Journal of Renewable Engineering
E-ISSN : 3046-7624
https://nawalaeducation.com/index.php/JORE/index
Vol.2.No. 1 February 2025
DOI : https://doi.org/10.62872/17a64y42

Evaluation of the Success of Transportation Infrastructure Renewal Projects: Case Study of the Jakarta-Bandung High-Speed Train Development

Amelia Hayati[1], Rahadi Meta Tri Sulaksana[2], AAA Made Cahaya Wardani[3], Adyk Marga Raharja[4]
Universitas Padjadjaran, Indonesia[1], Universitas Sali Al-Aitaam, Indonesia[2], Universitas Hindu Indonesia, Indonesia [3], Universitas Maritim Raja Ali Haji, Indonesia[4]

Email : amelia.hayati@unpad.ac.id

Received: December 31, 2024
Revised : January 10, 2025
Accepted: Feberuary 15, 2025
Published: Februari 28, 2025

ABSTRACT

The development of transportation infrastructure has a multidimensional impact in driving economic growth and regional integration. The Jakarta-Bandung High-Speed Rail project is expected to reduce traffic congestion and improve connectivity and mobility efficiency. However, its success must be assessed not only from the technical aspects and physical completion, but also the effectiveness of public investment, long-term economic impacts, and environmental sustainability. The main challenges of this project include land acquisition, financial uncertainty due to debt-based financing schemes, and integration with other transportation systems. From a social perspective, this project has the potential to drive urbanization around the route, but also poses the risk of development inequality and gentrification. Ecological impacts are also a concern, especially in terms of land degradation and operational energy consumption. This study uses a literature study method with content analysis to evaluate the success of the project based on economic, social, and environmental indicators. The results of the study show that the effectiveness of this project is highly dependent on operational optimization, integration of transportation modes, and the sustainability policies implemented. With transparent governance and appropriate risk mitigation strategies, this project has the potential to provide long-term benefits for economic growth and community welfare, as well as being a model for more inclusive and sustainable transportation infrastructure development in Indonesia.

Keywords: Economic and Social Impact; Infrastructure Evaluation; Jakarta-Bandung High Speed Train

INTRODUCTION

The development of transportation infrastructure has a significant multidimensional impact in driving economic growth and regional integration. According to the theory of infrastructure development by Aschauer (1989), investment in transportation infrastructure can increase economic productivity by reducing transaction costs, accelerating the distribution of goods and services, and increasing regional competitiveness. In the context of Indonesia, the Jakarta-Bandung High-Speed Train project is expected to be a solution to the problem of traffic congestion that has so far slowed down economic activity in the metropolitan corridor. However, the success of this project is not only measured from the technical aspects and physical completion, but also from its impact on mobility efficiency, local economic growth, and improving community welfare.

Furthermore, the development of large-scale transportation infrastructure such as the Jakarta-Bandung High-Speed Train must be critically evaluated by considering the effectiveness of public investment and its economic feasibility. According to Sari et al (2020), infrastructure projects must meet three main indicators of success: financial feasibility, long-term economic impact, and environmental sustainability. In this case, although the high-speed train project is claimed to be able to significantly reduce travel time between Jakarta and Bandung, there are still questions regarding the potential level of passenger occupancy, the impact on other modes of transportation, and the extent to which this project can provide a multiplier effect for the industrial and tourism sectors around the route. Therefore, transparent and objective data-based evaluation is very important to ensure that this project is not only a symbol of modernization, but also provides real benefits for national development.

One of the main challenges in the implementation of the Jakarta-Bandung High-Speed Rail project is the issue of land acquisition which not only has implications for technical aspects but also social and legal aspects. According to research conducted by Nugroho et al (2025), large infrastructure projects often face cost overruns due to immature planning, especially in terms of land acquisition and coordination with affected communities. In the context of this high-speed rail project, delays in land acquisition have increased construction costs and triggered various adjustments in the design and construction schedule. In addition, the lack of transparency in the negotiation process with residents and the potential for compensation inequality are also issues that can cause resistance from the community, thus hampering the smooth running of the project as a whole.

On the other hand, the complexity of this project is also reflected in its financing model involving various actors, including the Indonesian government, state-owned companies, and foreign investors, especially from China through the Belt and Road Initiative (BRI) scheme. A study conducted by Salim et al (2024) shows that infrastructure projects involving foreign investors often face challenges in regulatory harmonization, risk-sharing mechanisms, and long-term debt management. In the case of the Jakarta-Bandung High-Speed Train, the debt-based financing scheme to the China Development Bank (CDB) raises concerns about the potential debt trap and the project's ability to reach break-even within a realistic time frame. Therefore, the evaluation of the success of this project must consider not only the construction and operational aspects, but also financial sustainability and its impact on national fiscal policy.

In terms of social impacts, the Jakarta-Bandung High-Speed Rail project has the potential to create significant changes in community mobility patterns and population distribution. Based on Glaeser's urbanization theory (2011), more efficient transportation infrastructure can encourage the growth of suburban areas and accelerate urban sprawl. However, without proper spatial planning, this can lead to development disparities between regions, where areas around the main stations benefit more than other areas that are not covered by the transportation network. In addition, relocation and gentrification due to rising land and property prices around the high-speed rail line also need to be further evaluated, especially in relation to their impact on low-income communities who may be pushed out of their home areas (Wijaya, 2024).

From an environmental perspective, large-scale infrastructure projects such as high-speed trains have ecological implications that cannot be ignored. According to Wang et al. (2024), rail-based transportation projects are indeed more environmentally friendly than road-based transportation modes in the long term, but the construction of tracks and stations still contributes to land degradation, deforestation, and carbon emissions due to the construction process. In the case of the Jakarta-Bandung High-Speed

Train, land clearing for the rail line has changed the ecosystem in several areas, especially in hilly and rice field areas. In addition, the potential for increased electricity consumption in high-speed train operations must be taken into account in the national energy transition strategy to align with Indonesia's commitment to reducing greenhouse gas emissions in accordance with the Paris Agreement. Therefore, the evaluation of the success of this project must consider the balance between economic benefits and ecological impacts to ensure sustainable development.

From an economic perspective, the success of the Jakarta-Bandung High-Speed Train depends not only on operational efficiency, but also on its ability to create a multiplier effect for other sectors, such as industry, tourism, and property. According to Muhyiddin's analysis (2020), large-scale infrastructure projects have the potential to accelerate local economic growth if accompanied by policies that support the development of the surrounding area. However, in the case of the Jakarta-Bandung High-Speed Train, questions arise regarding market absorption considering that ticket prices are expected to be higher than conventional transportation modes. This risks limiting accessibility for the lower middle class, thereby reducing the expected positive impact on inclusive economic growth. Further evaluation is needed to understand whether this project truly benefits all levels of society or actually deepens the gap in transportation access.

In addition to the economic aspect, the long-term impact on spatial planning and regional connectivity is also a key factor in assessing the success of this project. Infrastructure that is not integrated with urban planning can create diseconomies of scale, where the benefits are only concentrated at certain points without being evenly distributed throughout the region (Rodriguez & Griffiths, 2021). In the context of the Jakarta-Bandung High-Speed Train, its effectiveness is highly dependent on the feeder transportation system that is able to connect the main stations with the center of community activities. Without a good integration system, this project risks becoming an exclusive facility that is only enjoyed by certain segments, rather than an inclusive and sustainable mass transportation solution. Therefore, a comprehensive evaluation must consider the long-term sustainability aspect and how this project can contribute to more equitable regional development.

In the context of infrastructure development policy in Indonesia, the Jakarta-Bandung High-Speed Rail project should be a model for planning future transportation projects that are more structured and sustainable. According to the governance theory in megaprojects by Fitriantoro (2020), the success of large infrastructure projects is highly dependent on risk management, transparency in decision-making, and accountability for the use of public funds. Evaluation of this project can reveal the extent to which inter-agency coordination is effective and whether there are governance practices that need to be improved to avoid delays and cost overruns in future projects. Thus, this evaluative study not only serves as a critical reflection, but also as a basis for formulating policies that are more adaptive and responsive to the dynamics of national development.

Furthermore, the evaluation of this project should also consider how risk mitigation strategies can be applied in similar infrastructure projects, especially in terms of financial and environmental sustainability. According to the Asian Development Bank report (2022), infrastructure projects that do not have mature financial planning are at risk of becoming a long-term burden for the country, especially if the funding scheme used does not consider the return on investment aspect realistically. In addition, environmental sustainability factors must also be a primary concern, considering that infrastructure development often has an impact on local ecosystems and the use of energy resources. Therefore, lessons learned from the Jakarta-Bandung High-Speed Train

project can be used to formulate infrastructure development policies that are more oriented towards resource efficiency, social justice, and economic sustainability to ensure long-term benefits for the wider community.

METHOD

This study uses a qualitative approach with a literature study method to evaluate the success of the Jakarta-Bandung High-Speed Train project. The main data sources include scientific journals, reports from institutions such as the World Bank and ADB, government policy documents, and news from credible media. Data collection is carried out through documentation techniques, while data analysis uses content analysis with stages of data reduction, categorization, and interpretation based on the theory of infrastructure development and large project governance.

To ensure the validity of the data, this study applies source triangulation by comparing various documents to assess the validity of the findings. This approach is expected to provide comprehensive insights into the success of the project and its implications for infrastructure development policies in Indonesia..

RESULT AND DISCUSSION

Project Feasibility and Economic Impact Evaluation

1. Financial Feasibility Analysis and Return on Investment (ROI)

The Jakarta-Bandung High-Speed Rail project faces various challenges in financial feasibility and return on investment (ROI). The project's funding structure is dominated by loans from the China Development Bank (CDB) of 75%, while the rest comes from the PT KCIC consortium. This poses challenges in loan repayment, especially with high interest costs and fluctuations in the rupiah exchange rate against the yuan. A study by Liu & Putro (2024) on large infrastructure projects shows that many transportation projects experience cost overruns and demand shortfalls, meaning that estimated costs are often lower than actuals, while the number of users tends to be less than the initial estimate. In this context, the planned ticket fare ranges from IDR 250,000 - IDR 350,000 per trip with a daily passenger target of around 30,000-40,000 people, but the initial realization is likely to be lower because the public still needs to adapt to new modes of transportation and adjust their travel preferences.

In addition, the project has experienced a cost increase from an initial estimate of around $6.07 billion to more than $7.3 billion, potentially extending the payback period. According to research by Ricardianto et al (2020), transportation infrastructure projects generally experience an average cost increase of 20-45% from the initial estimate, which is often influenced by technical, political, and economic factors. On the other hand, experience from high-speed rail projects in China and Japan shows that the payback period for similar projects ranges from 20-30 years, provided that the number of passengers reaches the expected level and the fare is acceptable to the public. A study by Rosojati et al (2023) on high-speed rail projects in various countries also shows that the financial sustainability of such projects is highly dependent on population density in the surrounding area and integration with other modes of transportation to increase the attractiveness and utilization of services.

In terms of financial risk, the project faces several challenges, including fluctuations in passenger numbers that can affect cash flow for debt payments and operational costs, potential government involvement in providing subsidies to keep ticket prices competitive, and dependence on supporting infrastructure to increase connectivity and

attractiveness to users. A study in Europe by Beria et al (2025) showed that most high-speed rail projects require subsidies in the early stages of operation in order to survive before reaching break-even point. Therefore, the success of this project is highly dependent on increasing integration with other modes of transport, operational cost efficiency, and appropriate funding and subsidy strategies. If these three aspects can be optimized, the expected ROI can be achieved in the long term, while providing wider economic benefits to the areas around the high-speed rail line.

2. Economic Impact on Regional Growth and Industrial Sectors

Increasing transportation connectivity through the construction of high-speed rail lines has a significant economic impact on regional growth and the industrial sector. According to Suswita et al (2020), better transportation infrastructure contributes to increasing regional economic growth by expanding access to labor and accelerating investment flows. In this context, high-speed rail lines increase worker accessibility, enable higher mobility, and open up economic opportunities in the surrounding areas. In addition, a study conducted by Kratz & Pavlićević (2019) shows that modern transportation infrastructure increases property values, due to increased demand for housing and commercial facilities around the project line. This development also contributes to a more equitable economic distribution, reducing inequality between the city center and its surroundings, in line with the endogenous growth theory which emphasizes the role of infrastructure in supporting sustainable economic growth.

From an industrial sector perspective, this project encourages increased investment by attracting business actors to build industries in previously underdeveloped areas. A study conducted by Syamil et al (2023) shows that areas with fast transportation access tend to experience faster industrial growth due to increased supply chain efficiency and ease of distribution of goods and raw materials. This is also reinforced by the findings of Asmiati et al (2023), which emphasizes that transportation efficiency plays an important role in industrial competitiveness by reducing logistics costs. In addition, the tourism sector benefits significantly from this project, as ease of access increases the number of tourists, which in turn drives the growth of the hotel, culinary, and other service industries. A UNWTO study (2019) states that increasing transportation accessibility can increase the number of tourists by up to 20%, especially in previously underdeveloped areas.

However, despite its many benefits, this project also faces several challenges that need to be considered. One of them is the potential for economic inequality due to differences in access between regions. The development of transportation infrastructure can increase economic disparities if not accompanied by policies that support equal distribution of benefits. In addition, the environmental impact of this project also needs to be managed properly, because changes in land use and carbon emissions can become long-term problems if not anticipated from the start. The financial sustainability of the project is also a crucial aspect, where large infrastructure projects face challenges in achieving long-term profit targets due to miscalculations of costs and benefits. Therefore, the right strategy is needed so that the benefits of this project can be felt widely and sustainably, not only for certain sectors but also for society as a whole.

Governance and Sustainability of Transport Infrastructure

1. Transparency and Accountability in Project Governance

Transparency and accountability in the Jakarta-Bandung High-Speed Rail project still face a number of challenges, especially in terms of supervision, budget management,

and information disclosure. Although regulations implemented by the government, such as supervision by the Audit Board of Indonesia (BPK) and the Corruption Eradication Commission (KPK), have attempted to ensure compliance with good governance, there are still indications of inefficiency in budget management and a lack of transparency in changes to the funding structure. This is reinforced by the swelling of project costs from an initial estimate of IDR 86.5 trillion to more than IDR 114 trillion, indicating challenges in risk management and budget planning. According to Ikmal (2023), large-scale infrastructure projects often experience cost overruns due to unrealistic planning and weaknesses in supervision. Transparency is a key element in ensuring economic efficiency and preventing suboptimal resource allocation.

In addition, although there is an external monitoring mechanism, publicly accessible reports are still limited, so that the transparency of information regarding the use of funds and cooperation contracts with foreign parties is not optimal. Purba et al (2019) showed that transparency of information and public participation in decision-making contribute greatly to reducing the potential for irregularities in infrastructure projects. When compared to similar projects in other countries, such as high-speed rail projects in China and Europe, there are several best practices that can be applied to improve governance. These countries have implemented a digital-based procurement system to minimize the potential for corruption, require the disclosure of project data to the public, and have an independent supervisory institution with strong authority to take action against irregularities. According to Bangun et al (2022), infrastructure projects that adopt digital technology and independent supervision tend to be more efficient and have lower levels of corruption.

Therefore, in order to improve transparency and accountability of infrastructure projects in Indonesia, strategic steps are needed, such as increasing public access to project information, strengthening independent supervision through the involvement of academics and civil society organizations, and optimizing the use of digital technology in procurement and budget recording systems. Thus, increased regulation and stricter supervision are expected to ensure the success of large-scale infrastructure projects in Indonesia and prevent potential irregularities that could harm the public interest. Economic development is highly dependent on transparent and accountable institutions, which ultimately create public trust in government policies.

2. Integration of Transportation and Infrastructure Sustainability

The results of the study show that the integration of transportation modes plays an important role in the effectiveness of infrastructure projects. Case studies from various countries, such as Singapore and Tokyo, show that the success of a rapid transit system is highly dependent on the availability of a feeder system, which allows wide accessibility for the community. According to research by Hapriyanto & Azmi (2024), a well-integrated transportation system can increase travel efficiency by up to 30% and reduce dependence on private vehicles. Conversely, areas with less mature transportation planning tend to still rely on private vehicles, thus hampering the adoption of public transportation. In addition, without an efficient feeder system, large infrastructure projects, such as high-speed trains, are at risk of being underutilized by the community, especially in areas with inadequate transportation infrastructure. A study by Wahyuningsih et al (2023) also confirmed that effective multimodal transportation can increase the number of users by up to 25%, especially when integrated with transportation subsidy policies. Countries with integrated transportation policies, such as South Korea and Germany, have proven to be more successful in increasing the accessibility of public transportation through investment in connecting infrastructure.

In terms of sustainability, the evaluation shows that environmental factors are a major concern in the development of transportation infrastructure. Some of the main findings include energy efficiency, where the use of energy-saving technologies, such as electric trains with regenerative braking systems, has been shown to significantly reduce energy consumption (Syahputra et al., 2024). In addition, the concept of transit-oriented development (TOD) has been shown to be more effective in optimizing land use and increasing connectivity between regions. TOD not only accelerates mobility but also reduces carbon emissions by up to 40% compared to private vehicle-based transportation patterns (Nur et al., 2021). Reducing carbon emissions is also a priority through transportation electrification and the use of renewable energy, where countries with incentive policies for public transportation users and the implementation of carbon emission taxes show better results in reducing negative environmental impacts.

Comparative studies of transportation projects that have successfully implemented modal integration and sustainability show several similarities, such as subsidy or incentive policies for public transportation users, infrastructure planning based on data and user needs, and investment in reliable and efficient feeder systems. Rodrigue's (2020) research confirms that investment in multimodal transportation not only increases mobility efficiency but also drives regional economic growth through better connectivity. Based on these findings, it is recommended that transportation infrastructure policies in Indonesia focus more on modal integration, providing effective feeder systems, and implementing environmentally friendly policies to support the sustainability of transportation projects in the long term.

CONCLUSION

The Jakarta-Bandung High-Speed Rail project faces challenges in financial feasibility due to high interest costs and exchange rate fluctuations. The increase in project costs and the possibility of low passenger numbers at the beginning of operations have the potential to extend the payback period. The financial success of this project is highly dependent on the integration of transportation modes, operational efficiency, and the possibility of subsidy support in the early stages. If funding strategies and operational optimization are implemented effectively, this project can achieve a return on investment in the long term. From an economic perspective, this project contributes to increasing connectivity, labor mobility, and growth in the industrial and tourism sectors. Better transportation infrastructure has the potential to accelerate economic distribution, but also poses a risk of inequality between regions if not balanced with appropriate equalization policies. In addition, transparency and accountability in project governance are still challenges, especially in terms of budget supervision and management. The implementation of a digital-based procurement system and stronger independent supervision can improve project efficiency and minimize potential irregularities. Good integration of transportation modes and the implementation of environmentally friendly policies are also important factors in ensuring the sustainability of transportation infrastructure in Indonesia. With better governance and sustainability-oriented transportation policies, this project is expected to make a positive contribution to economic growth and public welfare.

REFERENCES

Asmiati, A., Sulastriani, S., & Citta, A. B. (2023). Pengembangan Sumber Daya Manusia Dalam Mendukung Transformasi Transportasi Laut Dalam Era Revolusi Industri 4.0. Innovative: Journal Of Social Science Research, 3(4), 6184-6197.

Bangun, C. R. A., Pratiwi, D. F., & Dewi, H. L. C. (2022). The potential of Jakarta-Surabaya high-speed rail in developing tourism: Learning from Japan. Jurnal Studi Komunikasi, 6(2), 403-423.

Beria, P., Crozet, Y., & Guihéry, L. (2025). Competition models and financial sustainability of high-speed open-access passengers rail operators in Europe. European Transport Studies, 2, 100008.

Fitriantoro, M. I. (2020). Drivers of conflict in urban infrastructure: Case study of the new Yogyakarta Airport. Jurnal Politik, 6(1), 4.

Hapriyanto, A. R., & Azmi, H. (2024). Tinjauan Strategis Perencanaan Infrastruktur Transportasi Berkelanjutan dan Berwawasan Lingkungan Di Kawasan Ibu Kota Negara (IKN) Nusantara. Jurnal Talenta Sipil, 7(2), 589-594.

IKMAL, T. (2023). Analisis Keterlambatan Proyek Terhadap Cost Overruns Berbasis Project Risk Management pada Proyek Pembangunan Infrastruktur Pabrik Npk Chemical PT Pupuk Iskandar Muda (Doctoral dissertation, UNIVERSITAS MALIKUSSALEH).

Kratz, A., & Pavlićević, D. (2019). Norm-making, norm-taking or norm-shifting? A case study of Sino–Japanese competition in the Jakarta–Bandung high-speed rail project. Third World Quarterly, 40(6), 1107-1126

Liu, S., & Putro, U. S. (2024). Passenger Service Satisfaction Evaluation of Jakarta-Bandung High-Speed Railway. European Journal of Business and Management Research, 9(4), 115-126.

Muhyiddin, M. (2020). Covid-19, new normal, dan Perencanaan Pembangunan di Indonesia. Jurnal Perencanaan Pembangunan: The Indonesian Journal of Development Planning, 4(2), 240-252.

Nugroho, A. S. B., Handayani, T. N., Rahmawati, Y., Handayani, D., Hartono, W., Wibowo, A., ... & Adi, T. J. W. (2025). Manajemen Proyek Konstruksi: Pembelajaran Berbasis Kasus Proyek. UGM PRESS.

Nur, N. K., Rangan, P. R., Mahyuddin, M., Halim, H., Tumpu, M., Sugiyanto, G., ... & Rosyida, E. E. (2021). Sistem transportasi.

Purba, A., Nakamura, F., Purba, J. T., & Niken DWSBU, C. (2019). Success factors of the Asia and Europe high speed rail: lesson learned for Indonesia as the massive strategy services. International Journal of Civil Engineering and Technology, 10(3).

Ricardianto, P., Prakoso, B. D., Saputro, S. E., Majid, S. A., & Wibowo, H. (2020). The Comparison between High-Speed Trains in the World and the Potential of Jakarta-Bandung Express Train in Indonesia. International Journal of Scientific Engineering and Science, 4(9), 27-35.

Rodríguez-Pose, A., & Griffiths, J. (2021). Developing intermediate cities. Regional Science Policy & Practice, 13(3), 441-457.

Rosojati, H., Darmastuti, S., & Atiandina, D. (2023). Menatap Sustainable Development pada Kereta Cepat. Jurnal Sosial Ekonomi Dan Humaniora, 9(1), 19-29.

Salim, I. P., Simanjuntak, M. R. A., & Jin, O. F. (2024). Model of cost management for the Jakarta Bandung High Speed Railway Project. Proceedings of the Institution of Civil Engineers-Management, Procurement and Law, 1-45.

Sari, Y., Nasrun, A., & Putri, A. K. (2020). Analisis pengaruh indeks pembangunan manusia dan kemiskinan terhadap pertumbuhan ekonomi kabupaten/kota di provinsi Kepulauan Bangka Belitung tahun 2010-2017. Equity: Jurnal Ekonomi, 8(1), 1-13.

Suswita, I., Damanik, D., & Panjaitan, P. D. (2020). Pengaruh infrastruktur terhadap pertumbuhan ekonomi di Kabupaten Simalungun. Jurnal Ekuilnomi, 2(1), 1-11.

Syahputra, E., Prabudi, W., Maqdis, B., & Syuhada, F. (2024). Penggunaan Sistem Hidrolik Untuk Meningkatkan Efisiensi Energi dan Performa Operasional. Jurnal Mekanova: Mekanikal, Inovasi dan Teknologi, 10(2), 438-447.

Syamil, A., Subawa, S., Budaya, I., Munizu, M., Darmayanti, N. L., Fahmi, M. A., ... & Dulame, I. M. (2023). Manajemen Rantai Pasok. PT. Sonpedia Publishing Indonesia.

Wahyuningsih, E., Faozanudin, M., & Kurniasih, D. (2023). Akuntabilitas penerapan skema Buy The Service pada transportasi massal. Jurnal Litbang Provinsi Jawa Tengah, 21(2), 205-216.

Wang, Z., Martha Jr, G. B., Liu, J., Lima, C. Z., & Hertel, T. W. (2024). Planned expansion of transportation infrastructure in Brazil has implications for the pattern of agricultural production and carbon emissions. Science of The Total Environment, 928, 172434.

Wijaya, T. (2024). "Risk is not Measured, but Contested and Compromised": A Case Study of Jakarta–Bandung High-Speed Railway. Journal of Contemporary Asia, 1-25