1st International Conference on Multidisciplinary Engagement

The Impact of Infrastructure Quality Toward West and East Nusa Tenggara Economic Performance

Alamsyah Agit[1*], Qarina[2], Susilawati Muharram[3]
[1,2]*Alauddin State Islamic University Makassar, Gowa, Indonesia*
[3]*Badan Pengawas Pemilihan Umum (BAWASLU) Kota Parepare, Parepare, Indonesia*

Corresponding Author.
**Email*: alamsyahagit@gmail.com

ABSTRACT

This study examines the influence of infrastructure quality on economic performance in the provinces of West Nusa Tenggara (NTB) and East Nusa Tenggara (NTT), two regions with moderate-low economic growth rates and suboptimal regional competitiveness. The objective of the study is to analyze the components of the Infrastructure Development Index (IPI) as a proxy for infrastructure capacity to support inclusive and sustainable economic growth. This study examines the influence of infrastructure quality on economic performance in the provinces of West Nusa Tenggara (NTB) and East Nusa Tenggara (NTT), two regions with moderate-low economic growth rates and suboptimal regional competitiveness. The objective of the study is to analyze the components of the Infrastructure Development Index (IPI) as a proxy for infrastructure capacity to support inclusive and sustainable economic growth. The results show a significant infrastructure disparity between NTB and NTT, with NTT having a lower percentage of access to public facilities. Both provinces exhibit a pattern of fluctuation in physical infrastructure with a decline in 2022 but a recovery trend in 2023–2024. NTT's Infrastructure Development Index recorded a consistent increase, while NTB's declined and then recovered. Both provinces' economic growth is positive but remains fluctuating. The study concluded that infrastructure quality impacts regional economic performance and the achievement of the SDGs. Integrated infrastructure policies, oriented towards remote areas and based on local needs, are needed to create inclusive and sustainable development in West Nusa Tenggara (NTB) and East Nusa Tenggara (NTT).

KEYWORDS: Economic Development, Infrastructure, Infrastructure Development Index, Sustainable Development

1. INTRODUCTION

Physical infrastructure, in an economic context, is the foundation of the economy's fixed capital, encompassing transportation, energy, water, and public facilities. Quality physical infrastructure has the potential to reduce transaction costs, increase mobility, and strengthen supply chains. All of these processes ultimately drive growth, benefiting from robust infrastructure [1]. Targeted infrastructure investment can be a powerful factor in efforts to reduce disparities between regions and build regional capabilities to withstand shocks from disasters, crises, pandemics, and similar conditions [2]. Optimal infrastructure development requires policy design that considers the appropriateness of infrastructure investments, which can lead to increased multiplier effects while still considering monetary conditions. However, physical infrastructure development also has synergy with digital infrastructure, which is crucial for modern economic transformation because the two complement each other in improving the trade and business climate, as well as market efficiency and access [3].

Infrastructure Development Indicators, which generally include a general overview of the quality of public services, reflect the condition of sound roads and bridges, the availability of clean water, adequate sanitation, and access to electricity [4]. These indicators have numerous benefits in the planning process, guiding public policy to improve basic access and regional productivity [5]. The importance of infrastructure in economic

activity is reflected in regional mobility and connectivity, both of which are crucial for driving economic growth, increasing employment opportunities, and ultimately potentially reducing poverty in the region [6]. This highlights the importance of appropriate infrastructure investment. In some circumstances, infrastructure does not significantly impact the dimensions of growth in a region or produces growth outcomes that are not fully inclusive. Therefore, the impact of infrastructure on development in a region is largely determined by local policies and contexts, which must align with regional development goals [7].

Based on data obtained from the Central Statistics Agency (BPS), East Nusa Tenggara's economic growth in 2025 showed moderate growth, but West Nusa Tenggara showed negative growth. Both regions have experienced moderate to low growth in recent years. This indicates suboptimal economic performance, which is also supported by the regional competitiveness index published by the National Research and Innovation Agency. The Regional Competitiveness Index explains that in 2025, both West Nusa Tenggara and East Nusa Tenggara had moderate-low competitiveness scores. This suboptimal economic performance is assumed to be influenced by many factors, one of which can be caused by infrastructure.

Empirically, various studies have described the infrastructure conditions in the provinces of West Nusa Tenggara and East Nusa Tenggara. The provision of prime infrastructure in these two provinces is considered uneven, with many areas in East Nusa Tenggara (NTT) experiencing impassable roads during various seasons, while in West Nusa Tenggara (NTB), there are still many urban areas, affecting access to clean water and electricity [8]. Although this infrastructure is considered appropriate for the geographical characteristics of an archipelagic region, it hinders regional mobility due to limited regional connectivity. Furthermore, the border areas in these two provinces also exhibit low infrastructure, potentially contributing to barriers to economic and social access between regions [9]. The low economic performance in these two regions is generally caused by geographic factors, urban-rural disparities, and inadequate infrastructure access. Efforts such as the Mandalika Special Economic Zone are one of the Government's strategies to improve economic performance, but this is still hampered by a lack of precise policy design, a lack of harmonious sector synergy, and suboptimal investment quality [10]. To address this issue, it is considered necessary to implement policy implications that prioritize balancing connectivity with the provision of clean water, electricity, and basic services in remote areas. This is considered an initial step towards creating inclusive development [11].

Previous research has found various results explaining the positive and negative relationships between infrastructure and economic growth in Eastern Indonesia, including NTB and NTT. This diversity of results indicates differences in outcomes resulting from contextual policy benefits. Furthermore, previous studies often used non-longitudinal data and did not specifically focus on NTB and NTT. Previous research also has not extensively analyzed the distribution of access to basic services across regions, and has not focused on expansive analyses to evaluate inter-island connectivity and the impact of infrastructure policies on creating inclusive growth. This study will analyze the components of the Infrastructure Development Index (IPI) in NTB and NTT to obtain a representative picture of infrastructure capabilities in creating and improving economic performance in the provinces of West Nusa Tenggara and East Nusa Tenggara.

2. METHOD

This research was conducted using a quantitative approach based on statistical data analysis. This research is descriptive statistical in nature; the approach used is considered most appropriate for the research objectives that lead to an in-depth analysis of the characteristics of the research areas, namely the provinces of West Nusa Tenggara and East Nusa Tenggara. The descriptive statistical approach in this study is used to describe and interpret infrastructure and economic growth data in the two provinces. The data used in this study include infrastructure data and the Infrastructure Development Index. The infrastructure data referred to in this study includes five components consisting of data on the percentage of good roads, the percentage of good bridges, the percentage of clean water availability, the percentage of adequate sanitation availability, and the availability of access to electric lighting. These five components are then used as a composition to measure the Infrastructure Development Index.

The data analysis techniques in this study include data analysis, data presentation, and data interpretation. Data analysis is the initial stage, which involves collecting and analyzing data through grouping, determining the highest, lowest, and average values for each data item. Data presentation, the second stage in data analysis, is carried out to describe and visualize the data in the form of graphs and diagrams to facilitate visualization and

provide easy-to-understand illustrations. The final stage in data processing in this study is data interpretation, which provides meaning to the data that has been collected and analyzed. The interpretation stage does not stop at statistical data but also involves positioning the data as a factual basis and comparison with findings from previous studies. The comparison obtained from the data analysis in this study is to show the vulnerability of the economic performance of the provinces of West Nusa Tenggara and East Nusa Tenggara based on infrastructure quality, and to provide projections of the capabilities of infrastructure quality to support economic performance in the two provinces in this study.

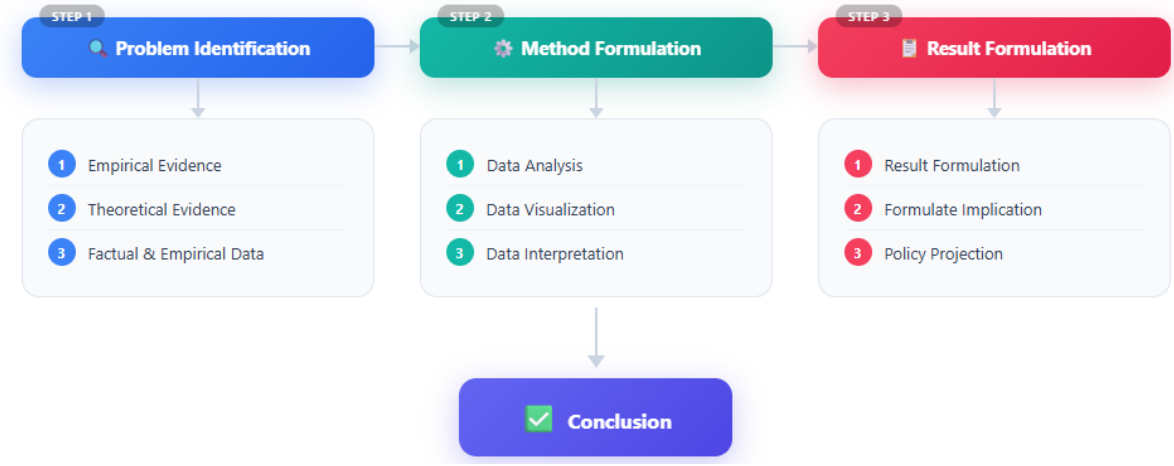


Figure 1. Research Flow Diagram

3. RESULTS AND DISCUSSION

The results of this study demonstrate the diversity of infrastructure component data, infrastructure development indices, and economic growth. These results indicate that infrastructure development in these two provinces has never stagnated or stopped. However, the potential for damage to infrastructure remains very real, explaining the fluctuations in the percentages of each component.

Infrastructure Quality

The directly observable quality of infrastructure refers to two components: the percentage of good roads and the percentage of good bridges in a region. This percentage of good roads and bridges indicates how many roads and bridges in a region are in good condition, compared to the total length of roads and the number of bridges in that region. The quality of roads and bridges not only reflects the quality of infrastructure but also provides an overview of a region's ability to provide inter-regional connectivity and economic mobility, which, of course, requires infrastructure for distribution activities. The following is an overview of the two components that describe the quality of infrastructure in the provinces of West Nusa Tenggara and East Nusa Tenggara.

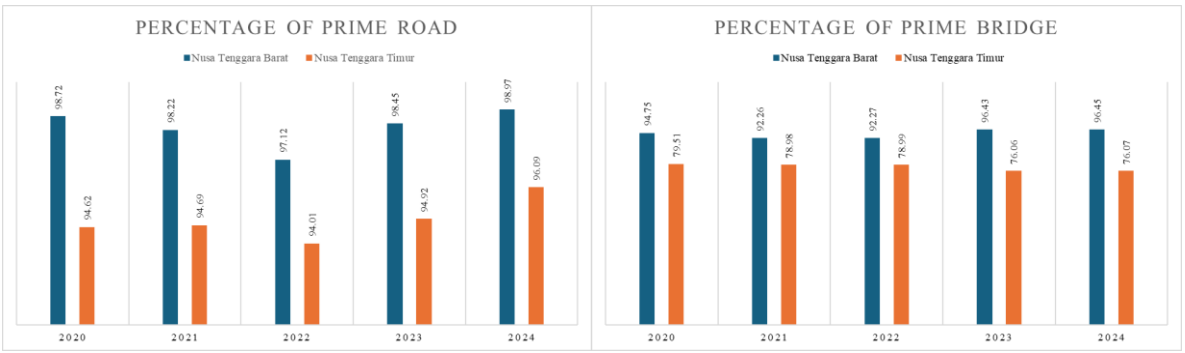


Figure 2. Percentage of Prime Road and Bridge

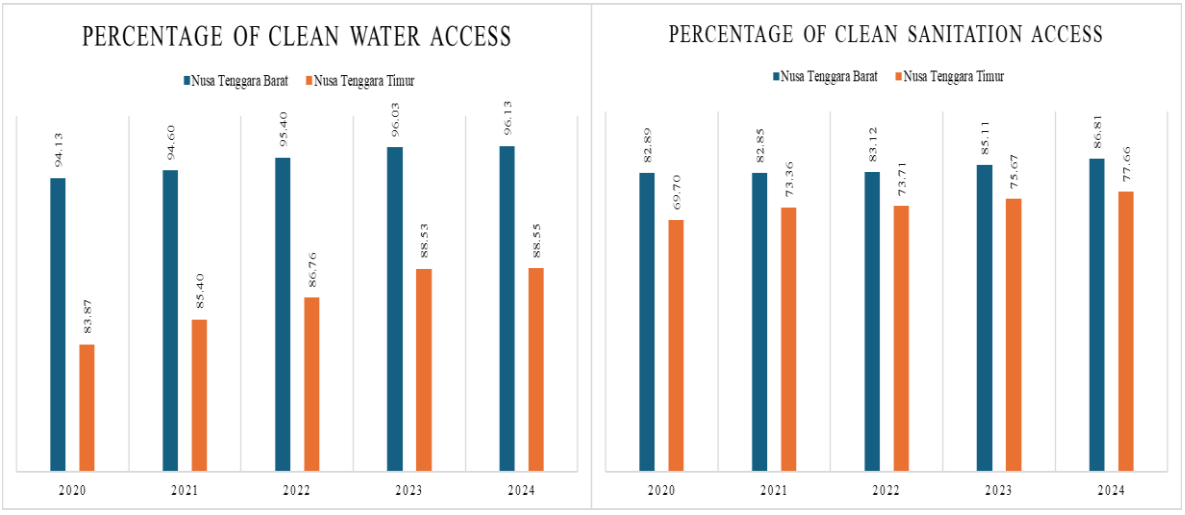
Based on the data obtained, it is known that the percentage of roads in good condition in both provinces in this study shows a fluctuating pattern. However, this pattern is very interesting, considering that the peak of the decline for both provinces occurred in 2022 and then experienced an upward trend over the last two years in 2023 and 2024. In contrast, the percentage of bridges in good condition ultimately decreased in 2024 for East Nusa Tenggara Province. Meanwhile, for West Nusa Tenggara, a fluctuating pattern is observed. Both data show alternating periods of repair and damage to infrastructure. This could be caused by increased frequency of transportation activities at certain times, or it could occur as a result of damage caused by extreme weather changes.

Nevertheless, in an economic context, the percentages for these two provinces are considered high enough for the implementation of economic activities, particularly distribution activities. However, this condition generally leads to provincial roads, leaving areas within districts or cities unable to accommodate them fully. Furthermore, remote areas are also generally left behind due to the lack of high economic activity in those areas. As a result, infrastructure development does not target remote areas, taking into account the economic benefits and potential that can be obtained in productive areas within the province. Furthermore, when linked to the Sustainable Development Goals (SDGs), infrastructure quality actually influences many potential goals. The availability and quality of good infrastructure can bridge the gap between the provision of high-quality public services, such as healthcare and education, and other economic needs at lower prices. Furthermore, long-term development goals such as employment and poverty reduction are also potential achievements with the presence of excellent infrastructure.

Previous research has explained the benefits a region should derive from robust infrastructure. Good quality roads and bridges can improve economic performance through logistical efficiency, reduced transportation costs, and improved connectivity between domestic and regional markets [12]. Furthermore, robust infrastructure strengthens a region's resilience to disasters. Prime infrastructure also maintains and minimizes disruptions to resource supply, and strengthens economic stability [13]. Linked to the SDGs, robust infrastructure supports the development of productive industries, creates inclusive economic growth, and serves as a crucial foundation for renewable, clean, and environmentally friendly energy, achieved through openness to investment, innovation, and capital resources [14]. Infrastructure stability is a crucial factor in creating job opportunities, increasing investment, and facilitating the synergistic achievement of the SDGs by the public and private sectors.

The Access of Public Fasility

In addition to the quality of roads and bridges, public facilities also serve as a measure of the quality of infrastructure in a region. These facilities refer to public access to clean water, proper sanitation, and electric lighting. Data on the percentage of access to clean water, proper sanitation, and electric lighting indicates the number of households with such access compared to the total number of households in the region.



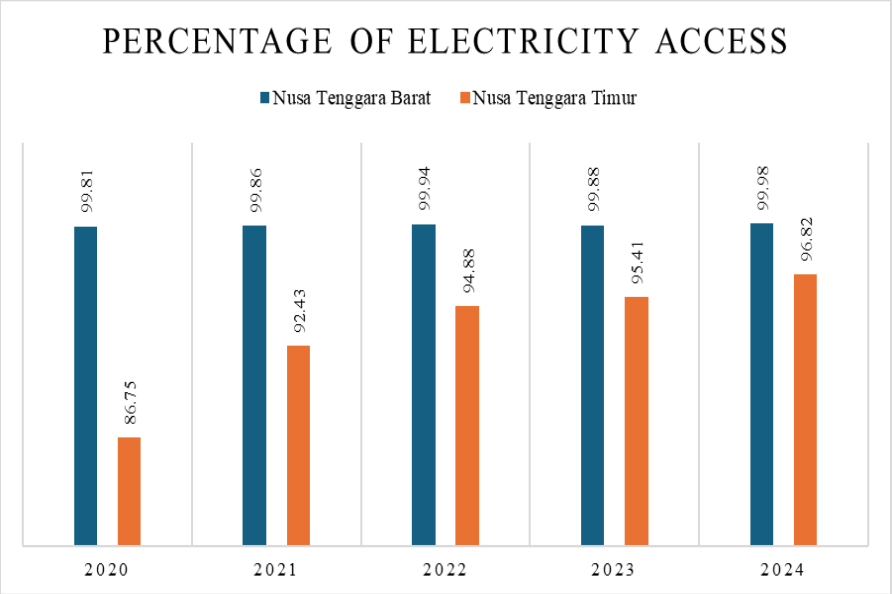


Figure 3. Percentage of Clean Water, Sanitation, and Electricity Access

Based on the data obtained, significant differences are evident between the provinces of West Nusa Tenggara and East Nusa Tenggara. This difference is evident across all components, with East Nusa Tenggara having a lower percentage of access to public facilities than West Nusa Tenggara. Generally, limited access to public facilities in the NTT region is caused by budget constraints, poor asset management, and rapid population growth. Furthermore, these issues are interrelated, with limited clean water sources contributing to inadequate access to clean sanitation. Regarding electricity, the large number of remote areas and the characteristics of small islands are the main factors hindering equitable access to electricity. However, residents generally rely on diesel-powered power plants for electricity, which can be very difficult under certain conditions.

Previous research explains how these three components are crucial in the context of economic development. Clean water and sanitation contribute to improved public health and reduced healthcare costs, ultimately driving increased productivity [15]. Both are also indicators reflecting wellbeing, which are part of the human development index [16]. The wellbeing of communities created by the availability of access to public facilities is also a factor that can encourage more inclusive economic growth. Through this growth, the influence or impact of infrastructure contributions will be felt in poverty reduction, income, and improving regional work capacity [17]. Employment absorption and improved quality of life are also benefits and are one of the goals of the SDGs. In general, these three components are important factors that can increase production activities, education, and productivity, although in some regions, the impacts obtained may vary contextually [18]. Optimizing infrastructure components to create sustainable economic impact is largely determined by the implementation of policies aligned with the SDGs, the integration of innovative financing policies, and coordinated governance [19]. Therefore, the impacts of infrastructure components, both physical and general, are closely linked to Government policies at the local, regional, and national levels.

The Infrastructure, Economic, and Sustainable Development

The quality of infrastructure in a region significantly impacts economic activity. With excellent infrastructure, the potential for greater achievement increases. As a measure of infrastructure quality, the Infrastructure Development Index measures the even distribution of infrastructure, both in terms of physical infrastructure such as roads and bridges, and in terms of the availability of access to public facilities such as clean water, adequate sanitation, and electricity.

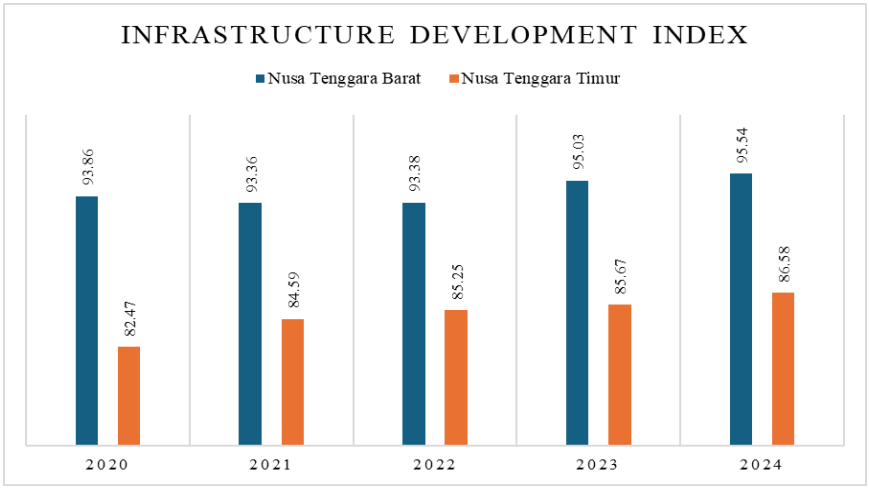


Figure 4. Infrastructure Development Index

Based on the data obtained, a significant difference is seen between West Nusa Tenggara and East Nusa Tenggara. West Nusa Tenggara showed a point of decline in 2021 and 2022, which then increased again in 2023 and 2024. Meanwhile, East Nusa Tenggara, although having a value that is quite different from West Nusa Tenggara, shows a positive trend with a continuous increase over the past 4 years.

Infrastructure development is considered an effort to improve economic performance, particularly in increasing production capacity, reducing logistics costs, and accelerating productivity in the long term, with the aim of increasing economic growth [20]. However, project quality, durability, and environmental impact are often used as benchmarks for assessing the potential contribution of infrastructure to a region's economy. Infrastructure investment in provinces generally takes the form of roads and basic facilities, designed to support regional growth [21]. However, maximizing this development requires careful planning; it is crucial to design and position it appropriately, especially in regions such as West Nusa Tenggara and East Nusa Tenggara. Some infrastructure development outside Java is implemented with policies that emphasize infrastructure development to reduce regional disparities and improve logistics connectivity through critical transportation infrastructure to support regional competitiveness [22]. Development in regions such as West Nusa Tenggara and East Nusa Tenggara is generally hampered by numerous factors, one of which is regional characteristics [23]. Therefore, infrastructure development in West Nusa Tenggara and East Nusa Tenggara Provinces requires careful planning based on priorities, community empowerment, and identification of the potential of remote areas.

Economic growth in these two provinces shows a fluctuating pattern in West Nusa Tenggara Province. In contrast, in East Nusa Tenggara Province, economic growth in the region has shown an increasing trend over the past four years. This growth explains that both the NTB and NTT regions show positive growth. This positive growth reflects continued growth despite experiencing a decline. Positive growth is a sign that productivity in the region continues to increase. Meanwhile, several other regions that show negative growth indicate that economic growth in the region is negative, with a decline in overall productivity.

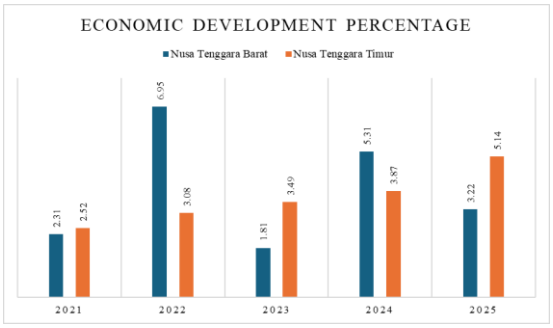


Figure 5. Economic Development Percentage

Economic growth is closely linked to infrastructure, as trade is conducted not only through land logistics but also by air and sea. Therefore, the importance of prime infrastructure is crucial for achieving high economic performance [24]. The quality and condition of prime infrastructure not only impact economic growth but also build regional competitiveness, reflecting a region's ability to meet domestic needs and compete in the global market [25]. Archipelagic regions also demonstrate the importance of infrastructure in supporting development, which is not only directed at the economy but also towards sustainable development goals. Meanwhile, in the context of sustainable development, concepts such as the Blue Economy and Green Economy are considered new approaches that can serve as a framework for economic development that not only pursues performance but also focuses on environmental and resource sustainability [26]. The advantage of provinces or regions with archipelagic characteristics is the tourism sector, which can be maximized to drive economic growth [27]. In line with sustainable development goals, infrastructure is generally considered a pioneering development tool, potentially contributing to demographic aspects related to human resources, reducing poverty and unemployment, increasing job opportunities, and increasing labor absorption in a region [28]. These results demonstrate that infrastructure significantly contributes to economic performance and sustainable development goals, particularly those related to human resource empowerment.

4. CONCLUSION

The research results show that infrastructure quality in both provinces fluctuates but generally continues to improve. The percentage of roads and bridges in good condition in both provinces decreased significantly in 2022, but increased again in the following two years. Meanwhile, there is a clear gap in access to public facilities, including clean water, proper sanitation, and electrification, with NTT consistently recording lower percentages than NTB. This gap is influenced by budget constraints, the geographical characteristics of the archipelago, and uneven population growth

The NTB Infrastructure Development Index showed a decline in 2021–2022 and then recovered, while NTT recorded a consistent upward trend over the past four years. Economic growth in both provinces is positive but remains volatile, reflecting that infrastructure contributes to regional productivity, albeit not yet optimally. These findings confirm that the quality of infrastructure, both physical and basic services, is a critical factor in driving inclusive and sustainable economic performance. Going forward, more targeted infrastructure development planning is needed, prioritizing remote areas and aligning with the Sustainable Development Goals (SDGs), particularly in terms of poverty alleviation, employment absorption, and improving interregional connectivity in NTB and NTT.

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