassopoulos (2012), efficiency in healthcare organizations involves cost reduction. Veillard *et al*. (2005) also define efficiency as the optimal use of inputs by a hospital to produce maximum output, taking into account available resources. Fragkiadakis *et al*. (2014) even distinguish efficiency into two categories, depending on the type of input used:

- Operational efficiency, resulting from inputs related to operational elements (number of personnel, operational characteristics).
- Economic efficiency, resulting from inputs related to economic data (costs).

Input or output orientation prioritizes reducing input or increasing output. Some studies emphasize input orientation, which is the most common orientation for public

structures, while others emphasize output orientation, arguing that management has greater difficulty controlling output (Cheng *et al*., 2016).

This study aims to improve the efficiency of Public Service Agency (BLU) hospitals to improve public health services, in line with the Sustainable Development Goal (SDG) point "Good Health and Well-Being." This quantitative study uses secondary data from the Directorate of Public Service Delivery (PPK) of BLU, the Directorate General of Taxes (DJPb), the Ministry of Health, the Ministry of Defense, the National Police, the Statistics Indonesia (BPS), and the Social Security Agency on Health (BPJS).

2 LITERATURE REVIEW

New Public Management (NPM) is also defined based on two discourses or paradigms, for example, public choice and managerialism. Public choice is a contemporary discourse on governance with broader concerns than management, while managerialism is a discourse originally intended to apply to organizations in the private sector. While there are differences of opinion regarding the specifics of NPM, the classical NPM model has seven directions (Hood, 1994). It focuses on hands-on practice and entrepreneurial management, as opposed to the traditional bureaucratic focus of public administration. NPM explicitly sets standards and demonstrates action. Another direction emphasizes output control. It also emphasizes the importance of disaggregation and decentralization of government services. Furthermore, there has been a shift toward promoting competition in the field of effective public service delivery (Kalimullah *et al*., 2012).

One form of NPM in Indonesia is the Public Service Agency (BLU). BLU with BLU financial management is a mandate from Law number 1 of 2004 concerning State Treasury, which is a result of the shift from a traditional budgeting system to a performance-based budgeting system, and financing does not only finance inputs or processes but has been directed at financing that finances results (outputs). BLU was established to improve services to the community in order to advance general welfare and improve the life of the nation by providing flexibility in financial management based on economic and productivity principles, and the implementation of healthy business practices in accordance with Article 2 of PP Number 23 of 2005 concerning BLU Financial Management. In addition, BLU also aims to realize the efficiency and

effectiveness of public services and the security of state assets managed by related agencies (explanation of Article 2 of PP number 23 of 2005). The healthy business practices mentioned above are defined in Article 1 paragraph (12) of PP Number 23 of 2005, namely "Healthy business practices are the implementation of organizational functions based on good management principles in order to provide quality and sustainable services."

BLU operates as a work unit of a state ministry/institution for the purpose of providing public services, the management of which is based on the authority delegated by the parent agency concerned, without prioritizing profit-seeking and carrying out public services with healthy business practices. Therefore, the Minister/head of the institution is responsible for implementing the public service delivery policy delegated to the BLU in terms of the benefits of the services produced.

3 METHODS

3.1 Data source and study design

The study subjects included 96 Public Service Provider (BLU) hospitals that had BLU status before year 2021: 32 hospitals under the Ministry of Health, 24 hospitals under the Ministry of Defense, and 40 hospitals under the National Police (Polri). The study covered the period 2022–2024, the post-COVID-19 pandemic period.

The analysis method that will be carried out in this study is that the efficiency of BLU Hospitals will be assessed using the Data Envelopment Analysis (DEA) method. Both to see service and financial efficiency. In addition to DEA, BLU Hospitals will also be assessed for efficiency using the POBO (Operating Income to Operational Expenditure) ratio which will be calculated based on data in the BLU financial report. After the efficiency results are seen, then to complete the DEA analysis, BLU Hospitals will also be seen for their productivity increases using the Malmquist Productivity Index (MPI) from 2022 to 2024. Then, the efficiency results from DEA, both from service and financial efficiency, as well as efficiency using the POBO ratio, will be analyzed using Tobit regression, to empirically prove and find a model of hospital efficiency related to the influence of BPJS service quantity, BOR, Financial Literacy, Gross Domestic Product Per Capita, Hospital Level, and Number of Hospitals on hospital efficiency.

3.2 Data Envelopment Analysis (DEA)

Since DEA was first proposed in 1978, it has been used in various regions, and the models developed vary. Two models exist: the CCR (Charnes, Cooper, and Rhodes) model and the BCC (Banker, Charnes, and Cooper) model. The first model (CCR) is based on constant returns to scale (CRS), assuming that the incremental returns between input and output are equal. The second model, the BCC, is based on variable returns to scale (VRS), assuming that the ratio of incremental input to output is not equal. Therefore, the CCR model can only provide technical efficiency (TE), while the BCC model divides technical efficiency into pure technical efficiency (PTE) and scale efficiency (SE). Technical efficiency (TE) refers to the ability to comprehensively measure the utilization and distribution of resources in the hospital being evaluated. Pure Technical Efficiency (PTE) describes the ability of managers or decision-making units (DMUs) to utilize their resources. Meanwhile, Scale Efficiency (SE) describes a DMU's ability to operate at the appropriate production scale.

In DEA, there are two types of measurement orientations: input-oriented and output-oriented. Input-oriented efficiency measurement emphasizes reducing inputs to achieve a fixed output. Output-oriented efficiency measurement focuses on maximizing output with a fixed input. In hospital efficiency research, most hospital efficiency measurements utilize an input orientation. This is possible because, given the significant control over inputs, management tends to minimize input usage to achieve the same output. The number of inputs and outputs in a DMU can affect efficiency scores. If the number of DMUs is relatively small compared to the number of outputs and inputs, or if the number of DMUs is very large compared to the number of inputs and outputs, the score can be overestimated. Therefore, it is recommended that the number of DMUs be at least three times greater than the number of input and output variables.

3.3 Malmquist productivity index

The Malmquist Productivity Index (MPI) was first introduced by Caves, Christensen, and Diewert in 1982. It is a distance function approach to describe technology in defining input, output, and productivity indices. Total Factor Productivity (TFP) estimation using the DEA approach uses an index approach. The TFP index is

illustrated as follows: If a company can produce the same output in periods t and t+1, but uses different inputs, namely, in t+1 only 75% of the input in period t, then the TFP index will increase by 1/0.75, or 1.3. Another example: if a company uses the same inputs in periods t and t+1, but produces different outputs, namely, output in period t+1 increases by 30% compared to output in period t, then the TFP index is 1.3 (Rustyani & Rosyidi, 2018).

Since the MPI calculation is based on the CRS assumption, there are only two sources of productivity growth: efficiency change and technical change. Total factor productivity is the product of technical efficiency change (EFFCH) and technological change (TECHCH), so productivity increases and decreases can be ascertained by comparing the EFFCH and TECHCH values.

3.4 Operating revenue to operating expense ratio (POBO)

Based on the Technical Guidelines for Budget Implementation and Accounting for the Central Government, Edition Number 32 of 2022 concerning Guidelines for Financial Report Analysis for Public Service Agencies and Regulation of the Director General of the Treasury Number PER-11/PB/2021 concerning Guidelines for Assessing Governance and Performance (Maturity Level) of Public Service Agencies, the POBO ratio is used to measure the efficiency of a Public Service Agency (BLU) using operating revenue to operating expenses. The purpose of the efficiency assessment is to assess the BLU's cost management capability in producing its service outputs, as reflected in operating revenue. A higher efficiency figure indicates improved cost management capability in producing its service outputs, as reflected in operating revenue. Conversely, a lower efficiency figure indicates suboptimal cost management capability and opportunities for cost management improvement. The formula for calculating POBO is as follows: operating income divided by operating expenses.

3.5 Tobit regression

The Tobit regression model was first proposed by James Tobin in 1958 when he analyzed household car spending in the United States. Car spending in some households was zero (because they did not purchase a car), and this significantly affected the results

of the regression analysis. He found that if OLS were used, parameter calculations would tend to approach zero and become insignificant. If they did become significant, their values would be biased (too high or too low) and inconsistent (when new data was available, the results would be inconsistent or inconsistent with the original results). To address these issues, the Tobit method uses maximum likelihood (ML) instead of least squares. Instead of minimizing the square of the error, as with OLS, the ML method maximizes the value of the likelihood function by finding the regression parameters that yield the highest values for the likelihood function.

The Tobit method assumes that the independent variables are unbounded (non-censored); only the dependent variable is censored. all variables (both independent and dependent) are measured correctly; there is no autocorrelation; there is no heteroscedasticity; there is no perfect multicollinearity; and the mathematical model used is appropriate. The Tobit regression model for this study is:

$$Efficiencyi_i^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon_i \qquad (1)$$

Efficiency = Efficiency of Service DEA, Financial DEA, and POBO Ratio

$\beta_1 X_1$= Quantity of BPJS Services

$\beta_2 X_2$= BOR Ratio

$\beta_3 X_3$= Financial Literacy

$\beta_4 X_4$= GDP Per Capita

$\beta_5 X_5$= Number of Beds (TT)

$\beta_6 X_6$= Number of Hospitals

ϵ_i= Constant

This study uses three analytical approaches to measure and evaluate the efficiency of Public Service Provider (BLU) hospitals in Indonesia for the 2022–2024 period. First, Data Envelopment Analysis (DEA) is used to assess the relative efficiency of hospitals based on a combination of service and financial inputs and outputs. In this study, DEA uses an input orientation and the Constant Return to Scale (CRS) assumption. Second, the Malmquist Productivity Index (MPI) is used to evaluate productivity changes over time. Third, the efficiency score results are then further analyzed using panel data Tobit regression to identify factors influencing efficiency, including the quantity of BPJS

patient, BOR, Financial Literacy, Gross Regional Domestic Product Per Capita, Hospital Level (based on number of beds), and Number of Hospitals, and the financial literacy of hospital leaders.

The input variables used are medical personnel, health workers, support staff, number of beds, total expenditure, and government funds (RM). Meanwhile, the output variables are the number of inpatients, outpatients, emergency room patients, and operational income. The models used to examine factors affecting efficiency are three models: service efficiency, financial efficiency, and POBO ratio.

3.6 DEA service efficiency

DEA results show variations in efficiency among Public Service Agency (BLU) hospitals. Most have not yet reached the frontier (score <1), indicating continued input slack and potential for significant improvement in resource management. According to Mourad *et al*. (2022), DEA efficiency scores are divided into the following categories: (a) Efficient: has an efficiency score of 100%. (b) Nearly Efficient: has an efficiency score of more than or equal to 90% and less than 100%. (c) Moderately Efficient: has an efficiency score of more than or equal to 80% and less than 90%. (d) Inefficient: has an efficiency score of more than or equal to 70% and less than 80%. (e) Very Inefficient: has an efficiency score of less than 70%. On average, BLU hospitals are classified as inefficient; only 13%, 14%, and 18% of hospitals were efficient in 2022, 2023, and 2024, respectively. Only five hospitals have been efficient for three consecutive years: Cicendo Eye Hospital, Bandung; Bhayangkara Hospital, Pontianak; Bhayangkara Hospital, Pusdiksabhara Lemdiklat Polri; Bhayangkara Hospital, Denpasar; and Bhayangkara Hospital, Banjarmasin.

The proportion of hospitals that received an efficient rating based on the Ministry/Institution can be seen in the following table.

Table 1

Proportion of Public Service Provider Hospitals Based on Ministry/Institution

Uraian	2022	2023	2024
BLU of Health Ministry	3	2	1
BLU of Ministry of Defence	3	3	3
BLU of Indonesian Police	6	8	13

Police hospitals dominate the number of efficient hospitals, while Ministry of Defense hospitals are stagnant, and Ministry of Health hospitals are trending downward. Efficient hospitals under the Ministry of Health are Marzuki Mahdi Hospital, Cicendo Eye Hospital, and Harapan Kita Mother & Child Hospital, all specialized hospitals with specific service focuses. This is in line with Lee *et al*. (2007) stated that specialized hospitals are more efficient due to their narrower service focus and more optimal resource utilization. This concept, called focused factories, which are dedicated to specific treatments or diseases, has been proposed as a way to improve hospital care efficiency (Meyer (1998); Bredenhoff *et al*. (2010)). The number of beds in specialized hospitals is generally smaller than in national referral hospitals, so the risk of overcapacity (low BOR) is much smaller. Because of the focus on services, the composition of medical and health workers is more dominant than support staff, reducing the slack input that often occurs in large general hospitals.

Efficient hospitals under the Ministry of Defense are generally level II, III, and IV, with small scale and lean input. Large TNI hospitals with large beds capacities tend to be inefficient due to excessive staff. A similar pattern emerges at Polri Hospitals, where level II and III hospitals are more efficient due to stable demand from internal TNI/Polri patients (captive demand).

3.7 DEA financial efficiency

Most hospitals have not been able to convert operational costs into optimal revenue. Efficient hospitals generally diversify services, optimize INA-CBGs rates, and maintain strict cost controls. DEA results show that 45% of hospitals are very inefficient and 38% are inefficient; only 18% are fairly or almost efficient.

Table 2

Efficiency Categories

No	BLU	Very Inefficient	Inefficient	Quite Efficient	Almost Efficient	Efficient	Total
1	BLU of Ministry of Helath	14	13	5	0	0	32
2	BLU of Ministry of Defence	18	5	1	0	0	24

3	BLU of Indonesian Police	11	18	6	5	0	40
Total		43	36	12	5	0	96

Ministry of Defense Hospitals are the most inefficient (75% are very inefficient), only 4% are almost efficient. Ministry of Health Hospitals: 44% are very inefficient, 41% are inefficient, and 16% are fairly efficient. Police Hospitals are better: 28% are very inefficient, 45% are inefficient, and the remaining 28% are fairly/almost efficient.

Ministry of Health hospitals are generally large with extensive beds and human resource capacity, resulting in very high operational costs. Some hospitals also receive large government fund allocations due to their national strategic functions. However, BLU operational revenues are not commensurate with these costs. Specialized hospitals such as heart and orthopedic hospitals (Surakarta) achieved a fairly efficient score because high-value-added premium services (eye, mental, and pediatric) tend to be more proportional, and some are categorized as "fairly efficient." Furthermore, hospitals that achieved a fairly efficient score were Dr. Soeradji Tirtonegoro Hospital, Dr. Kariadi General Hospital in Semarang, and Dr. Sardjito General Hospital in Yogyakarta. These hospitals received a fairly efficient score because they were supported by POBO values above 1, which means demand is balanced with capacity and spending. However, most large referral hospitals such as RSCM and Persahabatan still struggle due to overcapacity and high cost burdens. Other national referral hospitals tend to be inefficient because of excessive input (overcapacity, high spending) without converting into commensurate revenue.

Hospitals within the Ministry of Defense have a dual role: serving Indonesian National Armed Forces (TNI) personnel, civil servants (PNS) and their families, as well as the general public. Patients who are TNI personnel, civil servants, and their families often receive healthcare services that cannot be claimed by the National Health Insurance (BPJS). Furthermore, most hospitals remain heavily reliant on government funds and generate relatively little independent operating income.

Police hospitals are generally small to medium-sized (Level II/III). Similar to the Ministry of Defense Hospital, the Police Hospital also serves police members, civil servants, their families, and the general public. These services are not covered by BPJS.

However, the difference between the Ministry of Defense and the Ministry of Health hospitals is their relatively smaller operational expenses and medical expenses.

3.8 Malmquist productivity index

The Malmquist Productivity Index (MPI) shows variation, with some hospitals experiencing significant productivity increases, while others experienced declines. Ministry of Health hospitals tend to experience variations across hospitals, Ministry of Defense hospitals are relatively homogeneous in the adequate category, and National Police Hospitals show fairly consistent growth. The input-oriented Malmquist calculation yields a Total Factor Productivity Change (TFPCH), where a value above 1 indicates increased productivity, and below 1 indicates decreased productivity.

3.9 Service MPI

The service MPI showed a 0.39% increase in productivity during 2022–2024, indicating improvements in technical efficiency and post-pandemic technological changes.

Despite positive average productivity, hospitals under the Ministry of Health experienced a decline in performance from 2022-2023 to 2023-2024. This is because Ministry of Health hospitals are generally large and offer a broad spectrum of services. In the initial post-pandemic year, efficiency gains occurred as services stabilized. However, in the following year, the burden increased (high BOR, a variety of specialist services, and high operational costs), resulting in a slight decline in productivity.

Table 3

Malmquist Productivity Index Results for Service Ministries/Institutions

BLU	2022-2023	2023-2024	Average	Growth
BLU of Ministry of Helath	1,1727	1,1175	1,1451	-4,71%
BLU of Ministry of Defence	1,2735	1,1035	1,1885	-13,35%
BLU of Indonesian Police	1,2021	1,3597	1,2809	13,11%

Hospitals under the Ministry of Defense, despite positive average productivity, experienced a decline in performance from 2022-2023 to 2023-2024, with the sharpest

decline compared to those under the Ministry of Health and the National Police. Hospitals under the Ministry of Defense are generally medium-sized. In 2022-2023, productivity increased moderately due to resource optimization during post-pandemic recovery. However, a significant contraction occurred in 2023-2024, driven by limited additional inputs (human resources and technical assistance) compared to patient demand. The average growth in the number of beds hospitals from 2022 to 2024 was smaller, at negative 0.41%, compared to hospitals under the Ministry of Health and the National Police (Polri), which were 3.3% and negative 0.06%, respectively. Furthermore, the budgeting model at the Ministry of Defense, which sets spending targets and ceilings for hospitals under the Ministry of Defense for the following year, is below the targets and ceilings set in the Strategic Business Plan, and even below the previous year's realization. This results in hospitals experiencing difficulties in carrying out their activities, especially when spending realization in the Budget Implementation Budget (DIPA) approaches the budget ceiling. This is due to obstacles in revising the DIPA, including the need for revisions at the Regional Office of the Directorate General of Treasury (Kanwil DJPb) to wait until revisions are made at the Echelon I level. Furthermore, the overall service specialization provided by hospitals under the Ministry of Defense is fewer than that of hospitals under the Ministry of Health.

Hospitals under the National Police (Polri) have seen a significant increase in productivity, due to the relatively more adaptable nature of the Polri, which primarily focuses on specific services not available at other hospitals, such as police medicine. Furthermore, Polri hospitals have also implemented efficient input utilization due to a leaner medical workforce. The human resources at the National Police Hospital are fewer compared to hospitals under the Ministry of Health and Ministry of Defense.

3.10 Financial MPI

The financial MPI value for the period 2022 to 2023 shows a slight decline in financial productivity compared to the previous year. This means that, on average, the ability of Public Service Providers (BLU) hospitals to convert financial inputs (operating expenses and government funds) into financial outputs (operating income) stagnated or even decreased slightly. This is because in 2020 and 2021, the government provided incentives to all hospitals in Indonesia for their services in treating COVID-19 patients.

Consequently, in 2020 and 2021, hospitals received significant revenue from COVID-19 patients. Then, in 2022 and 2023, this revenue from COVID-19 patients continued to be provided, but in 2022, the revenue from COVID-19 patients provided was lower than in 2020 and 2021, resulting in a decline in overall BLU hospital revenue. This situation continued into 2023, where revenue from COVID-19 patients was significantly lower than the revenue received in 2022, resulting in a decline in total hospital revenue.

From 2023 to 2024, the financial MPI indicates an increase in financial productivity. This improvement is driven by increased technical efficiency (better cost and resource management). This reflects that hospital financial management is beginning to adapt to post-pandemic conditions, with many hospitals improving governance and finding new efficiencies, resulting in increased productivity.

Table 4

Malmquist Productivity Index Results for Financial Ministries/Institutions

BLU	2022-2023	2023-2024	Average	Growth
BLU of Ministry of Helath	1,0251	1,0538	1,0394	2,80%
BLU of Ministry of Defence	1,0212	0,9803	1,0007	-4,01%
BLU of Indonesian Police	0,9658	1,0351	1,0005	7,17%

Hospitals under the Ministry of Health experienced a 2.51% increase in productivity between 2022 and 2023. Furthermore, productivity increased even further between 2023 and 2024, reaching an average productivity growth of 2.8%. This indicates that hospitals under the Ministry of Health are able to maintain continuous efficiency and innovation. Driving factors for this increase in productivity include economies of scale at national referral hospitals and specialty hospitals, more established BPJS claims, and improved governance post-pandemic.

Hospitals under the Ministry of Defense experienced a 2.12% increase in productivity between 2022 and 2023. Then, productivity declined by -4.01% between 2023 and 2024. Hospitals under the Ministry of Defense experienced managerial inconsistencies and limited efficiency. After the increase, a decline occurred the following year. The decline from 2023 to 2024 was driven by a 23.3% increase in hospital operating expenses, compared to 19.45% and 1.82% for hospitals under the Ministry of Health and the Indonesian National Police (Polri), respectively. This increase in operating expenses indicates that hospitals under the Ministry of Defense are unable to cover all their

operational costs. Furthermore, hospitals under the Ministry of Defense must also serve patients from the Indonesian National Armed Forces (TNI), civil servants (ASN), and their families, who are not eligible for BPJS (Social Security).

Hospitals under the Indonesian National Police (Polri) experienced a 3.42% decline in productivity from 2022 to 2023. Furthermore, from 2023 to 2024, productivity increased by 3.51%, resulting in an average growth rate of 7.17%, higher than that of hospitals under the Ministry of Defense and the Ministry of Health. Polri Hospitals successfully adapted after the initial decline. This was due to an increase in patient numbers. The average increase in patient numbers was 27%, compared to 18% and 13% for hospitals under the Ministry of Defense and the Ministry of Health. Although in terms of numbers, the number of patients at hospitals under the Ministry of Defense and the Ministry of Health is still greater.

3.11 POBO ratio model

In aggregate, the POBO values for Public Service Providers (BLU) hospitals reached 0.886 (2022), 0.855 (2023), and 0.872 (2024). The Ministry of Health Hospital recorded the highest POBO ratio growth, followed by the Ministry of Defense and the National Police.

Table 5

Ministries/Institutions POBO Ratio

BLU	2022	2023	2024	Average	Growth
BLU of Ministry of Helath	0,8327	0,8262	0,8588	0,8392	1,6%
BLU of Ministry of Defence	0,8327	0,8377	0,8192	0,8298	-0,8%
BLU of Indonesian Police	0,9600	0,8886	0,9143	0,9209	-2,3%

Hospitals under the Ministry of Health experienced a slight decline in 2023, then increased in 2024, with a three-year average of still showing positive growth. The positive trend in 2024 was influenced by the improvement in the quality of BPJS claims, which were successfully paid on time. The quality of BPJS claims at hospitals under the Ministry of Health was better than that of hospitals under the National Police and the Ministry of Defense, at 97.99%, 97.75%, and 97.59%, respectively. Furthermore, hospitals under the

Ministry of Health are large-scale, with the majority being national referral hospitals, which allows for improved revenue capacity.

Hospitals under the Ministry of Defense experienced a slight increase in 2023, followed by a significant decline in 2024. Hospitals under the Ministry of Defense struggled to maintain financial efficiency due to a predominantly internal patient base (TNI personnel/family) and increased operational costs that disproportionately matched revenue growth.

Hospitals under the National Police (Polri) averaged a POBO (cost-to-pay) of close to 1 in 2022 and 2024, but experienced a sharp decline in 2023 due to increased operational costs due to additional staff. The average growth rate of additional staff at hospitals under the National Police (Polri) in 2023 was 5%, significantly exceeding the 4% and -0.3% growth rates for hospitals under the Ministry of Defense and the Ministry of Health.

Hospitals under the Indonesian National Police (Polri) were the hospitals with the highest POBO scores above 1 in 2024, as shown in Table 4.21, an 86% increase from 2023. Despite slowing revenue growth, the POBO ratio increased by 0.5%, indicating that hospitals under the Indonesian National Police (Polri) were able to maintain efficiency by tightening spending. This is consistent with research conducted by Homauni *et al*. (2023) and Almehwari *et al*. (2024), which found that cost management in hospitals involves various approaches to optimizing resources and simplifying financial processes. These approaches collectively contribute to a comprehensive understanding of cost management considerations in hospitals, with increased operational efficiency and financial sustainability as the ultimate goals.

Hospitals under the Ministry of Health (MoH) were the hospitals with the highest POBO scores above 1 after hospitals under the Indonesian National Police (Polri) in 2024, a 20% increase from 2023. Despite the decline in revenue, hospitals under the Ministry of Health were able to maintain efficiency in operational spending, resulting in a 0.6% increase in the POBO ratio. This can be attributed to operational spending controls and improvements in financial systems, such as cost efficiency in medicines, systems, and human resources. Specialized hospitals such as Harapan Kita Heart Hospital or Dharmais Cancer Hospital typically exhibit high POBO due to their high-tech services and more favorable INA-CBGs rates. This phenomenon aligns with Hollingsworth's (2008)

findings that hospital efficiency is often improved through cost containment rather than output expansion.

Only one hospital under the Ministry of Defense (Kemhan) achieved a POBO score above 1 in 2024, namely the Dustira Level II Hospital, Kesdam III/Slw. A stable POBO score around 1 indicates that TNI hospitals are operating at a break-even point, with operational revenue equal to expenditure. Hospitals under the Ministry of Defense have not been able to implement spending restrictions like hospitals under the National Police (Polri).

3.12 Tobit regression result

This study aims to analyze the influence of the quantity of BPJS patient, BOR, Financial Literacy, Gross Regional Domestic Product Per Capita, Hospital Level, and Number of Hospitals on the efficiency of BLU Hospitals, where hospital efficiency is based on 3 models, namely the service efficiency model, the financial efficiency model, and the POBO model. In this study, the service efficiency model, the financial efficiency model, and the POBO model use the STATA 16 application.

Table 6

Tobit Regression Results

Variable	Services Efficienct Model		Financial Efficienct Model		POBO Ratio Model	
	Coefficient	P>|z|	Coefficient	P>|z|	Coefficient	P>|z|
BPJS Patient	2,080	0.149	3,510	0.000*	2.35e-07	0.063**
BOR	0,429	0.000*	0,361	0.000*	.2132214	0.000*
Financial Literacy	-0,025	0.379	0,003	0.860	-.0016837	0.930
GDP Per Capita	5,740	0.607	-9,440	0.161	-1.50e-07	0.051**
Beds	-0,0001	0.000*	-0.001	0.015**	-3.93e-06	0.958
Number of Hospitals	-0.001	0.193	-0,001	0.235	-.0012992	0.147
Constant	0,549	0.000	0,496	0.000	.7590349	0.000

The results of the service efficiency model show that the variables with significant results are BOR and Beds with a significance level of 1 percent. The BOR variable is significantly positive while beds is significantly negative. So the service efficiency model equation is as follows:

$$Efficiencyi_i^* = 0{,}549 + 0{,}429BOR - 0{,}0001\text{Beds} + \text{Error} \quad (1)$$

The results of the financial efficiency model show that the variables with significant results are BPJS Patient Quantity and BOR with a significance level of 1 percent. Meanwhile, the Beds variable has a significance level of 5 percent. The BPJS Patient Quantity and BOR variables are significantly positive, while beds is significantly negative. So the financial efficiency model equation is as follows:

$$Efficiencyi_i^* = 0{,}496 + 3{,}510BPJS + 0{,}361BOR - 0{,}001Beds + \text{Error} \quad (2)$$

The results of the POBO model, the variables that have significant results are the Quantity of BPJS Patients, BOR, and GDP Per Capita with a significance level of 10 percent, 1 percent, and 10 percent. The variables Quantity of BPJS Patients and BOR are significantly positive while GDP Per Capita is significantly negative. So the POBO model equation is as follows:

$$Efficiencyi_i^* = 0{,}759 + 2{,}35BPJS + 0{,}213BOR - 1{,}50GDP + \text{Error} \quad (3)$$

4 DISCUSSION

The results of the hypothesis testing showed that the variables with significant results were BPJS patient, BOR, GDP per Capita, and Beds. Meanwhile, the variables that did not have significant results were the number of hospitals and financial literacy.

The quantity of BPJS patient has a significant influence on hospital efficiency. Empirically, there is a significant direct effect of the quantity of BPJS patient on hospital efficiency. These results align with research conducted by Kutz *et al*. (2019), which found that the implementation of a Diagnosis Related Groups (DRG)-based system may have encouraged behavioral changes, resulting in more efficient discharge planning. In line with this aspect, reduced LOS can positively impact costs per case, and efficiency will increase, leading to higher productivity and profits for hospitals with a DRG-based payment system. Furthermore, research conducted by Street *et al*. (2011) found that DRG-based hospital payments, compared to cost-based reimbursement and global budgets,

provide clear incentives for desired outcomes and avoid undesirable responses, thus providing clearer incentives for hospitals to improve their efficiency.

Hospitals with a high proportion of BPJS patients tend to have better efficiency scores due to the certainty of volume and payment. This is logical because BPJS patients dominate the healthcare market in Indonesia, especially Public Service Provider Hospitals (BLU). BPJS patients at BLU hospitals averaged 85.6% from 2022 to 2024, with the percentages at Ministry of Health Hospitals, Ministry of Defense Hospitals, and National Police Hospitals (Polri) as shown in Table 4.26.

High volume increases resource utilization (doctors, nurses, beds), thus improving efficiency scores. However, in some hospitals, the high reliance on BPJS patients puts pressure on margins, thus not always resulting in a linear increase in efficiency. This indicates a trade-off between patient volume and financial margins.

Table 7

BPJS Patient Comparison

BLU	BPJS Patient			% BPJS Patient
	2022	2023	2024	
BLU of Ministry of Helath	5.659.080	7.144.128	8.325.812	83,8%
BLU of Ministry of Defence	2.354.423	3.293.094	3.536.468	91,2%
BLU of Indonesian Police	2.378.009	2.909.242	2.870.016	81,7%

Ministry of Health Hospitals experienced a 21.4% increase in BPJS patients over three years. This growth demonstrates increasing public trust in Ministry of Health Hospitals as primary referral hospitals. The proportion of BPJS patients served was 83.8%. This relates to the Ministry of Health Hospital's role as a national referral hospital and specialist service center, also serving private and international patients. The Ministry of Health Hospital serves as a national safety net. Although predominantly BPJS patients, the proportion of non-BPJS patients remains significant due to specialized service segments (e.g., premium, international, or research services).

The Ministry of Defense Hospital experienced a 23.6% increase in BPJS patient growth over three years, significantly higher than the Ministry of Health Hospital. This is due to the proportion of BPJS patients served, which was 91.2%, the highest percentage compared to the Ministry of Health Hospital and the National Police Hospital. BPJS

patients served include not only members of the Indonesian National Armed Forces (TNI)/civil servants (ASN) and their families, but also the general public. This trend demonstrates the transformation of the Ministry of Defense Hospital into a public service provider open to the wider community.

The National Police Hospital experienced a 10.5% increase in BPJS patient growth over three years, significantly lower than the Ministry of Health Hospital and the Ministry of Defense Hospital. The proportion of BPJS patients served by the National Police Hospital was 81.7%, significantly lower than the Ministry of Health Hospital and the Ministry of Defense Hospital. Similar to the Ministry of Defense Hospital, the National Police Hospital also serves members of the National Police/civil servants and their families. However, the difference is that the National Police Hospital is dominated by level III hospitals (31 hospitals) and level II hospitals (8 hospitals). The National Police Hospital offers a smaller variety of services than the Ministry of Health and the Ministry of Defense Hospital. This is proven by the number of specialist doctors and sub-specialist doctors owned by the Indonesian Police Hospital, which is an average of only 39 doctors. This number is smaller than that of the Ministry of Health Hospital and the Ministry of Defense Hospital. Therefore, the National Police Hospital, with its limited specialist capabilities, often has to refer patients to larger hospitals with far more extensive services.

Table 8

Number of Specialist and Sub Specialist

BLU	2022	2023	2024	Average
BLU of Ministry of Helath	144	148	150	147
BLU of Ministry of Defence	51	55	56	54
BLU of Indonesian Police	36	39	43	39

With the reliance of Public Service Agency (BLU) hospitals on BPJS patients, the flow of revenue from BPJS claims will undoubtedly impact the hospital's cash flow. Payment of BPJS Kesehatan participant service claims is not made directly, but rather through a verification process by BPJS Kesehatan. Hospitals are entitled to payment for services rendered, while BPJS Kesehatan is obligated to settle claims payments to healthcare facilities (PPK) in accordance with the provisions stipulated in Minister of Health Regulation (Permenkes) No. 28 of 2014 concerning Guidelines for the Implementation of the National Health Insurance Program. This regulation stipulates that

claim payments must be made within 15 days after all claim documents are declared complete. If claim documents are found to be inaccurate or incomplete, they will be returned to the hospital for correction.

Several studies have shown that delays in claim disbursement are generally influenced by internal hospital factors and BPJS Kesehatan mechanisms. Research conducted by Puspaningsih *et al*. (2022) identified two sources of delays: hospitals and the BPJS. Dwi (2022) emphasized that delays in returning patient medical records resulted in delayed claims processing. Meanwhile, Amalia *et al*. (2023) found that inpatient claims were often returned due to incomplete submissions, requiring hospitals to make corrections before being re-verified by BPJS.

Furthermore, administrative issues also remain a barrier to claims procedures. Rahayu and Sugiarti (2021) highlighted that not all hospitals have standardized SOPs for BPJS patient membership administration, particularly regarding the completeness of registration documents (such as ID cards, and referral letters for non-emergency cases). This has resulted in an increase in cases of returned claim files. Other frequently encountered obstacles include weak author authentication, suboptimal record audits, and incomplete medical records, such as missing signatures from the attending physician or errors in the coding of medical procedures. This problem is exacerbated by the limited number of coders and inaccurate use of ICD-9-CM, resulting in many claims being pending due to non-compliance with verification standards.

BPJS claims submitted by BLU hospitals have been paid by BPJS on average over three years, amounting to 97.78%. This leaves the remaining 2.22% of claims unpaid.

Table 9

BPJS Claim Comparison

BLU	2022	2023	2024	Average
BLU of Ministry of Helath	99,56%	99,55%	94,85%	97,99%
BLU of Ministry of Defence	99,18%	99,26%	94,34%	97,59%
BLU of Indonesian Police	99,43%	99,55%	94,26%	97,75%

Ministry of Health hospitals have the highest BPJS claims, with a three-year average of 97.99%. This is because Ministry of Health hospitals have the National Health Insurance (JKN) quality indicator as a Selected Performance Indicator (IKT), signed by the Head of the Public Service Agency (BLU) with the Director General of the Treasury

as the representative of the Minister of Finance. This indicator forces Ministry of Health hospitals to pay attention to the quality of BPJS claims. If realized BPJS claims fall below the targets set in the IKT, this will impact the hospital's performance and, consequently, the remuneration received by its employees.

Ministry of Defense Hospital and National Police Hospital have BPJS claims below those of Ministry of Health Hospitals, due to their coders' lack of familiarity with the use of ICD-9-CM.

An interesting phenomenon is that all BLU hospitals experienced a decline in claims in 2024. This is due to the tightening of the verification process for determining claim eligibility with the introduction of a computer-based verification system in September 2024. Through this system, BPJS Kesehatan is suspected of tightening the process of verifying claims submitted by hospitals. Many claims are declared pending without the need to go through verification from BPJS.

BOR has a significant influence on hospital efficiency, empirically proven that there is a significant direct influence of BOR on hospital efficiency. BOR has a positive and significant impact on efficiency. Hospitals with a high BOR are more efficient because bed capacity is optimally utilized. In general, the higher the BOR, the higher the hospital's efficiency. This finding aligns with research by Medarevic *et al*. (2021), which also found a significant but negative coefficient. Similarly, a study in China found that BOR is a significant determinant ($P < 0.001$) of technical inefficiency, with an increase in BOR predicted to decrease a hospital's technical inefficiency score (Cheng *et al*., 2015).

These results apply to both service and financial models, emphasizing the importance of optimal capacity utilization. Several studies define the ideal hospital BOR range as 60% to 85% to maintain a balance between efficiency and service delivery (depending on hospital characteristics) (Mehta *et al*. 2025). A low BOR indicates underutilized capacity, while a high BOR can also lead to service bottlenecks (overcrowding).

Table 10

BOR Comparison

Uraian	2022	2023	2024
Efficient Hospital	12	13	17

Inefficient Hospital	84	83	79
BOR BLU Hospital Average	55,5%	64,5%	69,8%
Avg BOR Efficient Hospital	57,1%	71,9%	73,4%
Avg BOR Inefficient Hospital	55,3%	63,3%	69,1%

The increase in the bed occupancy rate (BOR) of Public Service Providers (BLU) hospitals from 55.5% to nearly 70% in three years indicates that many hospitals previously had suboptimal bed capacity and have begun to implement measures to increase occupancy, including through increasing referrals, optimizing elective inpatient schedules, or improving patient administration flows. This is consistent with research by Kooreman (1994a), which found that higher occupancy rates generally impact management's ability to achieve efficient outcomes, as they are generally unable to adjust staffing levels smoothly and quickly to fluctuating patient numbers. In the context of Public Service Providers (BLU) hospitals, the pressure for "service efficiency" drives management to reduce idle beds and improve patient access.

The BOR at efficient Public Service Providers (BLU) hospitals consistently exceeds the BOR at inefficient hospitals. This is consistent with the concept of technical efficiency, which states that hospitals that utilize their capacity closer to the efficiency frontier typically have higher occupancy rates than those farther from the frontier. A study in Fujian Province (China) showed that BOR has a positive impact on the operational efficiency of public hospitals: hospitals with higher BOR tended to be more efficient ($p < 0.01$) in their Tobit model (Sun *et al*., 2023). However, it should be emphasized that a high BOR alone is not sufficient to guarantee complete efficiency; scale, service quality, and input allocation are also crucial.

In a systematic review of hospital efficiency indicators, Imani *et al*. (2022) explained that hospital efficiency is measured through a combination of input variables (e.g., number of employees, number of beds, hospital structure), processes (service activities, process quality), and outputs (number of patients, clinical outcomes), not just BOR alone. Thus, efficient Public Service Provider (BLU) hospitals not only successfully increase BOR but also manage inputs such as medical personnel, medications, logistics, and workflow to manage the additional burden of a higher BOR without waste.

Based on the results, the BOR gap between efficient and inefficient hospitals widened in 2023 (approximately 8.6 points), then narrowed again in 2024 (approximately 4.3 points). This could indicate that in 2023, efficient hospitals increased bed occupancy

faster than inefficient ones. Meanwhile, in 2024, some inefficient hospitals began to catch up, implementing management improvement strategies or receiving policy support that increased utilization. This BOR parity phenomenon could reflect a "catch-up effect" (Guo *et al*. 2022), where lagging hospitals began adjusting operational flows, improving referral systems, or restructuring budgets to optimize underutilized capacity.

The combined effect of the increasing number of efficient hospitals and the increase in BOR in almost all Public Service Agency (BLU) hospitals contributed to the national average BOR increase from 55.5% to 69.8%. With the increase in hospitals achieving operational efficiency (17 in 2024), the proportion of hospitals that are "positive contributors" to the national BOR increases. Although inefficient hospitals also experienced an increase in BOR, they have not yet reached ideal performance. This is a dynamic where a compositional shift (more efficient hospitals) and an increase in overall utilization reinforce each other, causing the overall BOR to approach the optimal zone.

GDP Per capita has a significant influence on hospital efficiency, empirically proven by a significant negative direct effect of per capita GDP on hospital efficiency. This result contradicts research conducted by Zhou *et al*. (2020) that found per capita GDP has a significant positive influence on efficiency. Other studies have also found that a country's higher per capita gross domestic product (GDP) is associated with more technically efficient healthcare provision (Lagravinese *et al*. (2011); Greene (2004); Ravangard *et al*. (2014)).

Table 11

POBO And GDP Comparison

BLU	% POBO			% GDP Per Capita		
	2022 - 2023	2023 - 2024	Average	2022 - 2023	2023 - 2024	Average
BLU Hospitals	-2,8%	1,6%	-0,6%	8,5%	27,9%	18,2%

Between 2022 and 2023, the POBO value decreased by -2.8%. This indicates a decline in the ability of Public Service Providers (BLU) hospitals to generate revenue relative to their operating expenses. This was due to several factors, including slow BPJS claims and rising operational costs (salaries, medicines, and medical equipment). Although BLU hospitals received a significant amount of COVID-19 patient claim revenue in 2022, they were unable to implement spending efficiencies, resulting in the

POBO value remaining below 1. From 2023 to 2024, the POBO value increased again by 1.6%. This indicates a recovery, related to increased service utilization, improved financial management, and operational restructuring. However, overall, POBO growth remained at -0.6%, meaning that BLU hospitals, as a whole, were unable to consistently improve their financial efficiency over the two years. In contrast, GRDP per capita grew by 8.5% from 2022 to 2023, reflecting economic recovery following the COVID-19 pandemic. From 2023 to 2024, GDP surged dramatically to 27.9%. Overall, regional economic growth reached 18.2%, far exceeding the growth of the POBO for Public Service Providers (Public Service Providers) hospitals.

This indicates that, despite the high regional economic growth (27.9%), the financial growth of Public Service Providers (Public Service Providers) hospitals has not kept pace, and has even experienced a negative growth (from 2022 to 2023). This is explained by the public-private substitution theory, which states that in the healthcare system, public and private services can be substitutes for each other. Patients or potential patients can choose between services from public (state-supported) and private hospitals, depending on price, quality, access, and preference. According to Brekke and Sørgard (2006), in a mixed system, if private services are considered a close substitute for public services, empowering the private sector (for example, through contracts, partnerships, or private financing) can "absorb" some patients who would otherwise use public services. Indeed, in areas with high GDP, public purchasing power is greater. This can lead to the emergence of high-quality private hospitals that attract patients with higher paying abilities. Therefore, upper-middle-class patients may prefer private services, which are more convenient, faster, and offer better facilities. As a result, public hospitals face a decline in the volume of patients who can afford premium fees, resulting in a shrinking scale of public operations.

Areas with high GDP also experience a "crowding-out" effect due to the greater incentive for doctors to practice privately. If doctors in government hospitals also engage in dual practice, their time and effort at the government hospital may be reduced, ultimately reducing public efficiency. This phenomenon in Indonesia is due to the fact that Public Service Providers (BLU) hospitals primarily serve BPJS (Social Security Agency) patients, whose service fees are regulated by regulations, so they do not automatically increase with economic growth. There is even a gap between hospital rates and those paid by the BPJS. If BPJS rates are significantly lower than those set by the

hospital, the hospital will undoubtedly incur significant costs. Furthermore, delays in BPJS claims also lead to a decline in hospital financial performance (Puspaningsih *et al*., 2022). Similarly, rising operational costs also further depress the POBO ratio.

Hospital level has a significant influence on hospital efficiency, empirically proven that there is a significant negative direct influence of hospital level on hospital efficiency.

Table 12

BLU Hospitals And Number of Beds Comparison

Uraian	2022	2023	2024
Efficient BLU	101	101	102
Inefficient BLU	381	376	402

This is in line with research conducted by Pirani *et al*. (2018), which found that increasing the number of beds decreases hospital efficiency. Optimizing bed size can improve hospital efficiency. Nayar *et al*. (2013) found that small hospitals had higher efficiency and quality scores than large hospitals. Orsini *et al*. (2021) found that hospital size negatively impacted efficiency scores. Fizel and Nunnikhoyen (1992) argued that using different bed categories would highlight substantial differences in cost structures between, for example, 'skilled nursing' and 'intermediate nursing' care. They observed a negative relationship between size and efficiency.

A large number of beds creates the risk of inefficiency due to overcapacity. In many studies, hospital efficiency tends to be optimal at proportional capacity, not maximum capacity. Adding capacity beyond need or demand can lead to "waste" (idle) input, thus decreasing technical efficiency. Large hospitals with extensive services often have units with low BOR (e.g., specialized treatment rooms). As a result, the larger the bed capacity, the greater the risk of slack or idle capacity. Efficient hospitals are more likely to have beds with a number below 200, even for Ministry of Health hospitals, efficient ones are specialized hospitals that have specialized services, which is in accordance with the results of research by Dargahi *et al* (2011) that efficiency in specialized hospitals is higher than in general hospitals. Hospitals with limited beds have a tendency for stable performance because output is relatively comparable to input capacity, so there is not much slack.

4.1 Policy implications

The policy implications to be implemented by Public Service Providers (BLU) hospitals are: first, they need to develop superior services to attract non-BPJS patients, thereby increasing BLU revenue. Second, BLU hospitals need to achieve operational cost efficiency through, among other things, digitizing their management systems, streamlining non-medical staff, and integrating their pharmaceutical supply chains. Third, they need to implement efficiency dashboards based on DEA and Malmquist to monitor unit performance in real time. Fourth, they need to strengthen the BPJS finance and claims units with dedicated teams to maintain revenue efficiency. Fifth, they need to conduct regular capacity building programs in financial literacy and hospital management for leaders and unit heads.

4.2 Research limitations

Although this study makes a significant practical contribution to the development of efficiency models, several limitations require careful interpretation of the results and further research. These limitations include the following: this study focused on 96 BLU hospitals, so the results cannot be fully generalized to all BLUD hospitals and PNBP work unit hospitals, especially private hospitals with different organizational characteristics. Future research could incorporate other factors that might yield better results. This study used a research instrument, such as financial literacy, which utilized data on the education, knowledge, and position of BLU hospital leaders/president directors. However, similar data could be obtained from directors or financial managers who are deemed to have sufficient knowledge, allowing for broader and more in-depth research. caUsing a longer period would make the research more meaningful.

5 CONCLUSION

The efficiency of Public Service Agency (BLU) hospitals in Indonesia post-pandemic remains variable and generally has not yet reached the frontier, both in terms of service and financial models. Significant factors influencing efficiency are the quantity of BPJS (Social Security Agency) services, BOR (Revenue Revenue), GDP per capita

(negative), and hospital level (negative). These results underscore the need for more adaptive BLU management and governance reforms: optimizing capacity, improving the quality of BPJS claims, operational efficiency, and strengthening financial literacy among leaders. With these strategies, BLU hospitals can maintain healthy financial performance while sustainably improving the quality of public services.

REFERENCES

Almehwari S A, Almalki I S, Abumilha B A,. (2024). Improving Hospital Efficiency and Cost Management: A Systematic Review and Meta-Analysis. Cureus 16(10): e71721.

Amalia I, Fannaya P, Vitianingsih W, & Rumana NA. (2023). Gambaran Prosedur Klaim Peserta Rawat Inap BPJS Kesehatan di RSPAD Gatot Subroto Tahun 2022. *Jurnal Ilmiah Indonesia*, 3(4), 259–276. https://doi.org/10.36418/cerdika.xxx

Bredenhoff, Eelco, van Lent, Wineke AM, and van Harten, Wim H. (2010). Research article Exploring types of focused factories in hospital care: a multiple case study. BMC Health Services Research, 10:154

Brekke, Kurt R., Sørgard, Lars. (2006). Public Versus Private Health Care In A National Health Service. Cesifo Working Paper No. 1679 Category 9: Industrial Organisation.

Caballer-Tarazona, M., Moya-Clemente, I., Vivas-Consuelo, D., & Barrachina-Martínez, I. (2010). A model to measure the efficiency of hospital performance. *Mathematical and Computer Modelling*, *52*(7–8), 1095–1102. https://doi.org/https://doi.org/10.1016/j.mcm.2010.03.006

Cahyani, Nita, Akbar, Muhammad Sjahid, Susilaningrum, Destri. (2012). Kajian Tentang Tingkat Efisiensi Pelayanan Kesehatan Rumah Sakit Umum Pemerintah Kabupaten/Kota Di Jawa Timur Menggunakan Metode PCA-DEA. Jurnal Sains Dan Seni ITS Vol. 1, No. 1, ISSN: 2301-928X.

Cheng, Z., Cai, M., Tao, H., He, Z., Lin, X., Lin, H., & Zuo, Y. (2016). Efficiency and productivity measurement of rural township hospitals in China: a bootstrapping data envelopment analysis. BMJ open, 6(11), e011911.

Cheng, Z., Tao, H., Cai, M., Lin, H., Lin, X., Shu, Q., & Zhang, R. (2015). Technical Efficiency and Productivity of Chinese County Hospitals: An Exploratory Study in Henan Province, China. BMJ Open, 5 (9): e007267. https://bmjopen.bmj.com/content/5/9/e007267

Dargahi H, Masoori N, Safdari R, Fazaeli S, Yousefi M. (2011). Investigating Productivity Changes in Medical Records Departments of Tehran University of Medical Sciences Hospitals Using Malmquist Index.

Dwi U. (2022). Faktor Yang Berhubungan Dengan Ketepatan Waktu Pengembalian Rekam Medis Rawat Inap Di Rumah Sakit Universitas Andalas Tahun 2022. *Skripsi (Tidak dipublikasi)*. Universitas Andalas.

Fizel, J.L., and T.S. Nunnikhoven. 1992. Technical efficiency of for-profit and non-profit nursing homes. Managerial and Decision Economics 13 (5): 429-439.

Fragkiadakis, G., Doumpos, M., Zopounidis, C., & Germain, C. (2014). Operational and economic efficiency analysis of public hospitals in Greece. Annals of Operations Research, 247(2), 787-806.

Greene, W. (2004). Distinguishing between heterogeneity and inefficiency: stochastic frontier analysis of the World Health Organization's panel data on national health care systems. Health Econ.13(10):959–80.

Guo, Baojie, Zhang, Jianghua and Fu, Xuemei. (2022). Evaluation of Unified Healthcare Efficiency in China: A Meta-Frontier. Non-radial Directional Distance Function Analysis During 2009–2019. Front. Public Health 10:876449. doi: 10.3389/fpubh.2022.876449

Homauni A, Markazi-Moghaddam N, Mosadeghkhah A, Noori M, Abbasiyan K, Jame SZ. (2023). Budgeting in healthcare systems and organizations: a systematic review. Iran J Public Health. 52:1889-901.

Hood, Christopher. (1994). Explaining Economic Policy Reversals, Buckingham: Open University Press.

Hollingsworth, B., & Peacock, S. J. (2008). Efficiency Measurement in Health and Health Care. Taylor & Francis or Routledge's. https://doi.org/10.4324/9780203486566.

Imani, Ali, Alibabayee, Roghayeh , Golestani, Mina and Dalal, Koustuv. (2022). Key Indicators Affecting Hospital Efficiency: A Systematic Review, 3,4.

Kaji, A.H. and Lewis, R.J. (2006), "Hospital disaster preparedness in Los Angeles County", Academic Emergency Medicine, Vol. 13 No. 11, Pp. 1198-1203.

Kalimullah, Nazmul Ahsan, Alam, Khabir M. Ashraf, and Nour, M. M. Ashaduzzaman. (2012). New Public Management: Emergence and Principles. BUP Journal, Volume 1, Issue 1.

Kao C. (2014). Network data envelopment analysis: a review. Eur J Oper Res 239(1):1–16

Kounetas, Kostas, Papathanassopoulos, Fotis. (2012). How efficient are Greek hospitals? A case study using a double bootstrap DEA approach.

Kooreman, P. (1994a). Nursing home care in The Netherlands: A nonparametric efficiency analysis. Journal of Health Economics 13 (3): 301-316.

Kutz A, Gut L, Ebrahimi F, Wagner U, Schuetz P, Mueller B. (2019). Association of the Swiss diagnosis-related group reimbursement system with length of stay, mortality, and readmission rates in hospitalized adult patients. *JAMA Netw Open*. 2:e188332.

Lagravinese R, Paradiso M, Mastromarco C. (2011). Social heterogeneity and efficiency in Italian health care system: a Simar–Wilson methodology analysis. Societa Italiana degli Economisti Working Paper September. 15: p. 2011.

Lee, Kwang-soo, Chun, Ki-hong, Lee, Jung-soo. (2007). Reforming the hospital service structure to improve efficiency: Urban hospital specialization. *Health Policy 87 (2008) 41–49*

Lotfi, F., Kalhor, R., Bastani, P., Shaarbafchi Zadeh, N., Eslamian, M., Dehghani, M. R., dan Zakaria Kiaee, M. (2014). Various Indicators for the Assessment of Hospitals' Performance Status: Differences and Similarities. *Iranian Red Crescent Medical Journal, 16*(4). https://doi.org/10.5812/ircmj.12950

Mehta, Shraddha, Thakkar, Kunal. (2025). The Quality Equation: Assessing the Impact of Accreditation on Hospital Efficiency Metrics using Pabon Lasso Model**.** Int J Healthc Qual Patient Cent Saf, Volume 6, Issue 2

Medarevi´c, A. & Vukovi´, D. (2021). Efficiency and Productivity of Public Hospitals in Serbia Using DEA-Malmquist Model and Tobit Regression Model, 2015–2019. International Journal of Environmental Research and Public Health. **In-text reference**: Medarevi´c *et al* (2021)

Meyer, Harris. (1998). Focused factories. Are you ready for the competition?. *Hospitals & health networks* 72, no. 7: 24-6.

Meyer, A.D. (1982), "Adapting to environmental jolts", Administrative Science Quarterly, Vol. 27 No. 4, pp. 515-537.

Mourad, Nahia, Tharwat, Assem, Habib, Ahmed Mohamed, Wafik, Doaa, and Hamed, Mohamed Ahmed. (2022). Appraising The Economic Efficiency Of European Football Teams: Evidence From Covid-19 Crisis Using Data Envelop Analysis. Journal of Positive School Psychology. Vol. 6, No. 8, 4383-4403.

Nayar P, Ozcan YA, Yu F, Nguyen AT. (2013). Benchmarking urban acute care hospitals: efficiency and quality perspectives. Health Care Manag Rev;38(2):137–45.

Orsini, Luca Piubello, Leardini, Chiara, Vernizzi, Silvia and Campedelli, Bettina. (2021). Inefficiency of public hospitals: a multistage data envelopment analysis in an Italian region.

Pirani, Narges, Zahiri, Mansour, Engali, Kambiz Ahmadi, Torabipour, Amin. (2018). Hospital Efficiency Measurement Before and After Health Sector Evolution Plan in Southwest of Iran: a DEA-Panel Data Study.

Puspaningsih M, Chriswardani, Suryawati, & Paweles S. (2022). Evaluasi Administarasi Klaim BPJS Kesehatan dalam menurunkan kalim Pending. *Jurnal Ilmiah Indonesia*, 7(6), 7056–7064. https://doi.org/https://doi.org/10.36418/syntax-literate.v7i6.7317

Rahayu L, & Sugiarti I. (2021). Analisis Prosedur Klaim BPJS Kesehatan Di Rumah Sakit. *Indonesian Journal of Health Information Management (IJHIM),* 1(2).

Ravangard, Ramin, Hatam, Nahid, Teimourizad, Abedin, Jafari, Abdosaleh. (2014). Factors affecting the technical efficiency of health systems: a case study of Economic Cooperation Organization (ECO) countries (10). Int J Health Policy Manag. 3(2):63.

Rebmann, T., Wilson, R., LaPointe, S., Russell, B. and Moroz, D. (2009), "Hospital infectious disease emergency preparedness: a 2007 survey of infection control professionals", American Journal of Infection Control, Vol. 37 No. 1, pp. 1-8.

Rustyani, Selvia, Rosyidi, Suherman. (2018). Measurement of Efficiency and Productivity of Zakat Institutions in Indonesia using Data Envelopment Analysis and the Malmquist Productivity Index. International Journal of Zakat | ISSN: 2548 2335 | Vol. 3 (3).

Rowena, J., Peter C., S., & Andrew, S. (2006). Measuring Efficiency in Health Care Analytic Techniques and Health Policy. Cambridge University Press.

Son, C., Sasangohar, F., Neville, T., Peres, S.C. and Moon, J. (2020), "Investigating resilience in emergency management: an integrative review of literature", Applied Ergonomics, Vol. 87, p. 103114.

Street**,** Andrew, O'Reilly, Jacqueline, Ward, Padraic, and Mason, Anne. (2011). DRG-based hospital payment and effi ciency: Theory, evidence, and challenges. Diagnosis-Related Groups in Europe. WHO. European Observatory on Health Systems and Policies Series

Sun, Mengya, Ye, Yaojun, Zhang, Guangdi, Xue, Yuan, and Shang, Xiuling. (2023). Measuring the efficiency of public hospitals: A multistage data envelopment analysis in Fujian Province, China. Public Health Policy. *Front. Public Health* 11:1091811.

Veillard J, Champagne F, Klazinga N, Kazandjian V, Arah OA, Guiss*et al*. (2005). A performance assessment framework for hospitals: the WHO regional office for Europe PATH project. Int J Qual Health Care, 17(6):487–96. https://doi.org/10.1093/intqhc/mzi072.

Zhou, Lulin, Ampon-Wireko, Sabina, Dauda, Lamini, Xu, Xinglong, Antwi, Maxwell Opuni, and Larnyo, Ebenezer. (2020). Empirical Analysis of Factors Influencing Healthcare Efficiency among Emerging Countries.

Authors' Contribution

Both authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Putra, S. A., Gurendrawati, E., & Pahala, I. EFFICIENCY OF PUBLIC SERVICE AGENCY HOSPITALS IN INDONESIA POST-COVID-19 PANDEMIC. Veredas Do Direito, e223655. https://doi.org/10.18623/rvd.v22.n5.3655