

## **Index Of Infrastructure Competitiveness : One Of The Indicators Of Indonesia's Development Performance**

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**Abstract:** *This paper aims to measure the level of infrastructure competitiveness that reflects a number of criteria or indicators of the infrastructure development performance in Indonesia. In addition to referring to the Global Competitiveness Yearbook, the index of infrastructure competitiveness is expected to be used as the determination or benchmark of the global competitiveness in Indonesia.*

**Keywords:** *Index, Competitiveness, Infrastructure*

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### **I. Introduction**

In Global Competitiveness Yearbook, infrastructure sector became one of the key sectors determining Indonesia's global competitiveness level. Reports released by the World Economic Forum assesses the level of a country's competitiveness in three main aspects: basic needs fulfillment, efficiency enhancement, as well as innovation and cutting-edge factors. Infrastructure factors are major factors in encouraging national economic activity. Acceleration of infrastructure development policy is one of the spearheads in boosting national economic development. The availability of adequate infrastructure in terms of quality and quantity is a key factor to encourage and support sustainable economic growth.

High-quality infrastructure availability is one of the determinants of a region's attractiveness in addition to environmental quality, image, and society (culture) factors. On the other hand, infrastructure performance is a key factor in determining global competitiveness. In addition to macroeconomic performance, government efficiency, and business efficiency. In terms of global competitiveness, several international agencies regularly issue a ranking of Indonesia's infrastructure performance. Thus, infrastructure is seen as an important element of a nation's global competitiveness.

*Rencana Pembangunan Jangka Menengah Nasional (RPJMN)* or National Medium Term Development Plan 2015-2019 has been determined through Presidential Decree Number 2/2015 which contains development plan for the next 5 years to achieve infrastructure implementation objective which covers: (1) Availability of infrastructure according to spatial planning; (2) The development of transportation network; (3) Fulfillment of reliable and efficient power supply; (4) Initiating nuclear power utilization for power plant; (5) Realization of water resources conservation fulfillment of drinking water supply for basic needs as well as agricultural supporting rural region infrastructure development; (6) The fulfillment of shelter needs supported by long-term financing system; And (7) The realization of slum-free city.

Infrastructure development objectives have been determined and must be achieved by each K / L, whether it is the output target or outcome target (national target). In order to achieve these development targets, a media that can be utilized to predict Indonesia's future development is by compiling an index of Indonesia's infrastructure competitiveness. The compilation of Indonesia's infrastructure competitiveness index was conducted through a formulation that produces an index to measure the level of infrastructure competitiveness reflecting a number of infrastructure performance criteria or indicators.

### **II. Review Of Literature**

#### **2.1 Principles of Infrastructure Development in Spectrum of Area Conditions**

Infrastructure development must be suited to existing demand setting and its development potential. In this case, demand-setting is influenced by the characteristics of land use, population, accessibility to public service, the condition of social service and public utility, and socio-economic structure.

In planning infrastructure development, a region's potential will be the most important determinant, both potential level and type. Potential type will determine infrastructure function and structure. Potential level will determine the required infrastructure capacity. Therefore, some parameters determining infrastructure development are described as follows: Hierarchy of management, where the provision of infrastructure should be able to accommodate spatial patterns and concentration of activity centers, Geographical conditions,

including obstacles to rivers, lakes, and so forth, Climatic, hydrological and environmental conditions, Availability of existing natural resources, Population and type of activity, The development of economic activity, and Availability of funds for infrastructure development, In the context of infrastructure as an economic and social entity, SPM infrastructure can be defined as minimum performance that infrastructure must fulfill as a resources distribution facility and services to the community to at least guarantee basic needs fulfillment of a socio-economic society. As basic needs of the community will develop according to their economic level, SPM should also be dynamic and be used as an indicator as an evaluation tool to estimate the need (need assessment). According to Hudson et al (1997) indicators of infrastructure performance can be grouped into 4 categories, namely: Service and user perspective, Security and sufficient (sufficiency), Physical condition and Structure / capacity integrity.

Below are some factors to be considered in infrastructure provision:

- 1) Road infrastructure provision consideration factor:
  - City typology (Large, medium, small).
  - Urban planning structure
  - Land availability ; total area ratio 5 percent of total area.
  - Road function classification.
  - The ratio of road length / population ; length of 0.6 km / 1000 inhabitants
- 2) Clean water provision consideration factor.
  - Total population
  - Prioritized region.
  - City typology (large, medium, small).
  - Clean water source availability.
  - Service scale/range.
- 3) Drainage infrastructure consideration factor
  - Population and settlement density.
  - Priority and urgent area (prone to disasters)
  - Flooded area
- 4) Waste water infrastructure provision consideration factor
  - Natural physical condition of the region
  - Region typology (Large, Medium, Small)
  - Prioritized Region
  - Undergoing development program
  - Serves 80% of the population
- 5) Waste material infrastructure provision consideration factor
  - Total population
  - City center priority areas; settlement density > 100 people/ ha; industrial area. Areas with B3 waste (medical waste).
- 6) Telecommunication infrastructure provision consideration factor
  - Total population and prediction of target service user.
  - Region classification and typology
  - Population income level
- 7) Electricity infrastructure provision consideration factor
  - Total population and prediction of target service user.
  - Supporting resources.
  - Service range.

## **2.2 Correlation Between Infrastructure and Economy**

Infrastructure has a broad and diverse role in development context, both in the physical-environmental, economic, social, cultural, political and other contexts. Infrastructure is a driving force in economic growth. It undoubtedly possesses significant role in developing a region. Few empirical facts stated that infrastructure development capacity in a region is parallel to economic output development. A statement released by World Bank (1994) stated that an average 1 percent increase in infrastructure stock is associated with a 1% increase in GDP. Infrastructure possess vital role because it is believed to increase productivity. It will ultimately affect an increase in overall economic performance. On the other hand, infrastructure's role in economy is not merely availability formed into quantity and quality. Infrastructure could become an obstacle when the amount of Government investment for public infrastructure decreases. This is one of the reasons behind the declining role of agricultural sector in supporting economic output both nationally and regionally. Efforts to improve the condition of infrastructure is important in reducing income gap and its long-term impact on per capita GDP. Infrastructure improvements contribute in increasing productivity and are expected to support economic growth

in the long term. Referring to the World Development Report (World Bank, 1994), infrastructure plays an important role in promoting economic growth where higher economic growth is found in areas with sufficient infrastructure availability. Identification of infrastructure development programs in some countries concludes that in general the program's targets are conducted in medium term. It focuses on improving basic needs and human connectivity. Started from water, electricity, energy, to transportation (highways, railways, ports and airports). Weil (2009) also states that disparities in the availability of physical capital and human capital play a role in explaining the differences in economic growth between countries. In Indonesia, a number of studies explored the influence of infrastructure on economy with varying results. Sibrani (2002) found that infrastructure, in this case electricity and education, has a positive and significant impact on Indonesian society per capita income. On the other hand, road and telephone variables are insignificant. Centralized infrastructure development policies in Java and western Indonesia resulted in disparities in per capita income of each region in Indonesia, especially in eastern Indonesia. Furthermore, Yanuar (2006), utilized 26 provincial panel data, exhibits that physical capital, road infrastructure, telephone, health, and education have a positive effect on economic output. On the other hand, Prasetyo (2008) concludes that electricity, road length, capital stock, and local government have a positive effect on West Indonesia Region economic development, while clean water variable was not significant. Research by Prasetyo and Firdaus (2009) concluded that Indonesia's economic growth is influenced by the availability of infrastructure, including electrification, paved roads, and clean water. Infrastructure indirectly affects economic growth through households (through welfare improvements) and corporations (through decreasing costs and market expansion). It will simultaneously affect economic growth. Correlation between infrastructure and economic growth is inseparable from the function of infrastructure as an enabler of economic activity. Infrastructure is beneficial in encouraging various economy sectors because it is considered as social overhead capital.

There is a long debate about the link between infrastructure and economic growth in both developed and developing countries. Generally, there are three emphasized transmission channels. First, the impact of increased productivity from infrastructure, for example, through reduced transport costs and improved communications. Second, improvements in human resources, such as better education and health outcomes, such as more clinics and schools are built related to population. Third, infrastructure support economies of scale and scope of production, for example, by supporting the centralization of activities within clusters or enabling firms to serve larger markets. Conversely, there are potential problems associated with a decrease in other investment in the short term (crowding-out effect), although there is a potential increase in long-term benefits from infrastructure investment. Also, if a new investment is made by reducing spending on maintenance of existing infrastructure, then there may be a problem in terms of cost effectiveness. From a political economy point of view, depending on the institutional situation, a sharp increase in infrastructure spending can extend profit-seeking behavior, again affecting cost-effectiveness. Straub's study (2008) highlights the variation between studies of his country's samples and time periods, econometric techniques, the use of infrastructure investment amounts or physical measurements, and sets of emphasis on growth, output or productivity and between temporary and long-term influences. Among the 80 specifications, about half of them stated that infrastructure had a positive and significant effect. Two out of five found no influence and the rest found negative and significant effect. Findings of a positive influence on output or growth will be more likely in studies using physical infrastructure indicators than investment data (which can not always map the actual levels of physical investment well). Article published by Calderon et al. (2011) is one of the studies that found a positive relationship between output and the level of physical infrastructure. In particular, an infrastructure index is prepared as a weighted calculation of state support on transportation, electricity and telecommunications sectors. The index was used as an explanatory variable in the empirical analysis of 88 countries 1960-2000 period. To illustrate the importance of economic analysis results, should the level of infrastructure services of a country increased from sample median in the year 2000 to the 75th percentile, it will obtain an increase in output per worker at least under 8 percent. Furthermore, by moving the median rate from lower-middle-income countries to the median high-income countries, the output per worker will increase by 5.2 percent. Interestingly, there is little inter-state variation in the elasticity between infrastructure and growth. However, they found that added benefit to growth with improved infrastructure is greater for countries with lower levels of infrastructure. Countries with larger populations may receive smaller benefits because of the impact of congestion.

### **III. Research Method**

Based on the research objectives to be achieved as described in the previous section, it is to create a formulation that produces an index to measure the competitiveness of infrastructure level that reflects a number of criteria or indicators on the performance of infrastructure implementation. Research methodology utilized mix methode (qualitative and quantitative). Qualitative method describes the existing condition of infrastructure in Indonesia while the quantitative approach is intended for determining index value of each infrastructure component with numerical index analysis techniques.

IV. Discussion

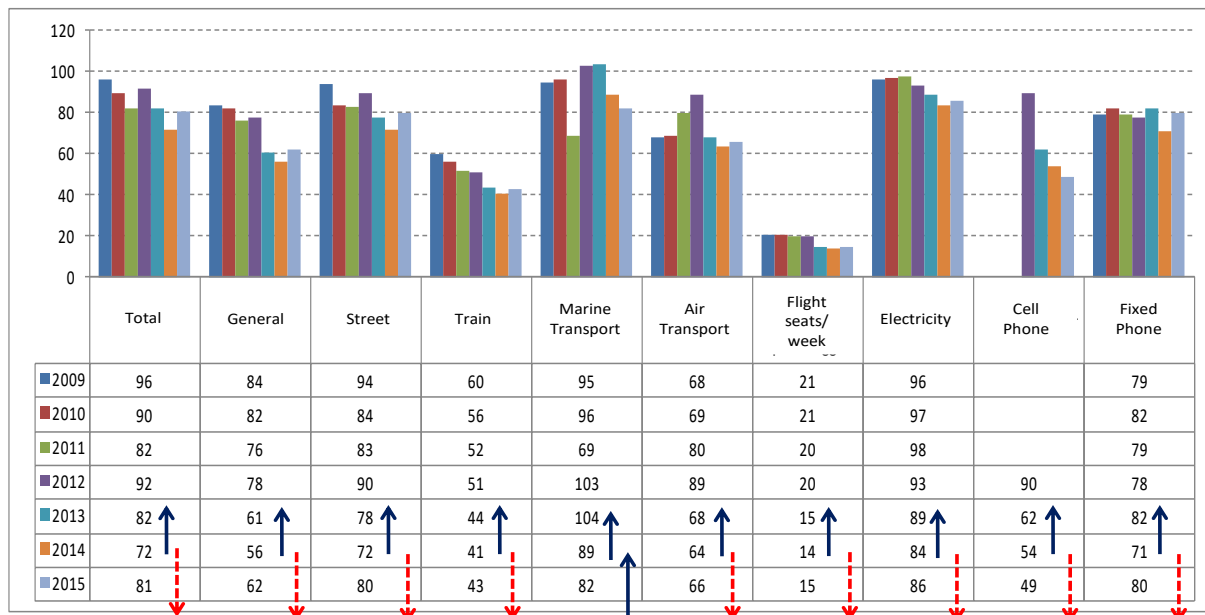
4.1 Indonesia Infrastructure Competitiveness Index 2009-2015

Based on Indonesia's infrastructure competitiveness index calculation result, 2015 experienced a decrease in index numbers compared to previous year index value from 4.2 to 3.8. From the decline in index numbers affected the competitiveness of Indonesia's infrastructure. By 2015 decreased in competitiveness index is predicted on road infrastructure, railways, marine transportation, air transport, electricity and telephone communication sectors. Compared other developing countries infrastructure development, Indonesia's infrastructure development has been slowing slightly. Several competitiveness indexes of infrastructure experienced improvements are only weekly flight and cell phones sector. Increasingly affordable airline ticket prices and Indonesia geographical conditions, consisting of islands separated by sea, make aircraft vehicles to be the prima donna of Indonesian people. The increase in weekly flights on 2015 reaches 2,622.9, predicted to increase on 2016 by 2,842.6. Furthermore, Indonesia is a potential market for handphone products. By 2016 it is predicted that 126.2 will increase from 121.5 in 2015. Indonesia's infrastructure competitiveness index is exhibited in the following table.

Table 1 Indonesia Infrastructure Competitiveness Index 2009 – 2015

Year	Total	General	Street	Train	Marine Transport	Air Transport	Flight seats/ week	Electricity	Cell Phone	Fix Phone
2009	3.1	3.2	2.9	2.8	3.4	4.7	1196.2	3.5		13.0
2010	3.7	3.6	3.5	3.0	3.6	4.6	1450.9	3.6		14.8
2011	3.9	3.8	3.5	3.1	4.6	4.4	1682.4	3.7		15.8
2012	3.7	3.8	3.4	3.2	3.6	4.2	1794.9	3.9	97.7	15.9
2013	4.0	4.2	3.0	3.5	3.6	4.5	2435.0	4.3	115.2	15.5
2014	4.2	4.4	3.9	3.7	3.9	4.5	2622.9	4.3	121.5	16.1
2015	3.8	4.2	3.7	3.6	3.8	4.4	2842.6	4.1	126.2	11.7

Source: Analysis Result, 2015.



Source: Analysis Result, 2015.

Figure 1 Indonesia Infrastructure Competitiveness Index Ranking 2009 – 2015

4.2 Indonesia Infrastructure Competitiveness Index 2016-2019

Based on the results of the calculation of Indonesia's infrastructure competitiveness index prediction, index of infrastructure competitiveness in 2016 to 2019 will experience an increase. Index value would reach 4.6 in 2019. Indonesia's infrastructure competitiveness ranking would increase with the rise of the index value. The prediction of Indonesia's infrastructure competitiveness is exhibited the following figure. Indonesia's declining infrastructure competitiveness index is found only in the competitiveness index in the airline weekly flights and use/availability of telephone communication.

**Table 2** Indonesia Infrastructure Competitiveness Index 2016 - 2019

Year	Total	General	Street	Train	Marine Transport	Air Transport	Flight seats/ week	Electricity	Cell Phone	Fix Phone
2009	▲ 3.1	▲ 3.2	▲ 2.9	▲ 2.8	▲ 3.4	▲ 4.7	▲ 1196.2	▲ 3.5		▲ 13.0
2010	▲ 3.7	▲ 3.6	▲ 3.5	▲ 3.0	▲ 3.6	▼ 4.6	▲ 1450.9	▲ 3.6		▲ 14.8
2011	▲ 3.9	▲ 3.8	▬ 3.5	▲ 3.1	▲ 4.6	▼ 4.4	▲ 1682.4	▲ 3.7		▲ 15.8
2012	▼ 3.7	▬ 3.8	▲ 3.4	▲ 3.2	▼ 3.6	▼ 4.2	▲ 1794.9	▲ 3.9	▲ 97.7	▲ 15.9
2013	▲ 4.0	▲ 4.2	▼ 3.0	▲ 3.5	▬ 3.6	▲ 4.5	▲ 2435.0	▲ 4.3	▲ 115.2	▼ 15.5
2014	▲ 4.2	▲ 4.4	▲ 3.9	▲ 3.7	▲ 3.9	▬ 4.5	▲ 2622.9	▬ 4.3	▲ 121.5	▲ 16.1
2015	▼ 3.8	▼ 4.2	▼ 3.7	▼ 3.6	▼ 3.8	▼ 4.4	▲ 2842.6	▼ 4.1	▲ 126.2	▼ 11.7
2016F	▲ 4.2	▲ 4.6	▲ 3.8	▲ 3.9	▲ 3.9	▼ 4.3	▲ 3151.5	▲ 4.5	▲ 138.1	▲ 14.5
2017F	▲ 4.3	▲ 4.7	▲ 3.9	▲ 4.0	▬ 3.9	▬ 4.3	▲ 3438.5	▲ 4.6	▲ 147.3	▼ 14.4
2018F	▲ 4.5	▲ 4.9	▲ 4.0	▲ 4.2	▲ 4.0	▬ 4.3	▲ 3725.5	▲ 4.7	▲ 156.5	▼ 14.3
2019F	▲ 4.6	▲ 5.1	▲ 4.1	▲ 4.3	▬ 4.0	▼ 4.2	▲ 4012.5	▲ 4.9	▲ 165.6	▬ 14.3

Source: Analysis Result, 2015.

Based on prediction result, the possibility of Indonesia's infrastructure competitiveness rank in 2016-2019 will continue to increase both as a whole and according to infrastructure competitiveness variable. Total ranking of Indonesia's infrastructure competitiveness in 2015 is at 81<sup>st</sup> position. It is predicted to raise up to 65 in 2019. It is considered optimistic to improve infrastructure competitiveness because it is related to government policy that prioritizes the acceleration of infrastructure development. It becomes the backbone of community activities and national economy accessibility.



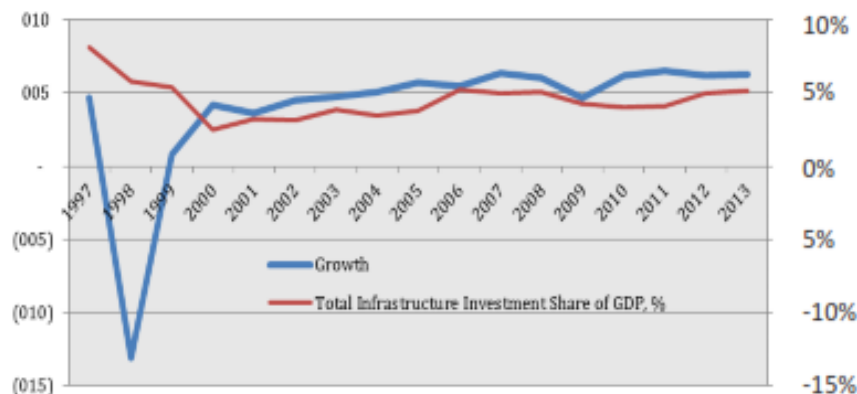
Source: Analysis Result, 2015.

**Figure 2** Indonesia Infrastructure Competitiveness Prediction 2016- 2019

Based on the analysis results, 2016-2019 prediction exhibits an increase in infrastructure index value. In 2016 until 2019, infrastructure competitiveness index will have increased up to 4.6 in 2019. Indonesia's infrastructure competitiveness rank increased in line with index value. With the increasing value of infrastructure index, it is also expected to be a determinant factor of increasing investment in Indonesia. This is in line with research conducted by Setiawan (2010) which states Infrastructure is a driving force in economic growth. Infrastructure has a role in developing a region, some empiric facts state that the development of infrastructure capacity in a region will go hand in hand with the development of economic output.

As per the direction of RPJPN 2005-2025, Indonesia is targeted to reach the position as one of the middle-income countries. To achieve this target, it required significant economic growth of 6-8 percent per year. Investment in infrastructure has a direct impact on the country's economic growth. As Figure 3 shows, infrastructure investment as measured by percentage of total GDP only reaches 5 percent. Therefore it still has not been able to encourage economic growth that can produce expected target.

To overcome infrastructure condition as well as to achieve Middle Income Country's infrastructure targets, infrastructure development acceleration emphasizes four main priorities: (1) Strengthening National Connectivity to achieve Development Balance (RPJMN) 2015-2019 2) Development of Urban Mass Transportation, (3) Infrastructure / Basic Infrastructure Development, and (4) Effectiveness Improvement, and Financing Efficiency in Infrastructure Provision.



Source : Bappenas, 2015

**Figure 3** Infrastructure Invest and Economic Development (1997-2013)

## V. Conclusion

Infrastructure development is prioritized on ensuring basic infrastructure availability to support welfare improvement. It also endeavor insuring expeditious distribution of goods, services, and information to enhance national products competitiveness. The objective of infrastructure development is developing national infrastructure possessing capacity and support for economic growth and social justice. It is conducted by encouraging community participation. During the three years of RPJMN 2010-2014 implementation, the budget allocation for infrastructure to GDP continues to increase from 3.4 percent in 2010 to 4.1 percent in 2012. Thus it is expected to achieve at least 5 percent of GDP. The increase is a strong effort from the government to continue encouraging businesses in Indonesia to remain enthusiastic with the economic growth rate between 6.3-6.8 percent, as targeted by RPJMN 2010-2014, in the midst of a world economy that tends to no change. From 2016 until 2019 the index infrastructure competitiveness has increased index value up to 4.6 in 2019. Indonesia's infrastructure competitiveness will increase parallel with index value.

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