

High-Speed Rail Transit Development in Indonesia, Lesson Learned from Developing Countries

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Abstract

The plan by Indonesian government to build a HSR has previously existed for years. The Japanese and Chinese governments have expressed interest in the project, and both have the technical capability to build a railway connecting Jakarta and Bandung. This project was awarded to China because they provided soft loans for the project, while Japan required the Indonesian government to provide all of the funds necessary to complete the entire project. The proposed railway lines construction would reduce travel time between Jakarta and Bandung from approximately three hours to just 45 minutes. The HSR will be integrated with developments along its corridor by transit-oriented developments as part of the project. Because of Jakarta's wide population and the number of pairs of destinations that the HSR would link, the line would draw about 10 million passengers per year in its first year of operating. According to passenger traffic data collected from Europe and Asia, the first HSR line built in Indonesia is expected to attract significant demand.

Keywords

HSR, Indonesia, travel time, ridership, transit oriented development

1. Introductions

Indonesian railways must always be ready to experience changes that are ready to always provide innovations according to the times in order to provide quality and adequate service (Purba, 2015, 2019, Purba, et al. 2020 and Panday & Purba 2015). For land transportation services, the consistency of this service is also (Purba, 2017, 2020) implemented by PT Kereta Api Indonesia (Persero) as a state-owned operator that is responsible for train services, which slowly continues to bear fruit. Railways in the last ten years have undergone transformation and progress (Purba & Purba, 2020). Of course, consistency in innovation is the key of the success of development including in the infrastructures as well services (Purba, Samuel and Purba, 2020, Adirinekso, et al, 2020, Purba, 2019). Good service-oriented and customer-focused by understanding it carefully must be applied by every element of service providers both in the level of management and workers in all organizational divisions (Purba & Purba, 2020, Simbolon, et al 2020, Purba, et al 2018).

To better understand why the authors wrote this paper; take advantage of the country's brief history of railways. A brief history of the railway system in Indonesia shows that the rail transportation system was created in the mid-19th century when Indonesia was still under Dutch colonial rule. The rail system created in 1939 was used in

facilitating the cargo and passenger's movement. Since then, the length of the railway lines on Java Island is 6,324 Km and on Sumatra Island 1,833 Km. Until 2009, the total length of the railway line had dropped dramatically from 6,324 km to 3,464 km in Java and 1,833 km to 1,350 km on the island of Sumatra (Sumadi, 2018). The ultimate cause of this decline is competition between rail and road transportation, which results in more funds being used to construct more roads at the expense of the railways. However, the fact is that the number of buses and private vehicles has increased sharply; causing traffic to become jammed which has resulted in increased fuel waste and public complaints.

An understanding those demands and needs on good service quality basically places innovation as one of the most important qualities and obligations in its service (Purba, 2014, 2015, Purba, et al 2019). Since service has become its focus for the advantage of customers, KAI's company improvement innovations have continued to go hand in hand with the dynamics of service user needs (Purba & Purba, 2020, Purba, 2018). As the result, the railroad transportation mode is increasingly gaining a place in the hearts of the public considering the many community needs for this transportation (Purba, 2019). Thus it will support the expansion of national economic transactions from the sectoral services (Budiono & Purba, 2019, Purba & Budiono 2019, Budiono, et al, 2020). This is proved by the increasing volume of train passengers from year to year. In 2016, KAI carried 352.3 million passengers. In 2017, the number increased by 12% to 394.1 million passengers. The increase in passengers continued in 2018 with a total number of 425 million passengers, an increase of 8%. Until Semester I 2019, there was an increase of 2% compared to the same period in the previous year. In Semester I 2019 PT Kereta Api Indonesia (Persero) served 210.7 million passengers. Meanwhile, in Semester I 2018, KAI served 207 million passengers. The increasing percentage of train passengers from year to year proves the urgency of the community's need for this transportation service, thus the quality of service is absolutely improved because it will gradually affect an increase to the national economy (Purba, 2015, Tan, et al, 2019, Purba, et al. al 2020, Budiono, et al, 2020)

Nevertheless, railway transport system is better when compared with other means of transport because of the following listed reasons. These include higher load carrying capacity, minimum energy usage, space efficiency, less environmental pollution, low carbon emission, higher reliability and safety. Hence, Law No. 23/2007 was approved to make railway transport an important means of transportation within Indonesia. This clearly maps out the development guide for the national railway system. The network development plans include the construction of railway lines using double tracks; creation of a cluster of railway lines to form urban area network linking six major cities, and six major airports

1.1 Objectives

The purpose of this study is to provide sharpening and comparison of the success of HSR development in countries that have been proven successful in implementing High Speed Railway technology as public transportation used by the community (Purba, 2019, 2020). This is an appropriate and accurate lesson to be applied in development trains transportation in this country (Purba, et al. 2019).

2. History and Recent Development

The HSR project was expected to connect Jakarta and Bandung over a distance of about 143 kilometers, making it Indonesia's very first HSR project. As previously stated, both the Japanese and Chinese governments have declared their intentions. While both the Japanese and Chinese governments had previously conducted detailed studies, it was only Japan that went the extra mile and issued a study for a project that would stretch to Surabaya, a distance of around 730 kilometers. Following that, the Chinese government submitted a counter offer in April 2015, much to the dismay of the Japanese. On March 26th, 2015, Joko Widodo paid a state visit to China, where he encountered Chinese President Xi Jinping and had a fruitful meeting. Following the meeting, Chinese President Xi Jinping publicly stated the Chinese government's support for the implementation of Indonesia's high-speed project, which was accompanied by the signing of a memorandum of understanding between the two governments. In July 2015, Indonesia, conducted by President Joko Widodo, announced their intention to begin construction of the HSR, which would connect Jakarta and Bandung. The bidding process was then made public, resulting in a competition between potential bidders, which included both Japanese and Chinese train manufacturers. The contest became interesting as the Chinese train-maker organized a Chinese HSR Technology exhibition in August 2015. This was a excellent move in which neither competitor had seen before, as the Chinese and Japanese have long competed in industry,

often using aggressive lobbying to outdo each other. The primary explanation for the high level of domineering campaign exhibited has been widely acknowledged.

In mid-September 2015, the Chinese government played a new card by submitting a new proposal that proposed to completely meet the Indonesian government's demands while also removing the funding requirement to begin with. After that, there were several months more of bidding and discussions between the two nations. It caused the project to be briefly canceled, but the Indonesian government decided to choose China as the preferred bidder for the US\$5 billion project because of its financial framework, which was difficult to resist given how different it was from what the Japanese project proposed.

China's victory can be attributed to the country's ability to finance the initiative. This would in fact lead to a waiver, which was different from what the Japanese had offered, and the Japanese had also refused to shift their grounds. China had even gone further ahead alleviate its deal by including its commitment to institute a program for the manufacture of light and electric rail system in partnership with local businesses. These products would be targeted at the Indonesian emerging market from small size until big companies will play in this evident (Tan, et al, 2019, Kim et al, 2019). Exported neighboring markets will create seamless high technology transfer system that would lead to growth of local technology for renovating and train stations with Industrial service technology 4.0 based on sophisticated, economical, efficient and good information technology (Purba, Panday, 2015, Purba, Hery, Widjaja, 2020, Simbolon, et al 2020, Purba, et al. 2020).

2.1 Transit Oriented Development

Development of an area or location, among others; road infrastructure, buildings, social facilities and public facilities especially in the surrounding urban areas encourage industrial and trade developments that have an impact on urban economic growth (Pu Hao, Richard Sliuzas, & Geertman, 2010, Budiono & Purba, 2019, 2020, Purba & Budiono, 2019, 2020). So population growth is one of the causes for the increase in the volume of people's trips and of course the economy has also increased due to community economic transactions, either cash or non-cash that taking place (Suk, et al, 2019, Tan, et al, 2019, Budiono & Purba, 2020). Development of the urban traffic system in Indonesia apart from being determined by the movement of city people and goods, it is also influenced by commuters traveling around the city, as well as from surrounding districts within the metropolitan scope (Purba and Tan, 2018).

Transit-oriented development is an area with an integrated layout where you can easily reach various public facilities and social facilities on foot. This concept has several easily identifiable features. Some of the characteristics of TOD include: High population density, many vertical residences that use limited land. There are mixed-use developments where residential areas are adjacent to business and office areas. Other supporting facilities include shopping centers, health facilities, education centers, entertainment area, banking facilities and sports facilities.

Therefore, it looked like Indonesia had benefitted immensely from the Japan-China competition, as the Indonesian HSR bid earmarked continuous competition between Japan and China in their bid for other infrastructure projects with Asia. The HSR system has 71.63 km of the track on the ground level, while 53.54 km of the track will be raised, and the remaining 15.63 km will be below the surface. Following that, on January 21st, 2016, a groundbreaking ceremony was held to begin the construction of the HSR. After its official launch in 2019, the HSR system will be open for public.

3. Methods

Comparative analysis usually serves to test how important the interrelationships are to be implemented. More specifically, comparative analysis enhances people's own understanding by locating familiar structures and routines against other systems (understanding); comparison heightens our consciousness systems, culture, and other patterns of thinking and acting, thus providing a new light (Esser & Vliegenthart, 2017). Authors compare the proposed Jakarta-Bandung HSR corridor with the some of HSR corridors in Asia and Europe regions and to identify key factors that have contributed to its successful. International comparison is especially important in HSR because the

research shows important differences across countries due to topography, demographics, nature of transit demand and government investment schemes (Campos & De Rus, 2009, Albalate & Bel, 2010)

4. Results and Discussion

4.1. Project's Description

The HSR is part of the governments' grand ambition of upgrading Indonesia's lagging infrastructure. If successful executed, the project will drastically reduce travel time to just 45 minutes only. The HSR has four stations as seen in Figure 1.

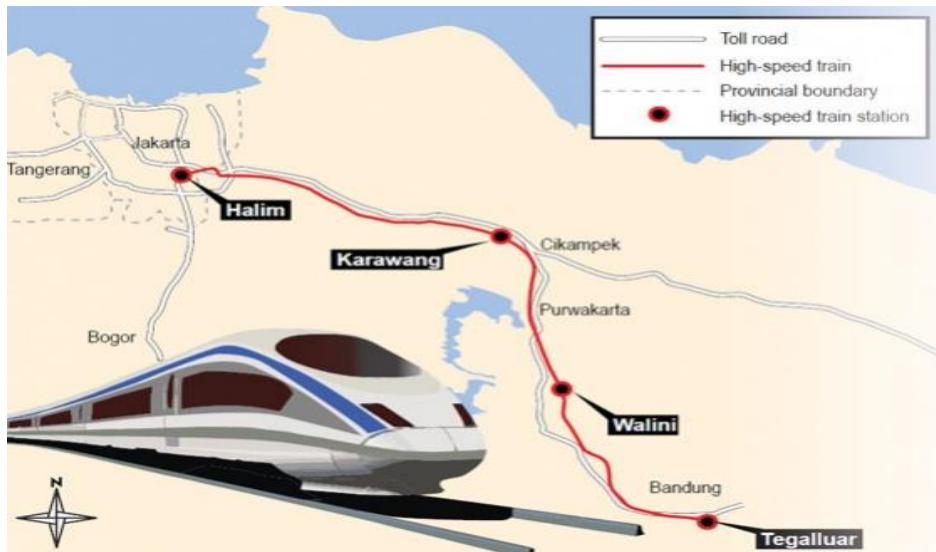


Figure 1. Route of Jakarta to Bandung HSR

The HSR project will be financed exclusively by China. The project will include integration of the HSR stations with developments along its corridor through transit oriented developments (TOD) (A Purba, et al 2018).

Table 1. Brief data of Jakarta to Bandung HSR [9]

Termini	Halim (Jakarta) ~ Tegalluar (Bandung)
Intermediate station	Karawang and Walini (West Java)
Route length	Approximately 143 km
Schedule train frequency	Every 35 min (first year operation)
Job opportunity	39,000 jobs-HSR construction
	20,000 jobs-TOD construction
	28,000-HSR and TOD operation
Payback period of investment	40.2 years-without TOD 23.74 years-with TOD
Ticket price	IDR 225,000 (US\$16)
Speed	Maximum operating speed 350 km/h
Estimated journey time	Between Halim and Tegalluar:45 min
Revenue from ticket sales	US\$ 168 million (2020)
Commencement date	2020
Estimated completion date	2020
Passenger flow volume (2020)	About 29,000 passengers per day

Project costs	US\$ 5.135 billion-without TOD
	US\$ 5.294 billion-with TOD
	FIRR of project investment-before taxes= 4.87%-without TOD
	FIRR of project investment-before taxes= 6.85%-with TOD
	FIRR of project investment-after taxes= 4.05%-without TOD
	FIRR of project investment-after taxes= 5.64%- with TOD
	FIRR of capital-before taxes= 4.72% - without TOD
	FIRR of capital-before taxes= 11.19% - with TOD
	FIRR of capital-after taxes= 3.86% - without TOD
	FIRR of capital-after taxes= 9.29% - with TOD

The ambitious proposal for the national railway network comes amid recent news that the cost of the Jakarta-Bandung HSR has swelled to almost US\$6 billion, from US\$5.2 billion. Rail ridership in Indonesia, on the other hand, has increased significantly in recent years, making decades of underinvestment and increasing urban congestion important concerns for transportation stakeholders as they improve and build new lines. According to Statistics Indonesia (BPS), total rail passengers increased from 199 million in 2011 to 202 million in 2012, 216 million in 2013, 277 million in 2014, and 325 million in 2015. While the country's rail network remains limited to Java and Sumatra, with 22,296 km of total line operational in 2015, the average length of a passenger journey has decreased from 95 km to 68 km. The Infrastructure Development Agenda in the Medium-Term Development Plan 2015-2019 identifies projects such as providing 3,258 km of newly constructed or rehabilitated rail lines, consisting of 2,159 km of intercity railways and 1,099 km of urban railways, and increasing rail freight volumes to 1.5 million twenty-foot equivalent units annually.

Urban rail lines, such as a proposed light rail transit (LRT) system in Jakarta, are expected to help alleviate traffic congestion and transportation costs, which have risen to the highest in South-east Asia. The new line was expected to draw about 10 million passengers in its first year of service, as shown in Figure 2.

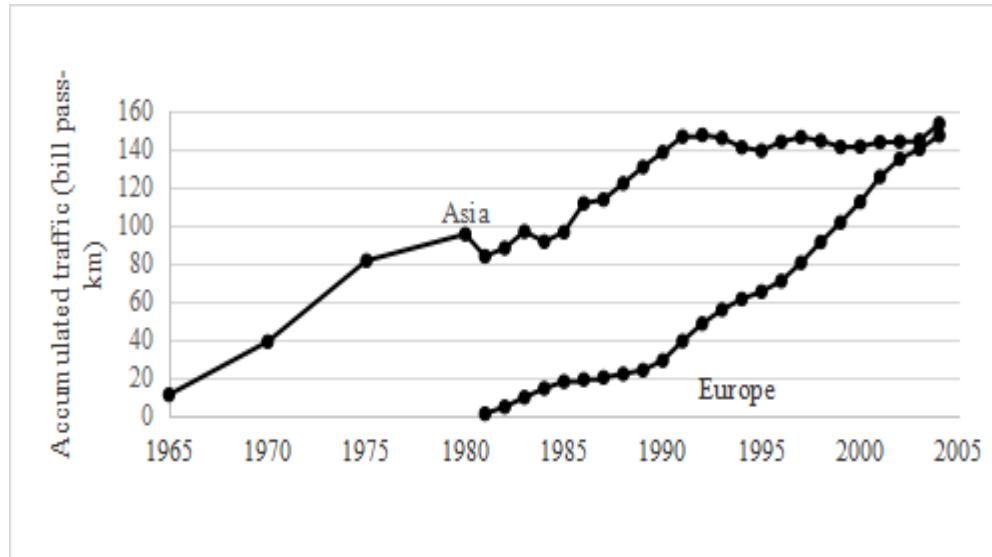


Figure 2. Accumulated HSR traffic [10]

For 20 years, Shinkansen services in Japan enjoyed a sustained traffic; it gained 100 billion passengers-kilometers. From 1994 to 2004, within the next 20-years interval, the demand halved, because only 50 billion additional passengers-kilometers used HSR. When compared with most European HSR projects which are still in their first 20-year period, it is natural to expect high growth rates as expressed by Figure 2. Figure 2 shows accumulated traffic used the HSR services in Asia and Europe based on traffic data from each operator during the 2010 to 2016 period. As confirmed by Figure 3 the only China is still in it incredible constant growth and gained a huge accumulated traffic around 850 billion passenger-km. Two other Asian countries i.e. South Korea and Taiwan started HSR services in first decade of 21 centuries only gained accumulated traffic of 31.4 and 20.2 billion passenger-km

respectively during the same period. Based on long experienced of HSR services in Japan and Europe countries it is easy to predict that most China HSR projects still enjoyed a constant traffic growth for the next two decades most triggering by combined building new dedicated electrified lines and upgrading existing lines. Both South Korea and Taiwan HSR service expressed constant demand growth for the following first decade even the Korea Train Express (KTX) has transported approximately 150 million passengers since the four years after its opening. Taiwan HSR itself has carried about 100,000 passengers per day for fifty first months of commercial service. However, Shinkansen services is still in its positive growth and gained accumulated traffic of 196 billion passenger-km from 2010 to 2016, two times higher than France figures of 99 billion passenger-km during the same period. France HSR had stagnant traffic growth from 2010 to 2016; in 2016 as an example, SNCF collected accumulated traffic of 49 billion passenger-km, otherwise in 2010 it figures stood at 51 billion passenger-km. Other Europe HSR operators include Dutch, England, and Sweden indicated sustained traffic growth and collected accumulated traffic around 42 billion passenger-km until the end of 2016.

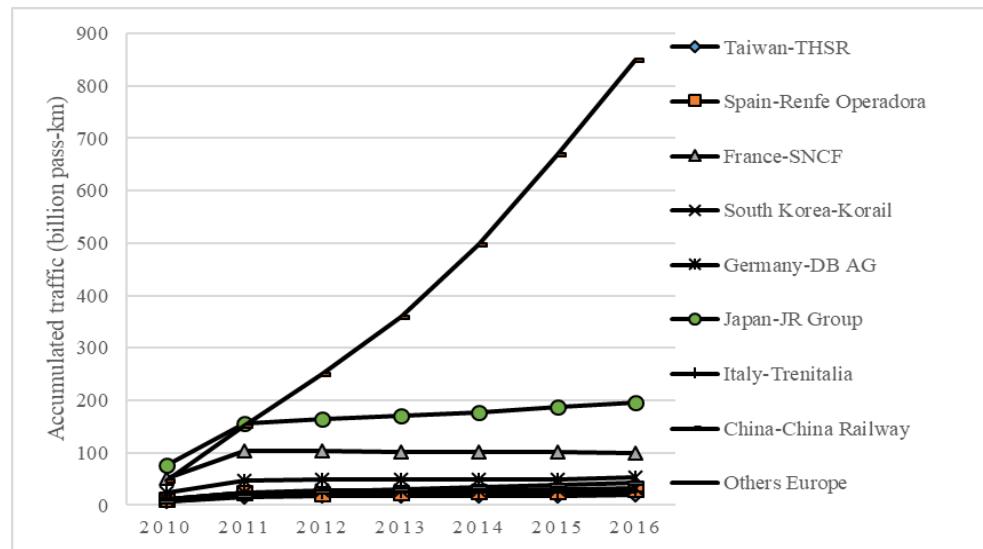


Figure 3. Accumulated HSR traffic during the 2010 to 2016 period (UIC, 2015)

According to passenger traffic data collected from Europe and Asia, the first HSR line built in Indonesia is expected to attract significant demand. However, it is important to note that the construction of HSR lines in Europe and Asia was prompted by the failure of their traditional lines to meet demand, necessitating the addition of new capacity to expand rail service. It's also worth noting that many of these existing rail lines have already been doubled or tripled in order to expand capacity. As a result, the high demand for conventional rail in these countries can be said to have generated a market for HSR. It is unavoidable to note that Indonesia, including Jakarta and Bandung, lacks this aspect that has contributed to the success of HSR services in Europe and Asia.

5. Proposal of SG-KL HSR Project

The Malaysian and Singaporean governments signed an agreement on February 2013 that would result in the construction of HSR line, connecting Malaysia. As happened in the countries of Singapore and Malaysia where the Joint Ministerial Committee has been tasked with looking at the 'details and modalities' of high-speed connections between cities, which are about 300 km away. Singapore's Lee Hsien Loong and his Malaysian counterpart Najib Razak agreed that building a high-speed rail line would be a strategic development in their bilateral relationship, which would dramatically improve connectivity between the countries (Railwaygazette, 2013). It is of utmost important and key to the successful implementation of Malaysia's national development strategy, (one of the main objective is to increase the country's GDP per person by 150%) by the time this HSR line will be completed in 2020, the Malaysian government is also looking forward to a further boost in the country's economics by closely-tied cooperation with the Singaporean government.

Cost of this project is estimated at RM 40 billion (USD 12 billion). The source(s) of the funding, however, has not been officially disclosed; although some private sources say that Private-Public-Partnership (PPP) funding will be used, others claim that it will be jointly co-funded by both the Malaysian and Singaporean governments considering the fact 335 km of the line will be in Malaysia while the remaining 15 km will be in Singapore. The HSR will have a total of eight stops, seven of which will be within Malaysia and one will be within Jurong East. The high speed rail line which will consist of bullet trains moving at top speed, above an estimated 300 km/hour is projected to become operational in 2026. This would therefore reduce the land journey between Kuala Lumpur and Singapore from about five hours to a mere 90 minutes' journey (Figure 4).

This project has attracted keen interest from various large corporations within Asia and Europe. However, Mahathir Mohamad who is the current Malaysian Prime Minister had announced on Monday May 28, 2018 that the HSR project will be axed, but he had also explained that it will take some time to execute because the Malaysian government and Singaporean government had also signed a contract on the multi-billion-dollar project. Meanwhile, Dr Mahathir Mohamad, the Malaysian Prime Minister had also assured that the government will remain "business friendly" to all investors involve in the project. Business people must believe that the new government is business-friendly, and [that] the government intends to build Malaysia with private companies.

Key Highlights

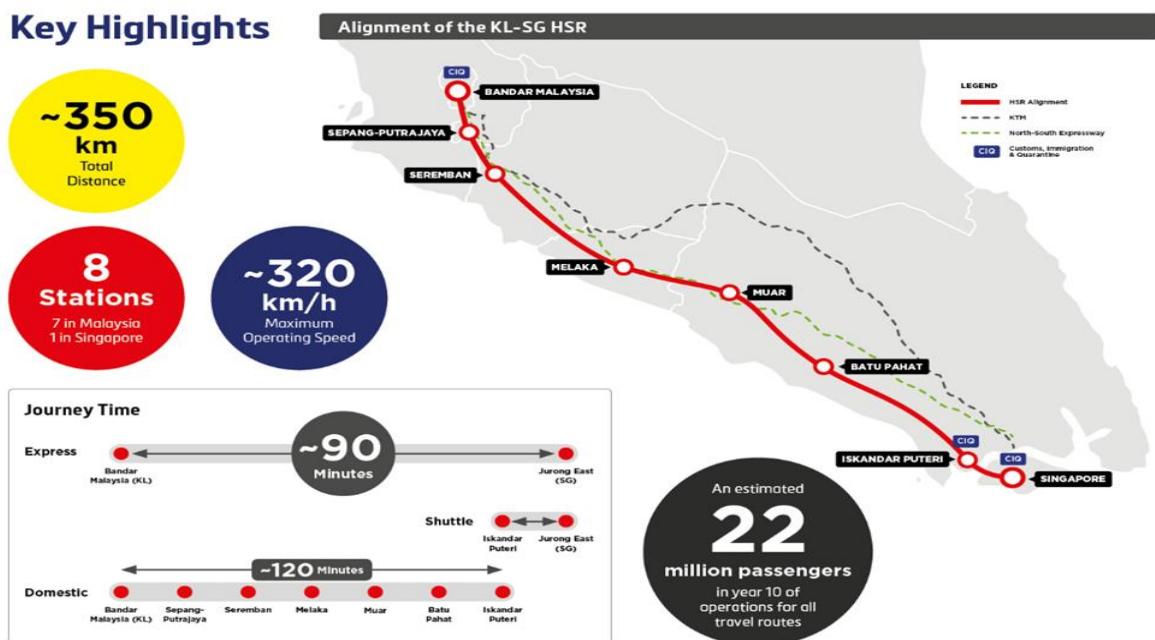


Figure 4. Proposed Kuala Lumpur – Singapore HSR line

The relationship existing between Malaysia and Singapore is considered unique because of certain factors, these include the geography of both countries, economy, politics, historical background, cultural heritage, and ethnicity. It is also attributed to the fact that Singapore separated from Malaysia in 1965, hence the similarity. It is also intriguing to know that although both countries have been characterized by healthy competition in economic and social matters, they however enjoy a very high level of economic interdependence as major trading partners. The existing relationship between Singapore and Malaysia has been described as symbiotic. However, this mutually symbiotic as the relationship has been beneficial to both countries, although the relationship has faced some challenges in the past, it has existed since 1965. The Mahathir administration which was in control in Malaysia from 1997 to 2002, was believed by many to be the most stressful period between both Singapore and Malaysia. However, the situation changed after Abdullah Badawi got into power and became the prime minister of Malaysia in 2003, and since then there has been enhanced contact and cooperation between both governments. History is starting to repeat itself again in the part of the SG – KL HSR project.

6. Conclusion

In conclusion, the Jakarta-Bandung HSR project, which connects Jakarta and Bandung, was carried out by PT Kereta Cepat Indonesia China (KCIC) under a business-to-business agreement with the Indonesian government. China, which was not only a competitor, was awarded the project due to the availability of low-interest loans; on the other hand, Japan, which had expressed interest in the project, had proposed that the project be financed by the Indonesian government. Surprisingly, Japan was the first to have indicated interest in the project and had even gone ahead to commence working on a feasibility study for HSR track, connecting Jakarta to the country's second largest city, Surabaya, which is about 730 kilometers apart.

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