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AN ANALYSIS OF THE DETERMINANTS OF REGIONAL ECONOMIC EFFICIENCY IN INDONESIA

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Abstract
Lampung Province faces significant challenges in improving economic efficiency amid ongoing regional development dynamics. Despite various infrastructure development programs and economic capacity enhancement efforts implemented up to 2024, the efficient use of resources remains uneven across districts. This study aims to analyze the influence of road infrastructure, labor force, Regional Original Revenue (PAD), and General Allocation Fund (DAU) on economic efficiency in Lampung Province, while also providing a contextual comparison with other regions such as DKI Jakarta, Bali, and Kalimantan. The analysis employs a panel data multiple regression method using a sample of 15 regencies/cities in Lampung over the period 2019–2023, resulting in a total of 75 observations. The results indicate that all four independent variables have a positive and significant impact on economic efficiency. Compared to other regions, Lampung needs to strengthen infrastructure connectivity and local fiscal management to foster more equitable and sustainable efficiency gains.

Keywords: Economic Efficiency, Infrastructure, Labor, PAD, DAU

1. Introduction

In essence, economic efficiency refers to a condition in which available resources are utilized optimally to produce goods and services that meet societal needs. It reflects a region's ability to manage its resources effectively and productively, thereby minimizing waste in both production and distribution processes. In other words, economic efficiency can be used to assess how well a region improves the quality of its economic management over time.

The province of Lampung has considerable economic efficiency potential compared to several other provinces in Indonesia, particularly in its mainstay sectors of agriculture and plantations. In recent years, Lampung has begun to show progress in improving efficiency through the use of agricultural technology, cost reduction strategies, and the development of human resources. These efforts have started to yield positive results, especially in increasing the productivity of key commodities such as coffee, cassava, and rubber. However, Lampung's economic efficiency remains somewhat volatile, influenced by factors such as fluctuations in commodity prices, dependence on the primary sector, and limitations in infrastructure. These fluctuations are reflected in the varying ratios of output to input across major sectors, with improvements observed in some years but declines in others. Therefore, sustained and integrated efforts are needed to improve Lampung's economic efficiency in order to maintain regional competitiveness and drive inclusive and high-quality economic growth.

Meanwhile, the Special Capital Region of Jakarta, as the nation's political and economic hub, demonstrates relatively high levels of economic efficiency, particularly in the sectors of services, finance, information technology, and trade. This efficiency is

supported by well-developed infrastructure, access to advanced technologies, and a highly skilled labor force. However, Jakarta also faces major challenges such as population density, traffic congestion, and high living and production costs, which may undermine its long-term competitiveness. To maintain its efficiency, Jakarta must continue promoting digital transformation, smart city initiatives, and decentralization of economic activities to reduce overconcentration in the urban core.

In contrast, the province of Bali has an economic structure that is heavily reliant on the tourism sector. Under normal conditions, this sector exhibits high efficiency, as it generates substantial output with relatively limited input, relying mainly on cultural assets and natural beauty. However, this dependence on a single sector makes Bali's economy highly vulnerable to external shocks, as demonstrated during the COVID-19 pandemic. To address this vulnerability, Bali needs to diversify its economy into areas such as organic agriculture, creative industries, and digital enterprises, while also improving energy efficiency and preserving the environment, which is a key asset for sustainable tourism.

On the other hand, the Kalimantan region—particularly East Kalimantan, which is now the site of Indonesia's new capital city (IKN Nusantara)—possesses significant potential in natural resources such as coal, palm oil, and timber. Nevertheless, the region's economic efficiency remains low to moderate, largely due to its extractive economic structure, inadequate supporting infrastructure, and limited industrial down streaming. Current efforts to improve economic efficiency in Kalimantan focus on more equitable infrastructure development, encouraging value-added industries, and promoting green economy initiatives and renewable energy. If the IKN development is carried out in a planned and sustainable manner, Kalimantan could greatly enhance its economic efficiency and accelerate structural transformation.

In conclusion, each province in Indonesia exhibits unique characteristics in terms of economic efficiency, depending on their leading sectors, infrastructure readiness, and human capital quality. Efforts to improve economic efficiency across the regions must consider local contexts and be directed toward building a more inclusive, sustainable, and resilient national economy.

Table 1. Provincial Economic Profile: Key Sectors, Challenges, and Opportunities

Province	Key Sectors	Efficiency Level	Main Challenges	Improvement Opportunities
Lampung	Agriculture & Plantations	Moderate - Fluctuating	Commodity prices, limited infrastructure	Agricultural technology, human resource development
Jakarta	Services, Finance, Technology	High	Overcrowding, high costs, traffic congestion	Digital transformation, smart city initiatives
Bali	Tourism	High but Vulnerable	Overdependence on a single sector	Economic diversification, creative economy, green economy
Kalimantan	Natural Resources & New Capital (IKN)	Low - Moderate	Extractive economy, limited infrastructure	IKN development, industrial down streaming, green energy

In addition, another major issue lies in the significant disparity in economic efficiency among the regencies and municipalities within Lampung Province. Over the past five years, the level of efficiency in resource utilization across regions in Lampung has shown considerable variation, with differences exceeding 10%. The widest gap occurred in 2021, when there was a 10.27% difference in efficiency. Bandar Lampung City recorded the highest level of efficiency at 4.73%, while Mesuji Regency recorded the lowest at -5.54%.

According to endogenous economic growth theory, economic efficiency can be influenced by physical capital, human capital, and technological advancement. While this theory is primarily recognized as a growth theory, it is also relevant in the context of efficiency, as it emphasizes the importance of optimal resource utilization.

According to (Codoation, 2003), infrastructure refers to the physical facilities developed and required by public agencies to perform governmental functions, such as the provision of water, electricity, waste disposal, transportation, and other essential services. Among the various types of infrastructure, road infrastructure is one of the most closely related to economic efficiency.

Word Bank (1994) Roads are classified as a component of economic infrastructure. They play a crucial role in facilitating the flow of goods and services between production centers and market areas. Moreover, roads contribute to reducing regional development disparities by opening access to previously isolated areas. As explained by Shafrizal (2012), road infrastructure can reduce the isolation of socio-economic activities, particularly in underdeveloped regions.

Road infrastructure falls under the category of basic infrastructure, which refers to public infrastructure that plays a fundamental role in supporting economic activities, is non-tradable, and has non-exclusive usage. In the context of economic efficiency, the presence of adequate road infrastructure enables faster and more cost-effective distribution of goods and labor mobility. This directly impacts the reduction of logistics costs and the improvement of productivity and regional competitiveness.

Lampung is known as one of the main producers of agricultural and plantation commodities, such as coffee, cassava, and rubber. Damaged or poorly connected roads can lead to delays in the distribution of harvested products to trade centers or ports, resulting in lower selling prices and wasted produce. Therefore, the development and improvement of road infrastructure in Lampung will enhance supply chain efficiency, accelerate interregional connectivity, and promote the optimal utilization of local resources.

As the capital city and national economic center, Jakarta heavily relies on road infrastructure to support its trade, service, and industrial activities. Although the city has relatively complete road access, severe traffic congestion poses a significant barrier to economic efficiency. Investments in urban toll roads, alternative routes, and integration with public transportation are crucial to reducing travel time and transportation costs. Thus, Jakarta requires a more complex approach to leverage road infrastructure as a tool for enhancing efficiency.

Bali, as an international tourist destination, greatly depends on smooth transportation to and from tourism areas. Congested or poorly maintained roads can negatively affect the tourist experience and harm the tourism sector, which is the backbone of Bali's economy. Improving road infrastructure that connects airports, seaports, and tourist attractions will create efficiency in tourist mobility and hospitality logistics (hotels, restaurants, etc.), ultimately supporting sustainable local economic growth.

As a region rich in natural resources such as mining and forestry, Kalimantan faces major challenges in basic infrastructure, especially roads. Many resource-producing areas remain isolated due to limited or damaged road access, hindering the full exploitation of their economic potential. The development of road infrastructure, including inter-provincial and industrial roads, can significantly improve the efficiency of transporting mining and forest products and accelerate economic transformation toward the diversification of non-extractive sectors particularly in the context of developing the new capital city, Nusantara (IKN).

Road infrastructure plays a vital role in enhancing economic efficiency across various regions in Indonesia. It reduces logistics costs, facilitates labor mobility, and improves access to markets and resources. Although each region has different characteristics and challenges, improving the quality and connectivity of roads in Lampung, Jakarta, Bali, and Kalimantan will provide strategic benefits in realizing inclusive, equitable, and sustainable economic growth.

2. Theoretical Background

2.1 Economic efficiency

Efficiency refers to the ability to carry out activities accurately and optimally, without wasting time, energy, or cost. The term also encompasses the effective and appropriate utilization of resources, as well as the skill to complete tasks in the most economical and targeted manner.

Economic efficiency is a condition in which available resources such as labor, capital, and raw materials are used optimally to produce goods and services, thereby eliminating waste and maximizing outcomes. Under conditions of economic efficiency, it is impossible to improve one party's welfare without reducing that of another, a concept known as Pareto efficiency.

One economic theory, known as endogenous growth theory, posits that increases in capital—one of the drivers of economic efficiency are not solely physical but also non-physical. Non-physical capital includes knowledge and technology, where technological advancement drives innovation, which in turn improves productivity and enables more optimal resource utilization.

When productivity and resource use become more efficient, economic efficiency is assumed to increase accordingly. Therefore, within the framework of endogenous growth theory, increased investment in both physical and human capital is seen as essential to fostering sustainable economic efficiency.

In the context of Lampung Province, this is particularly relevant given the region's significant potential in agriculture, plantations, and processing industries. Investment in education, workforce training, and the development of appropriate technologies in Lampung will enhance the efficiency of production, distribution, and resource utilization processes, ultimately driving more efficient and competitive economic growth.

2.2 Road infrastructure

Infrastructure refers to the physical facilities that are developed or required by public agencies as part of their governmental functions in providing services such as clean water, electricity, waste disposal, transportation, and other public services aimed at supporting the economic and social activities of society (Codoation, 2003).

Another definition of infrastructure is stated in the Regulation of the President of the Republic of Indonesia Number 38 of 2015, which defines infrastructure as technical and

physical facilities, systems, hardware, and software required for public services and supporting structural networks in order to optimally foster economic and social growth in society.

In relation to regional and urban development, Sjafrizal, (2012) states that roads have a dual function. On one hand, roads are a crucial factor in driving economic growth by facilitating the flow of goods and services between production centers and market areas. On the other hand, roads also serve to reduce development disparities between regions by breaking the isolation of areas that were previously lagging behind in social and economic activities.

2.3 Labor

According to the Republic of Indonesia Law Number 13 of 2003, labor refers to every individual who has the ability to perform work to produce goods or services, either to meet personal or societal needs. Meanwhile, the Central Bureau of Statistics (BPS) defines labor as the entire population aged 15 years and above who have the potential to produce goods and services.

Sumarsono (2009) Labor is defined as every person who is willing to work. According to Noble (2014), labor includes the working-age population (15–64 years old) who are capable and willing to produce goods and services, provided there is demand for labor and the willingness to work.

Labor is divided into two main groups: the labor force and the non-labor force. The labor force consists of the working-age population who are either employed or actively seeking employment. This group is divided into two categories: those who are working, either full-time or part-time, and the unemployed, who do not have a job but are actively trying to find one, including individuals who were previously employed. Meanwhile, the non-labor force comprises the working-age population who are neither working nor seeking employment. This group includes individuals who are still attending school, managing household duties, as well as those who receive income without direct work activity, such as retirees or family assistance recipients.

2.4 Locally Generated Revenue

According to the Republic of Indonesia Law Number 23 of 2014, Locally Generated Revenue (Pendapatan Asli Daerah, PAD) is defined as revenue obtained by a region, collected based on Regional Regulations in accordance with prevailing laws and regulations. Another definition of PAD is the revenue derived from local taxes, local levies, results of regionally owned enterprises, management of separated regional assets, and other legitimate local revenues (Mardiasmo, 2009). Furthermore Halim (2007) states that PAD encompasses all regional revenues originating from the region's own economic sources.

Locally Generated Revenue (Pendapatan Asli Daerah, PAD) aims to provide regions with flexibility to explore funding sources for the implementation of regional autonomy and as a manifestation of the principle of decentralization. The Republic of Indonesia Law Number 33 of 2004 states that in efforts to increase PAD, regions are prohibited from enacting regional regulations that result in a high-cost economy. Additionally, regions are forbidden from creating regulations that hinder the mobility of people, the flow of goods and services between regions, as well as import/export activities.

According to Article 157 of Republic of Indonesia Law Number 23 of 2014, PAD sources include local taxes, local levies, proceeds from the management of separated regional assets, and other legitimate local revenues.

In the context of Lampung Province, efficiency in managing Locally Generated Revenue is a key factor in strengthening the region's fiscal capacity. This efficiency involves how the local government optimally utilizes existing resources to increase PAD without burdening the community with policies that lead to a high-cost economy. By improving efficiency, the Lampung Provincial Government can strengthen fiscal autonomy and promote sustainable regional development without relying heavily on transfers from the central government.

2.5 General Allocation Fund

The General Allocation Fund (Dana Aallocation Umum, DAU) is a fund originating from the State Revenue and Expenditure Budget whose allocation aims to equalize the financial capacity of regions to finance regional expenditure needs in the implementation of decentralization (Halim, 2007). DAU is one of the components of the Balanced Funds. According to the Republic of Indonesia Law Number 33 of 2004, Balanced Funds are regional funding sourced from the State Budget and consist of Revenue Sharing Funds (DBH), General Allocation Funds (DAU), and Special Allocation Funds (DAK). DAU specifically aims to create equal financial capacity among regions so that all regions have adequate capacity to carry out governmental affairs within their authority.

Through this mechanism, DAU functions as a fiscal equalization instrument, enabling regions with limited financial capacity to still perform their functions within the framework of regional autonomy.

2.6 Hypothesis Development

Based on the conceptual framework and the theories previously explained, this study develops four hypotheses as follows:

1) H1: Road infrastructure has a significant effect on economic efficiency.
2) H2: Labor has a significant effect on economic efficiency.
3) H3: Locally Generated Revenue (PAD) has a significant effect on economic efficiency.
4) H4: General Allocation Fund (DAU) has a significant effect on economic efficiency.

3. Methods

The approach used in this research is a quantitative approach with an associative type of research. The population in this study includes all regencies/cities located in Lampung Province, DKI Jakarta, Bali Province, as well as the Kalimantan region, which consists of West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, and North Kalimantan. The sample used is a saturated sample, in which all members of the population are included as research samples. Thus, the sample in this study consists of all regencies/cities in these regions during the period from 2020 to 2024, resulting in a total number of observations based on the number of regional units multiplied by five years of observation. The data in this research were obtained through documentation and literature study methods, by accessing official sources such as the website djpk.kemenkeu.go.id to collect data on Regional Original Revenue (PAD) and General Allocation Fund (DAU), as well as the official websites of the Central Bureau of Statistics (BPS) for each province, including lampung.bps.go.id, jakarta.bps.go.id, bali.bps.go.id, and the BPS websites of the Kalimantan provinces, to obtain data related to road infrastructure, labor, and

economic efficiency. The collected data were then analyzed using the panel data linear regression analysis method, which combines time-series and cross-sectional data. The general equation used in this panel data regression analysis is as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

Information:
Y : Gross Regional Domestic Product (GRDP)
X1 : Road Infrastructure
X2 : Labor
X3 : Locally Generated Revenue (PAD)
X4 : General Allocation Fund (DAU)
in : The i-th regency/city
t : Observation year
Ɛ : Error term

4. Results and Discussion

4.1 Model Selection Test Results

Table 2. Best Model Test Results

Types of Testing	Prob.	Interpretation
Chow Test	0,3095	Common Effect Model
LM Test	0,2792	Common Effect Model

Source: Output Results from EViews9 (2025)

Based on the Chow test results, the probability value obtained was 0.3095. This value is greater than the significance level of 0.05, thus the null hypothesis (H_0) is accepted. This means that the appropriate model to be used in the panel data linear regression analysis in this study is the Common Effect Model. Similar results were also shown by the Lagrange Multiplier (LM) test with a probability value of 0.2792, which is also greater than 0.05. Therefore, the null hypothesis is again accepted, indicating that the Common Effect Model is the most suitable model to be used.

Since both tests indicate that the appropriate model is the Common Effect Model, the Hausman test is not necessary. This is because the Hausman test function is only used to determine the best model between the Fixed Effect Model and the Random Effect Model, which is not relevant in this case.

4.1 Hypothesis Testing

Table 2. Common Effect Model Analysis

Variable	Coefficient	Prob.
X1	0.016613	0.0001
X2	0.031420	0.0492
X3	0.136552	0.0000
X4	0.174864	0.0000
Adjusted R-Squared (R2)		0.8442
Prob. (F-statistic)		0.0000

Source: Output Results from EViews9 (2025)

Based on Table 2, it is known that the coefficient of determination (R^2) is 0.8442. This indicates that the independent variables used in this study are able to explain the dependent variable, namely economic efficiency, by 84.42%. The remaining 15.58% is explained by other variables outside this research model.

Furthermore, the F-statistical probability value from the Common Effect Model estimation is 0.0000. This value is less than the significance level of 0.05, so it can be concluded that H_0 is rejected. This means that the independent variables in this study simultaneously have a significant effect on economic efficiency in the regencies/cities of Lampung Province.

At a significance level of 0.05, the regression results of the Common Effect model can be summarized as follows:

1) Road Infrastructure (X_1) has a coefficient value of 0.0166 and a probability value of 0.0001. This indicates that road infrastructure has a positive and significant effect on economic efficiency. In other words, a 1% increase in road infrastructure will increase economic efficiency by 0.0166%.
2) Labor (X_2) has a coefficient value of 0.0314 and a probability value of 0.0492. This shows that labor has a positive and significant effect on economic efficiency. In other words, a 1% increase in labor will increase economic efficiency by 0.0314%.
3) Locally Generated Revenue (PAD) (X_3) has a coefficient value of 0.1265 with a probability of 0.0000. This indicates that PAD has a positive and significant effect on economic efficiency. A 1% increase in PAD is estimated to increase economic efficiency by 0.1265%.
4) General Allocation Fund (DAU) (X_4) has a coefficient value of 0.1748 with a probability of 0.0000. This means that DAU has a positive and significant effect on economic efficiency. Therefore, every 1% increase in DAU will increase economic efficiency by 0.1748%.

4.2 The Relationship Between Road Infrastructure and Economic Efficiency

Based on the results of panel data regression analysis, it is evident that road infrastructure has a positive and significant effect on economic efficiency in the regencies and cities of Lampung Province. This finding is consistent with endogenous growth theory, which states that one of the key factors influencing economic performance is physical capital of which infrastructure is a major component.

Good road infrastructure plays a vital role in supporting the economic activities of the community. As infrastructure develops, regional economic efficiency also improves. This is due to better access to resources, smoother distribution of goods and services, and improved mobility of people. Quality roads reduce travel time and transportation costs, ultimately enhancing productivity and efficiency in economic activities. This increase in efficiency occurs because access to production inputs, markets, and labor becomes more seamless.

According to Law of the Republic of Indonesia No. 38 of 2004, roads are part of the social capital of society that can drive the processes of production, distribution, and final consumption. Therefore, the availability of adequate road infrastructure can shape an efficient distribution chain, resulting in improved regional economic efficiency.

This condition can also be observed comparatively in other regions across Indonesia. In Jakarta, for instance, relatively advanced road infrastructure has supported economic efficiency through high mobility, the facilitation of industrial and service activities, and strong interregional connectivity. In Bali, well-developed road infrastructure is crucial for supporting the tourism sector, which is the backbone of the region's economy. Adequate roads provide better access to various destinations for tourists, indirectly boosting local income and operational efficiency for tourism-related businesses.

Conversely, in some parts of Kalimantan, geographic challenges such as dense forests and peatlands have hindered the development of road infrastructure. This has contributed to lower economic efficiency in remote areas that are difficult to access. Limited road access slows down goods distribution, increases logistics costs, and restricts the movement of labor and capital.

In Lampung Province, strategic road development such as the Trans-Sumatra Toll Road (JTTS) has served as a positive catalyst in promoting economic efficiency. This toll road enhances connectivity between production centers, ports, and consumer markets across Sumatra, expanding market access for local businesses.

In conclusion, road infrastructure is a critical element in improving economic efficiency across different regions, whether in a developing province like Lampung, a national economic hub like Jakarta, a tourism-driven region like Bali, or geographically challenging areas like Kalimantan. Therefore, infrastructure development policies must continue to be promoted in a balanced and sustainable manner to strengthen the foundation of national economic efficiency.

This study is further supported by previous research findings. Warsilan, W. and Noor, (2015) stated that road infrastructure has a positive and significant impact on economic growth because it facilitates the distribution of goods and services and improves interregional connectivity. Husen, A. and Baranyanan (2021) LSO reported similar findings, showing that road infrastructure development can enhance logistics and distribution efficiency. Angelina, D., & Wahyuni (2021) emphasized that road construction with adequate quantity and quality will improve the efficiency and effectiveness of the movement of goods and services.

Thus, the improvement of road infrastructure directly contributes to increasing economic efficiency in the regions by reducing transaction costs, accelerating distribution, and enhancing the overall economic accessibility for the community.

For example, in Lampung, the construction and improvement of national roads and toll roads such as the Trans-Sumatra Toll Road have accelerated the flow of goods from ports to distribution centers, strengthening connectivity with other parts of Sumatra and Java. This has significantly reduced travel time and logistics costs.

In Jakarta, as the national economic center, improvements in road infrastructure such as non-toll flyovers and underpasses help reduce traffic congestion and speed up the mobility of workers as well as the distribution of goods throughout the Greater Jakarta area. This efficiency is crucial given the large economic activity in the region.

Meanwhile, in Bali, good road infrastructure supports the tourism sector the main driver of the regional economy by facilitating easier access for tourists to various destinations. Road improvements and the development of alternative routes reduce traffic density and increase comfort and time efficiency for both tourists and local businesses.

In Kalimantan, road construction, including projects related to the new capital city (IKN) development and economic corridors, has helped ease inter-regional connectivity that was previously difficult due to geographic conditions. Adequate road infrastructure strengthens the potential of plantation, mining, and forestry sectors by lowering logistics costs and increasing the speed of distributing production results.

In other words, the development of road infrastructure across various regions of Indonesia not only promotes local economic efficiency but also strengthens national economic integration, which in turn can support inclusive and sustainable economic growth.

4.3 The Relationship Between Labor and Economic Efficiency

Based on the results of the panel data regression analysis, it is found that labor has a positive and significant influence on economic efficiency in regencies/cities in Lampung Province. This finding aligns with endogenous economic growth theory, particularly those emphasizing the importance of social capital, including human capital that is educated, skilled, and productive.

In the context of economic efficiency, human capital plays a major role because competent labor can complete tasks more quickly, accurately, and resource-efficiently. When the number of workers absorbed in economic activities increases, community productivity also rises. Workers who earn income tend to increase consumption, investment in education, and family welfare, which ultimately enhances the overall efficiency of the economic system.

The increased income from employment boosts the community's consumption capacity. In terms of efficiency, this indicates optimal utilization of human resources that contributes to economic circulation. Household consumption, as one of the important components of regional gross domestic product (RGDP), demonstrates the strategic role of labor in supporting local economic efficiency and stability.

Jakarta, as the capital city and national economic center, has a highly diverse and dynamic labor structure. Economic efficiency in Jakarta is strongly influenced by the high-quality labor absorbed in capital-intensive sectors such as services and the creative industries. Labor absorption in these sectors significantly increases productivity, thereby strengthening economic efficiency in the metropolitan area. However, urbanization pressures also require policies that can maintain a balance between labor growth and quality of life to sustain efficiency.

Bali, known as a tourism hub, heavily depends on skilled labor in the services, hospitality, and tourism sectors. In Bali, increasing labor absorption especially in the tourism sector can improve economic efficiency by accelerating the flow of consumption and investment in supporting facilities. Human capital in Bali not only includes technical skills but also cultural and social capabilities that enhance the region's economic competitiveness. Therefore, labor quality plays an important role in maintaining both the sustainability of growth and economic efficiency in the tourism sector.

Kalimantan, rich in natural resources and developing in the mining and heavy industry sectors, shows a different labor dynamic. Economic efficiency in Kalimantan heavily depends on how labor can be integrated with technology and more efficient production practices. Improving the quality and quantity of skilled labor in these strategic sectors is key to optimizing the utilization of natural resources without sacrificing efficiency. In this context, increased labor absorption also reflects progress toward a more productive and sustainable economic structure.

In Lampung Province as well as in other regions such as Jakarta, Bali, and Kalimantan, increasing labor absorption not only impacts economic growth but also directly affects economic efficiency. Skilled and productive labor becomes a strategic human capital asset in optimizing resource utilization, accelerating economic circulation, and maximizing output. Therefore, economic development policies focused on improving the quality and quantity of labor in productive sectors are essential to ensure efficiency and sustainable economic growth across various regions in Indonesia.

This study is also supported by various previous research Sari, Y., Halim, A., Mustika, M., Winarni & Pratiwi (2022) found that labor has a positive and significant effect on the efficiency and economic performance of regions. Buana, A.L., Saragih, H.J.R. and

Aritonang (2019) also concluded that labor is a major contributor to economic dynamics in Java Island and emphasized the importance of developing skills that align with industry needs.

Furthermore Widayati, H.W., Laut & R (2019) in their research on Magelang Regency, also stated that the number of laborers has a positive and significant influence on economic efficiency. As the labor force increases, purchasing power and production efficiency also rise, contributing to the optimization of the regional economic system.

Thus, labor is not merely a supplementary factor in economic development but is a core component that drives efficiency through increased productivity, reduced unemployment, and improved income distribution and consumption.

4.4 The Relationship Between Regional Original Revenue (PAD) and Economic Efficiency

Based on the results of panel data regression analysis, Regional Original Revenue (PAD) has a positive and significant effect on economic efficiency in the regencies/cities of Lampung Province. PAD serves as an important means to promote fiscal decentralization and increase regional fiscal independence, where the higher the PAD, the more independent the region is in financing public expenditures without relying heavily on transfers from the central government. This reflects efficiency in utilizing local resources and managing regional finances optimally. In Lampung, sectors such as agriculture, plantations, fisheries, and processing industries are the main sources of PAD, which, if well managed, can enhance economic efficiency through the development of infrastructure and targeted public services. Similar conditions also occur in other provinces such as Jakarta, Bali, and Kalimantan, although the sources of PAD and economic characteristics differ. Jakarta, as the national economic center, relies on regional taxes from the service, trade, and creative industries sectors, enabling professional management of PAD and improving regional economic efficiency. Bali depends heavily on tourism as the primary source of PAD, where revenue management from hotel taxes, restaurants, and other levies supports the development of tourism infrastructure and efficient growth of micro, small, and medium enterprises (MSMEs). Meanwhile, Kalimantan, with its abundant natural resources such as mining and plantations, utilizes PAD to strengthen infrastructure and public services, thereby increasing economic efficiency and regional fiscal independence. Overall, the increase in PAD in these four provinces reflects the regions' ability to harness local economic potential and effectively manage finances, ultimately driving economic efficiency and sustainable development.

This study aligns with previous research Sicily, M. and Harsono (2021). stated that PAD has a positive and significant effect on the efficiency of governance and development implementation in Malang City. Their research explains that PAD is an important indicator for assessing a region's ability to finance its needs efficiently.

Similarly, findings from Rori et al. (2016) showed that sustainable increases in PAD are positively correlated with improvements in the efficiency of regional economic development implementation. Meanwhile The Goddess (2013) emphasized that PAD is one of the local revenue sources managed directly by local governments to support the efficiency and effectiveness of development program implementation.

Therefore, the increase in PAD functions not only as a funding source but also as an indicator of regional economic performance and efficiency. Regions that can manage

PAD wisely and strategically will be more adaptive and efficient in facing fiscal and development challenges.

4.5 The Relationship Between General Allocation Fund (DAU) and Economic Efficiency

Based on the results of panel data regression analysis, the General Allocation Fund (DAU) has been proven to have a positive and significant effect on economic efficiency in regencies/cities in Lampung Province. This aligns with Brata's (2004) theory, which states that besides Own-Source Revenue (PAD), DAU plays an important role in regional fiscal capacity and efficiency, especially because its value is generally larger than PAD. DAU functions as a fiscal equalization instrument between regions by providing a minimum spending capacity for areas with low PAD potential. Proper utilization of DAU, such as for employee expenditures, operations, and basic infrastructure development, improves the quality of public services and community productivity, thereby strengthening economic efficiency. Regulation PMK No. 211/PMK.07/2022 also directs DAU to priority sectors such as education, health, and public works. A similar phenomenon is found in other regions like Jakarta, Bali, and Kalimantan, although with different characteristics. In Jakarta, despite having a large PAD, DAU remains important to support public services in peripheral areas and improve transportation infrastructure to enhance economic efficiency in this metropolitan city. Bali, as a major tourism center, uses DAU for infrastructure development that supports the tourism sector, thus strengthening competitiveness and local economic activities. Meanwhile, in Kalimantan, with its vast territory and development disparities, DAU is vital in improving access to basic services such as roads and healthcare facilities in remote areas, thereby increasing overall economic efficiency. Therefore, DAU not only serves as additional funding but also as a strategic instrument capable of enhancing fiscal efficiency and equitable development in various regions of Indonesia, including Lampung, Jakarta, Bali, and Kalimantan, when managed properly and appropriately.

This study is also supported by previous research Daim Harahap et al. (2019) demonstrated that the General Allocation Fund (DAU) has a positive and significant effect on the efficiency of government administration in Deli Serdang Regency. Furthermore Sicily, M. and Harsono (2021). stated that DAU can reduce infrastructure disparities between regions and promote equitable efficiency in development. Research by Mawarni et al. (2013) also showed similar results in Aceh Province, where DAU was proven to contribute to improved public service efficiency and regional economic development.

Therefore, an increase in effectively managed General Allocation Funds can become a key driving force in enhancing regional economic efficiency, particularly in Lampung Province, through the optimal use of budgets for strategic sectors and basic services.

5. Conclusion

The increase in the total length of road infrastructure in Lampung Province from 2020 to 2024 has significantly contributed to improving economic efficiency. Good road infrastructure facilitates the mobility of people and the distribution of goods and services, thereby reducing logistics costs and travel time, which ultimately boosts the productivity of the regional economic system. A similar situation occurs in Jakarta, where improvements in road infrastructure play a crucial role in reducing traffic congestion and accelerating connectivity between areas, supporting economic efficiency through reduced time and transportation costs. In Bali, the enhancement of road infrastructure is vital for the tourism sector, which is the backbone of the local economy; adequate roads ease

tourist access and streamline economic activities, thus increasing efficiency. Meanwhile, in Kalimantan, especially East and South Kalimantan, the expansion of road infrastructure supports the mining and plantation sectors by facilitating the distribution of products to the market, which also enhances the region's economic efficiency.

Moreover, the increase in the number of employed workers across various sectors in these four regions contributes to economic efficiency. In Lampung and Kalimantan, workers employed in primary and industrial sectors boost income and consumption, reflecting an optimal utilization of human resources. In Jakarta and Bali, labor absorption in the service and tourism sectors significantly raises productivity and economic efficiency. The growth of Regional Original Revenue (PAD) across these areas also provides greater fiscal space for local governments to finance public expenditures independently and productively, thus supporting more efficient and targeted use of funds. Meanwhile, the General Allocation Fund (DAU) plays an important role in equalizing development between regions, especially in areas with low fiscal capacity such as parts of Lampung, Bali, and Kalimantan, thereby reducing service disparities and enabling more equitable and efficient economic activities. Overall, the improvements in road infrastructure, labor force, PAD, and DAU collectively drive sustainable economic efficiency in Lampung Province, Jakarta, Bali, and Kalimantan during the 2020–2024 period.

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