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The Economic Impact Analysis of Infrastructure Development in East Java: Do Roads Drive Growth?

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ABSTRACT

Infrastructure development is considered as a locomotive that accelerates the pace of the economy in a region. The success of the development process is generally measured by economic growth. This study aims to analyze the effect of road infrastructure development on the economic growth of districts/cities in East Java and identify differences in the economic growth of East Java districts/cities before and after road infrastructure development. To answer the first research objective, panel data regression was used in 38 districts/cities in East Java with the dependent variable being economic growth, and the independent variable measuring the availability of infrastructure. Furthermore, to answer the second research objective, paired t-test was used. Road infrastructure, as well as government spending on public services and capital were found affecting economic growth at a decreasing rate. Tax revenue found to boost economic growth, implying that tax still one of the main instrument driving growths. Lastly, during the development of infrastructure, no significant difference has been found in economic growth. Indicates that the development effect on growth is a long-term effect. The results contribute to the discussion regarding the determinants of regional economic growth and how development can affect the economic growth of one or more regions.

Keywords: Development, East Java, Economic Growth, Economic Impact Analysis, Infrastructure.

INTRODUCTION

Development is one of the main functions that must be carried out by the government as one of the policy makers. In the concept of development, it contains the process of allocating resources (resources), regulation, and community empowerment. Resources allocated in the development process are publicly owned resources, such as natural resources, energy resources, financial resources, and human resources (Feldman et al, 2016). In this perspective, ideally development can expand public access to obtain the resources needed to achieve community welfare, facilitate public access to obtain and enjoy various basic service facilities (education, health, clean water, electricity, security, and so on) (Kodongo & Ojah, 2016), as well as ensuring the availability of infrastructure and the continuity of these resources for the survival of the community. The success of development is often measured by economic growth.

Infrastructure is the driving force behind economic growth (Apurv & Uzma, 2020; Owusu-Manu, Jehuri, Edwards, Boateng, & Asumadu, 2019). Sari (2020) underlined a positive effect of physical infrastructure development on economic growth. One of the most important infrastructures is road infrastructure that allows people, goods and services to be transported from one place to another, supporting the production process and distribution of economic commodities (Ng, Law, Jakarni, & Kulanthayan, 2019). Inadequate infrastructure is one of the key obstacles to faster economic growth (An, King, & Hwang, 2019; Timilsina, Hochman, & Song, 2020). Research by Kodongo and Ojah (2016) proves that infrastructure has a better impact on economic growth in developing countries than in more developed countries.

When viewed from the allocation of public and private financing, infrastructure is often likened to the locomotive of national and regional development. In a macroeconomic perspective, the availability of infrastructure services affects the marginal productivity of private capital, while in a microeconomic context, the availability of infrastructure services affects the reduction of production costs (Nakahigashi & Yoshino, 2016). Infrastructure also has an important meaning for increasing consumption value, labor productivity, and access to job opportunities (Komatsuzaki, 2016). Kuznet stated that infrastructure development is the government's obligation as a public servant, which is something that should be the government's obligation because public infrastructure supports the economic activities of a country (Zulfa, 2016). In addition, the adequacy of infrastructure also greatly determines the level of efficiency and effectiveness of economic activities (Matas, Raymond, & Ruiz, 2018). For example, infrastructure in the form of roads and transportation increases the access of rural areas to cities, and the effect of urban agglomeration causes the smooth mobilization of productive capital and skilled labor from rural areas to cities over time (Banerjee, Duflo, & Qian, 2020).

East Java Province is the second largest province in terms of population and has a higher average economic growth than the national average. According to BPS data (2021), the population of East Java in 2020 is 40.665.696 people, growing by about 2.43% compared to the previous year. This number has also increased significantly compared to East Java's population of 35.301.796 in 2001. Furthermore, based on economic growth, East Java recorded an average growth of 4.68%. Although it had contracted in 2020 during the pandemic, East Java's economic growth returned to positive growth in 2021 by 3.57%.

Todaro and Smith (2006) explain that economic growth is a process of increasing production capacity in an economy continuously or continuously over time so as to produce higher levels of national income and output. The success of the inclusiveness of East Java Province is impossible to achieve if it is not supported by adequate

infrastructure. The National Medium-Term Development Plan (RPJMN) in which infrastructure development is one of the seven national development agendas. Infrastructure development is carried out continuously to connect the production area with the distribution area, facilitate access and mobility between sectors, increase job opportunities, and accelerate the increase in economic value added from the regional level. Among national priority infrastructure, the development of economic infrastructure such as new roads, toll roads, trans-island roads is the main agenda aimed at increasing connectivity and facilitating economic activity (RPJMN, 2019-2024). In line with the national development agenda in the RPJMN, infrastructure development is also part of the East Java Provincial Medium-Term Development Plan (RPJMD) 2019-2024.

According to the East Java Bappeda (2019), the development of physical infrastructure (physical development) is an important part in efforts to distribute welfare, reduce inequality, increase connectivity, facilitate logistics distribution, achieve food security, and encourage economic growth and sustainable development. The infrastructure development agenda in East Java is supported by budget resources of 8.9 trillion in 2021. Among the infrastructure development projects on the agenda, including the construction of the Kertosono-Kediri, Kediri-Tulungagung Toll Roads, then Probowangi Toll Roads, Ngawi-Bojonegoro Toll Roads -Tuban-Lamongan-Gresik, and the Malang-Kepanjen Toll Road. This infrastructure will connect the northern, central and southern routes to the eastern end of Banyuwangi. This development is included in the National Strategic Project regulated in Presidential Regulation Number 109 of 2020 (Coordinating Ministry of Maritime Affairs and Investment, 2021).

Based on the Decree of the Governor of East Java dated February 12, 2016 Number 188/128/KPTS/013/2016 concerning the Determination of Road Sections according to their Status as Provincial Roads, the length of provincial roads in East Java is 1,421 km. Based on the graph above, the percentage of provincial roads in good/steady condition in East Java has increased, although it had decreased in 2014 and 2016. In 2017, 90.31% of provincial roads already met the criteria for steady roads, an increase from the percentage of fulfilling road criteria. steady in 2012 by 85.73%. Based on the description of the achievements of East Java's economic growth and infrastructure development above, this study will analyze the economic impact of road infrastructure development in districts/cities in East Java Province.

LITERATURE REVIEW

Basically, there is no single theory that is able to comprehensively explain regional economic development. However, there are several theories that can help in understanding the importance of regional development for the economic growth of a region.

Neo Classical Territory Growth Theory

In the neoclassical approach, which was first proposed by Robert Solow and Trevor Swan, economic growth is seen as the result of the addition and development of factors that affect aggregate supply. This theory also emphasizes that the development of production factors and technological progress are the keys to economic growth (Sukirno, 2005).

Regions that have developed capital accumulation are faster than other regions which sooner or later will experience a decline in taking up capital accumulation. Investment in underdeveloped areas will become more attractive and productive for labor migration between regions, capital movements, and technology shifts. Since the convergence condition with stable coverage of countries has been achieved, regional disparities are

expected to decrease over time although it cannot be completely eliminated. Neoclassical growth theory does not explain the role of urban structure.

Neoclassical theory divides three types of inputs that influence economic growth, namely the influence of capital in economic growth, the influence of technology on economic growth, and the influence of the labor force on economic growth. The role of neoclassical economic theory is not too deep in analyzing regional (regional) development because this theory does not have a significant spatial dimension. However, this theory provides two main concepts in regional economic development, namely equilibrium and the mobility of production factors. That is, the economic system will reach its natural balance if capital can flow without restriction. Therefore, capital will flow from high-wage areas to low-wage areas.

Growth Center Theory

The growth center theory states that growth centers consist of a collection of industries that will be able to drive a country's economic growth because these industries have strong forward and backward linkages with leading industries. The theory developed by Perroux (1970) also emphasizes that industries will tend to cluster in locations centered in big cities and supported by potential areas. Potential areas are areas that are still lagging behind or are not developing at all but have factors that can cause them to develop quickly if development occurs.

Perroux (1970) in this theory also states that growth does not occur in different areas at the same time. Growth only occurs in a few places called growth centers. Some of the core explanations of this theory are as follows: First, there will be leading industries that will become the main driving industries in regional economic development. The development of leading industries will affect the development of other industries that are closely related to the industry because the linkages in this sector are very strong. Second, industrial concentration in a region will accelerate economic growth, because industrial concentration will create different consumption patterns between regions so that industrial developments in that region will affect the development of other regions. Third, the economy is a combination of a relatively active (superior) industrial system with a relatively passive (not superior) industry, namely industries that depend on leading industries or growth centers. A relatively active area will affect a relatively passive area positively.

As previously developed by Hirschman (1958), the existence of a growth pole will cause a trickling down effect and a polarization of economic growth. Hirschman stated that due to the unequal distribution of resources from one region to another, it will also lead to uneven economic development. So, to be able to develop well, a country needs to choose one or more regional growth centers that have the strongest potential.

If these strong areas have grown, there will be a spread of growth for the weak areas. The spread of this growth can have a positive impact called the trickling down effect, namely the existence of strong regional growth and absorbing potential labor in weak areas who are still working or perhaps weak areas produce products that complement stronger regional products. Meanwhile, the negative impact in the form of a polarization effect occurs when production activities in strong areas compete with products in weak areas, which actually results in competition so that better regulation is needed.

Central Place Theory

Central place theory assumes that there is a hierarchy of places. Each central site is supported by a number of smaller sites that provide resources (industry and raw materials). The central place is a settlement that provides services to local residents who

support it. This central place theory can be applied to regional economic development, both in urban and rural areas. For example, the need to differentiate functions between neighboring (bordering) areas. Some areas can be service provider areas while others are only residential areas. A regional economic development expert can help communities to develop their functional role in the regional economic system.

Central place theory is very relevant to be used in regional planning, this is because the central place theory explains three basic concepts that are very important in developing the region, namely threshold, range and hierarchy. These three concepts can be used to explain dependency relationships between concentration centers and the surrounding areas (Adisasmita, 2005).

RESEARCH METHOD

This study uses a quantitative research approach. Quantitative research presents specific procedures, complete literature and clearly formulated hypotheses. Based on the explanation of the problem and the previous theory, the researcher used a quantitative research approach. The data used in this study is secondary data sourced from the Central Statistics Agency of East Java Province. The variables used include economic growth and variables that are proxies for infrastructure development, including steady road conditions, public service ratios, tax contributions, and capital expenditure ratios. To achieve the first research objective, namely the effect of road infrastructure development on the economic growth of districts/cities in East Java, this study uses panel data regression analysis. To achieve the second research objective, namely to identify differences in the economic growth of districts/cities in East Java before and after infrastructure development, Paired t-test was used.

RESULTS

Based on the results of panel data analysis conducted in 38 districts/cities in East Java, the following estimates are generated:

Table 1. Panel Data Regression Results

Independent variables	β	Std Error	z	Prob z	95% C.I. for Exp (β)	
					Lower	Upper
Steady condition road	-0,029	0,026	-1,13	0,259	-0,081	0,022
Public service ratio	-0,218	0,070	-3,08	0,002	-0,357	-0,079
Tax Contribution	2,687	1,760	1,53	0,127	-0,762	6,136
Capital expenditure ratio	-22,439	3,669	-6,12	0,000	-29,631	-15,247
Contrast	15,307	3,512	4,36	0,000	8,422	22,191
Wald chi2 (4)	42,05					
Prob > chi2	0,0000					
Number of observations	114					
note: significance level ***1%, **5%, *10%						

Source: Processed Data, 2022

Based on the results of data processing, it is found that road infrastructure development can increase economic growth at a decreasing rate. The explanation for this finding relates to the Solow growth model. This growth model explains long-term economic growth which has three main factors, namely capital accumulation, labor growth, and multifactor productivity. When developing countries (such as Indonesia) accumulate

capital, their per capita output and standard of living will catch up to those that were initially more developed with smaller increases in economic growth, or what is often referred to as the steady state. In a broader perspective, road infrastructure supports the development of transportation networks so as to encourage economic growth. In many empirical studies, the contribution of transportation infrastructure to economic growth and the causal relationship between them have been widely observed. Transport infrastructure that is reflected in public policies is often aimed at reducing disparities and inequalities, as well as increasing economic growth (Brocker & Rietfeld, 2009). Economically, infrastructure development requires not small costs, requires a fairly large proportion of public spending, but as part of public capital, infrastructure is the most powerful instrument in inducing the world economy, so it is often likened to the "wheel" of the economy (Cigu, Agheorghiesei, Gavriluță, & Toader, 2019).

On the other hand, infrastructure such as roads and transportation systems can be considered as productive public expenditures (Barro, 1990; Munnel, 1990) because the economy can get moving faster by facilitating access to markets and public services, mobilizing products and labor more efficiently. good, thereby increasing welfare and reducing income inequality, as well as saving transaction costs in business. Road infrastructure is considered important to contribute to economic growth both directly and indirectly (Arvin, Pradhan, & Norman, 2015; Beyzatlar, Karacal, & Yetkiner, 2014; Pradhan & Bagchi, 2013). From an economic perspective with good infrastructure conditions (Mohmand et al, 2016), infrastructure can support industries that supply goods and services, thereby attracting direct investment. The theory in Arvin, Pradhan, and Norman (2015) suggests three ways because the choice of infrastructure is important for economic growth: (i) Increase the productivity of the production unit as a whole (Bougheas, Demetriades, & Mamuneas, 2000; Lakshmanan, 2007); (ii) disseminating technology spillovers more broadly; and (iii) increase the profitability of businesses, both by increasing their sales and by reducing their transaction costs from upstream to downstream.

Several previous research findings have supported the above arguments, such as Nawir, Bakri, and Syarif (2022), Vlahinić Lenz (2018), or even before that Agénor & Moreno-Dodson (2006) and Aschauer (1989). Aschauer (1989) states that public infrastructure is the basis that determines the quality of human life. The explanation is that good roads improve public safety and reduce accidents. Agenor and Moreno-Dodson (2006) investigated the relationship between the presence of infrastructure, health and education in the community, and the results showed that infrastructure services are very important for human capital because they contribute to the quality and accessibility of health and education, which ultimately aims at people's welfare. On the other hand, in some cases the impact on economic growth was not found. For example, the results of Banerjee, Duflo, and Qian (2020) show that proximity to transportation networks does have a positive causal effect on GDP per capita levels across sectors, but in the case of China it has no effect on growth. This contradicts the view (Huang, 2008) that infrastructure may have brought considerable benefits to the economy as a whole, but the localization of advantages is limited by the lack of factor mobility. The lack of mobility factors means that development gains are concentrated in relatively better-connected areas compared to relatively isolated areas.

Government spending on public services and capital were found to have same effect to growth as road infrastructure. When the capital per worker ratio is high, investment to increase capital per worker has a relatively small effect. That is what happened in developed countries, or emerging countries heading for developed countries. Because we are included the year of 2020 into the analysis, other judgement that can be stated to this finding is because in 2020, there was refocusing activities and budget reallocation

that was directed to support the President's policy in handling Covid-19 outbreaks, apart from other spending like infrastructure.

The third finding is that tax was found to positively affect economic growth. As the biggest share of government revenue, tax seems to be one of the main economic growth drivers in East Java. This finding is in line with many other researches (Ayoub & Mukherjee, 2019; Edewusi & Ajayi, 2019; Kareem, Arije, & Avovome, 2020; Nwanakwere, 2019; Tanchev, 2021).

Table 2. Paired t-Test Results

Variables	Obs	Mean	Std Error	Std Dev	95% C.I. for Exp (β)	
					Lower	Upper
Growth~e	38	5.328	0.095	0.590	5.134	5.552
Growth~r	38	5.091	0.210	1.298	4.664	5.518
Diff	38	0.236	0.147	0.910	-0.062	0.536
Pr (|T|>|t|)	0.1173					

Source: Processed Data, 2022

The last finding from the second research objective is district/city economic growth was found not to differ significantly since infrastructure development. This finding still confirms the Solow growth model which shows the importance of physical capital investment for a country's economic growth from a long-term perspective. Economic growth will increase greatly when the country begins to accumulate capital. Thus, growth will itself slow down as the accumulation process continues. Thus, capital accumulation will have a greater impact when the capital per worker ratio is lower, such as in developing countries and leads to a more even economic or economic convergence. Increasingly connected connectivity due to infrastructure development will not only make a country's economy more efficient and competitive, not only to be enjoyed in the present, but also to be felt in the long term. Therefore, there needs to be sustainable development, especially in the availability of infrastructure.

CONCLUSION

Several conclusions that can be driven from this paper including road infrastructure, as well as government spending on public services and capital were found affecting economic growth at a decreasing rate. Next, tax revenue found to boost economic growth, implying that tax still one of the main instrument driving growths. Lastly, during the development of infrastructure, no significant difference has been found in economic growth. Indicates that the development effect on growth is a long-term effect. However, road infrastructure development is the main trigger for the growth of new jobs and has an impact on various sources of community income. Infrastructure development also often has a greater social impact in shaping interregional connectivity than the direct economic impact.

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