

A US\$6.07 BILLION JAKARTA - BANDUNG HIGH - SPEED RAIL: CHALLENGES AMID COVID-19 PANDEMIC

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ABSTRACT

The Jakarta-Bandung high-speed railway project is one of the government's national strategic projects in the transportation sector and is expected to require a total investment of US\$6.07 billion. The railway project will serve four main stations: Halim in Jakarta, Karawang in West Java and Walini and Tegalluar in Bandung regency. A total of 80 km of the railway will be elevated, while a further 16.9 km will be in tunnels. The trains will travel at 350 km per hour, cutting travel time between Jakarta and Bandung to 45 minutes, faster than the approximately three hours and a half on the Parahyangan existing train. Railway developer PT Kereta Cepat Indonesia China (KCIC), a joint venture between Indonesian and Chinese railway companies, initially planned to finish the project and start operations in December 2021. Unfortunately, development of the project would depend on the situation of the coronavirus outbreak in the country. In order to curb the outbreak, the Jakarta government called on the public in mid-March to implement social distancing measures by studying, working and praying at home. Hence Chinese workers wanting to return to work on the Jakarta-Bandung high-speed railway project should abide by the health and safety protocols. In late March a regulation offering an exemption for foreigners working on national strategic projects from the temporary ban on foreign arrivals and transits. The ban is set to last until the government declares an end to the outbreak. In order to speed-up the progress, the consortium have made a number of breakthroughs in building tunnels, railway bridges and stations to pursue the remaining progress of 56 percent over the next 18 months.

Keywords: *High-speed railway, Jakarta-Bandung, National strategic project, COVID-19*

INTRODUCTION

PT KCIC is established based on deed No. 86 dated October 16, 2015 and project Jakarta-Bandung high-speed railways (HSR) designated as one of the government's National Strategic Projects in Presidential Regulation No. 3 of 2016 concerning the Acceleration of National Strategic Projects. Having a length of 142.3 km stretching from Jakarta to Bandung, the HSR line has four halting stations, Halim, Karawang, Walini, and Tegalluar with one depot located in Tegalluar. The construction was carried out on a massive scale to pursue operational targets in 2021. Of the total length of the fast train track, more than 80 km of them have elevated structures while the remainder are 13 tunnels and sub-grades. Otherwise, the project construction has been facing challenges regarding land procurement as the main problem that needed to be solved after the issuance of the construction permit. And since the coronavirus is going global, Chinese workers wanting to return to work on the Jakarta-Bandung high-speed railway project should abide by the health and safety protocols. Hence, these situations cause and effect of delay of project delivery. The Indonesian government

has begun discussions on possible Japanese participation in a planned high-speed railway between Jakarta and Bandung, hoping to spur progress on the delayed Chinese-led project as costs mount. Meanwhile, the latest information indicates that the new proposal would combine that rail link with a Japanese-Indonesian project upgrading an existing 750 km connection between Jakarta and Surabaya. Discussions have begun on extending the high-speed Jakarta-Bandung railway to Surabaya and whether it would be possible to include Japan in the consortium. Many in the Indonesian government have argued that a single railway running through Bandung to Surabaya would be more efficient than separate routes going east and southeast from the capital. Cost overruns on the Bandung-Jakarta HSR project have given a boost to this view. The project was originally scheduled to be completed in 2019 at an estimated cost of US\$5.5 billion. However, the project expected to be completed in December 2021 at a cost of over US\$6.07 billion. In mid-May 2020, construction progress reaches 48.3% and has worked again and follow physical distancing although the Covid-19 pandemic is not yet over. This paper identifies the challenges to complete the HSR project successfully.

The previous paper related to the Jakarta-Bandung HSR can be found in Purba et. al. [1], and Purba [2].

PROJECT HIGHLIGHTS

Originally approved in May 2017 following the signing of a US\$4.5 billion loan agreement between the two countries, the project initially experienced a number of lengthy delays, largely on account of protracted land-rights negotiations. KCIC as HSR developer such optimism, however, went to the wall as soon as the unprecedented extent of the Covid-19 outbreak – and its wider implications – became apparent, with countries across Asia and beyond locking down flights and barring port entry. As in many other countries, a number of Chinese project directors, managers, engineers and consultants for the HSR project, who had returned home for the spring festival period, were unable to resume their roles. The map and brief data of Jakarta-Bandung HSR line are shown in Fig. 1 and Table 1, respectively. HSR Jakarta-Bandung comes with the latest type, CR400AF, which is equipped with modern and reliable technology. Combined with the concept of transit oriented development (TOD), HSR station ensures an integrated system with a wide choice of integrated transportation modes, a variety of culinary delights, facilities and other privileges [3].

As of September 2019, in line with the progress on physical infrastructure development, the Jakarta-Bandung HSR project in parallel is also preparing an operating system and maintenance of facilities and infrastructure. The contractor is preparing the need for human resources ranging from the organizational structure to the number of personnel for operational after the project completion. KCIC is targeting to involve 1,700 personnel for the train operation. In this regard, KCIC has been partnering with PT MRT Jakarta, a pioneer of modern railroad facilities in Indonesia operating the mass rapid train in Jakarta. The two companies agreed to transfer knowledge to each other in connection with the maintenance and operation, which include human resources development as well as innovation and strategies for developing Transit Oriented Development (TOD) and the other line of non-train businesses. Jakarta-Bandung HSR is an advanced-technology but risky mega project. The risk largely is sourced from the real demand of the train connecting the two big cities. Indeed, a lot of people commuting from Jakarta to Bandung, and in another way around.



Fig. 1 The proposed of HSR line

Table 1. Brief data of Jakarta-Bandung HSR line [4]

Element	Data
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
Terms of loan (40 years loans period)	60% in US\$ with interest 2%/year 40% in RMB with interest 3.46%/year
Concession period	50 years (31 May 2019 ~ 31 May 2069)

FACTORS RELATED TO RIDERSHIP

Still, it does not guarantee that the commuters are interested to regularly take the HSR as a preferable transportation mode. While, the train can significantly cut the travel time more than half, the ticket price would also be taken into consideration. The more expensive the ticket price, the less appetite of people to take the HSR as a regular transportation mode. Therefore, TOD in areas surrounding the railway of bullet train is very important to pursue to enable smaller towns grow as the places of living. Shorter trip using HSR connecting the towns in affordable costs could increase the number of passengers [5]. Issue related to the number of passenger to be attracted by the HRS line has also been discussed in one of the most reputable colleges. Private car is still the main choice of transportation for Jakarta - Bandung road trip. At least 127,133 trips are made per day by private car, followed by public transportations which carry 13,000-14,000 passengers per day, a

large bus carries fewer than 1,000 passengers per day, and Argo Parahyangan train carries 2,000-2,500 passengers daily. As to meet the investment value which is Rp72,5 trillion, the minimum number of passengers per day should reach at least 21,134 people. The figure is considered unrealistic to be achieved. In addition, the ticket price is rather expensive which is Rp200,000 [6]. Otherwise, rail ridership in Indonesia has risen substantially in recent years, making decades of underinvestment and growing urban congestion important considerations for transport stakeholders as they upgrade and construct new lines. Statistics Indonesia (BPS) reports that total rail passengers rose from 199 million in 2011 to 202 million in 2012, 216 million in 2013, 277 million in 2014 and 325 million in 2015. The average length of a passenger journey has

simultaneously fallen from 95 km to 68 km, while the country's rail network remains limited to Java and Sumatra, with 22,296 km of total line operational in 2015. The Medium-Term Development Plan 2015-2019 includes an infrastructure development agenda that outlines projects such as having 3,258 km of newly built or rehabilitated rail lines, made up of 2,159 km of intercity railways and 1,099 km of urban railway, and boosting rail cargo volumes to 1.5 million twenty-foot equivalent units annually. Urban rail lines, including a planned light rail transit (LRT) system in Jakarta, are also expected to help reduce congestion and transport costs, which have become the highest in South-east Asia. It was forecast that the new line would attract around 10 million passengers per year in first year of operation, as shown in Fig. 2.

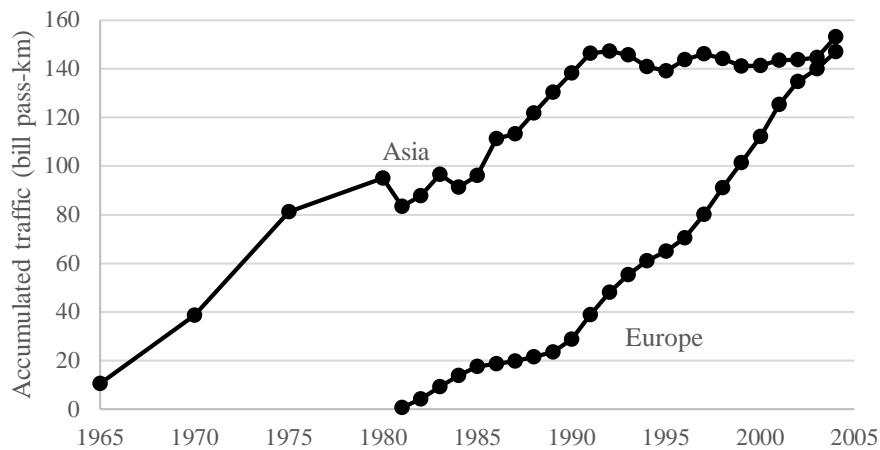


Fig. 2 Accumulated HSR traffic [7]

For twenty years, Shinkansen services in Japan enjoyed a sustained traffic, it gained 100 billion passengers-kilometer. From 1994 to 2004, within the next 20-years interval, the demand halved, because only 50 billion additional passengers-kilometer 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 Fig. 2. Based on passenger traffic data obtained from Europe and Asia, the first HSR line constructed in Indonesia is expected to gain considerable amounts of demand.

COVID-19 CHALLENGE

KCIC initially aimed to finish the project and begin operation by December 2021, a two-year delay from its original target. Currently KCIC is working on 13 tunnels, while the progress of land acquisition has

reached 99.96 percent. Meanwhile, construction on the HSR project is expected to be delayed amid the COVID-19 pandemic. Hence, the target must be rescheduled because the construction is suspended. To curb the outbreak, the central government called on the public to implement physical distancing measures by studying, working and praying at home. The provincial administration in Jakarta, which has become the national epicenter of the outbreak, recently introduced large-scale social restrictions that have suspended school, office, religious and public activities for 14 days. About 300 out of the 2000-strong Chinese workforce engaged on the project including senior managers travelled to China in February for the Lunar new year but were unable to return due to travel restrictions to prevent the spread of the COVID-19. The supply of materials from China has also been interrupted, although this should

resume as Chinese industry restarts after the COVID-19 lock-down. More trouble is caused by the fact that nearly 50% of materials, including pipes, waterproofing and signaling equipment are made in China. In late March a regulation offering an exemption for foreigners working on national strategic projects from the temporary ban on foreign arrivals and transits. Chinese workers wanting to return to work on the project should abide by the health and safety protocols. Previously, abnormal rainfall in the Jakarta area on January 2020 caused flash floods followed by repeated heavy rainfall and flooding into February which delayed the project. The ministry's construction safety committee found unmanaged debris from the HSR project had clogged the drainage system on the adjacent Jakarta-Cikampek toll road, causing some parts of the toll road to be flooded during heavy rains. KCIC had identified risks surrounding the project area to take action against potential disruption and environment damage. Apart from recovery measures, the contractors under the PT KCIC consortium (Table 2), which include China's Sinohydro, China Railway Engineering Corp (CREC) and state-owned builder PT Wijaya Karya, swept through a number of landslide and flood-prone areas, monitoring river and water gates across project locations to ensure they function normally.

Table 2 Shareholders in PT KCIC

Indonesia (60%)	
PT Wijaya Karya	22.8%
PT Kereta Api Indonesia	15%
PT Perkebunan Nusantara VIII	15%
PT Jasa Marga	7.2%
China (40%)	
China Railway International Co	2%
China Railway Engineering Corp	12%
Sinohydro	12%
CRRC	4.8%
China Railway Signal & Communication Co	9.2%

All such optimism, however, went to the wall as soon as the unprecedented extent of the COVID-19 outbreak. Recently, in order to speed up progress, some measures are being taken by the consortium to protect employees working on the project from the COVID-19, and communications between all parties has been stepped up. The construction of the HSR project is currently focusing on its tunnels, including the main tunnel in Halim, east Jakarta which is 1,885 meters long. The project will have 13 tunnels, 7 of which have started their excavation phase. Walini in west Java was another critical spot for the project because the developer had to construct three tunnels with a total length of 7.44 km. The project had been divided into 115 development points, and 32 of which

were elevated projects, including bridges in Bekasi, west Java. Currently, 42 points were under construction, including 7 tunnels and a train depot in Tegalluar, Bandung. To date, the progress of the HSR project has reached 44% and as for land acquisition alone, it has reached 99.96% [8]. The central government through the Transport Ministry was maintaining that the project had only actually been shut down for two weeks, with a December 2021 completion date still a possibility.

Technical Challenge

At the technical level, the challenges mainly arise from the local topography and geological conditions, such as land subsidence or sudden earthquake disasters. The topography along the HSR line is quite complicated, which might require special attention and methods for solving. Firstly, the topography along the line is diverse and complex which includes steep slopes which may be the cause of concern for the operation of HSR [9]. Referring to The Ministry of Economy, Trade and Industry [10] the steepest slope can be up to 30%, and may continue to increase because of the land subsidence, as a result of the overuse of underground water. The land subsidence itself can also be a problem, because it makes the rail uneven. In order to overcome the issue, the China Rail High-speed (CRH) is increasingly replacing the railroad by the viaduct bridge, which can be 58% of the total length of the HSR. However, these challenges may potentially be mitigated by the expertise of CRH which reportedly owns some of the world's longest high-speed railway networks with high operating speed, and low occurrence of accidents. As for the variety of constructive and operational environment, CRH have faced similar or more severe problems comparing with Jakarta-Bandung HSR project, such as the land subsidence, high temperature, and the tunnels and bridges.

New Normal

The Public Works and Public Housing (PUPR) Ministry is preparing a protocol to carry out construction services amid the new normal. The new normal construction protocol is designed to address several packages delayed due to COVID-19. The PUPR ministry suggest that the consortium will still operate with COVID-19 protocols under the new normal scenario, e.g. maintaining physical distancing practices (limited workers in one area) and limiting extra working hours for construction workers. The PUPR ministry also believes that land acquisitions, which require direct contact with a large number of people (land owners), would remain slower than normal. Undeniable, infrastructure development is one of the keys to boost economic recovery post-COVID-19 as it absorbs a large number of workers. According to Ministry of PUPR's rule of thumb,

every Rp1trillion worth of construction work could employ 14,000 workers. Overall, the government estimates that its strategic national project developments, included HSR project, could employ some 4 million workers per year, which in aggregate could employ 19 million workers in 2020-2024.

Meanwhile, the most common indicator is the number of passengers handled, but as stated by Shatkin [11], the Indonesian government has sought out investment aimed at integrating Indonesia more tightly into global flows of investment and trade, and part of that strategy has included the improvement of logistics. Referring to Chinese experience as study case, with the development of economic and social, many migrant workers began to accept high-speed rail which the price is relative high in traffic tools. In these migrant workers, mostly are under the age of 35. Along with the modernization of city, population flow more frequently. For the younger generation of office workers, the speed, punctuality and higher service

level of high-speed rail have a great attraction to them. Under normal circumstances, a business travel is urgent, and need to arrive on time. In previously of high-speed rail appearing, air travel is likely to attract most of this group. Because of the high-speed, punctuality, and less sensitive to weather conditions, high speed railway can compete with civil aviation [12]. In the wider context, Mittal et. al. [13] stated that the factors like population, income, travel speed and land-use development patterns would have a significant influence on the passenger transport demand. Along Java island itself, railway passenger services experienced a *renaissance* in the 1995-1999 period, with the introduction of many new passenger express services (Fig. 3). With the advent of cheap airplane tickets, operator PT Kereta Api has experienced a downturn in the number of passengers carried, though the number has stabilized and most trains remain at more than 50% occupancy rate.



Fig. 3 Conventional rail services along Java island

CONCLUSION

The Jakarta-Bandung high-speed railway project is one of the government's national strategic projects in the transportation sector and is expected to require a total investment of US\$6.07 billion. Three years after the ground breaking, the construction of the high-speed railway has faltered because of various technical and financial challenges, exacerbated by the COVID-19 pandemic. In mid-February 2020, construction progress reaches 44 percent and land acquisitions reach 99.96 percent. Due to the COVID-19 pandemic, work of the project has been halted temporarily, resulting in the delay of the targeted finish of construction and start of the operation. In mid-May 2020, construction progress reaches 48.3 percent and the construction has worked again and follow social/physical distancing, although the COVID-19 pandemic is not yet over. In order to speed-up the progress, the consortium have made a

number of breakthroughs in building tunnels, railway bridges and stations to pursue the remaining progress of 56 percent over the next 18 months through consolidation of manpower, equipment and advanced technology. Otherwise, referring to the new normal protocol's, the project's management team should to set a goal of zero infection for all employees and the consortium raised disinfection level and frequency, and tightened disease prevention in working areas such as offices and construction sites. The consortium should be conduct strict measures and made emergency response plans to prevent cases infected from outside of HSR project.

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