Expected Economic Benefits of a High Speed Rail Network

Ir. Dr Wang Hong Kok

In 2016, the Malaysia and Singapore Governments signed a Memorandum of Understanding (MOU) for the joint development of a 350km Kuala Lumpur-Singapore High Speed Rail (HSR) with a travelling speed of 320km per hour, at a cost of S$15 billion (RM45 billion).

In 2016, the Malaysia and Singapore Governments signed a Memorandum of Understanding (MOU) for the joint development of a 350km Kuala Lumpur-Singapore High Speed Rail (HSR) with a travelling speed of 320km per hour, at a cost of S$15 billion (RM45 billion).

Six years have since passed. The HSR project was identified as a key element that would propel Kuala Lumpur into the ranks of World City under the Economic Transformation Programme (MYHSR, 2017). According to a report in Focus Malaysia (18-24 November, 2017), it was believed that the joint economic benefits derived from the HSR would amount to US$1.12 billion (RM4.69 billion) per annum, with the lion's share going to Malaysia.

What would be the economic benefits and expectations for the average HSR commuter?

The details of the KL-Singapore HSR were put on public display for feedback from November 2017 to January 2018. See Figures 1 and 2.

Even though policy-makers are upbeat about the role of the HSR in economic development, its acceptance as a global phenomenon was slow since it made its debut as Japan's Shinkansen Line in 1964. According to Blanquart and Koning (2017), by 2016, the HSR lines in 16 countries covered a total distance of 34,679km (China alone operated 21,688km or 62.53%). Worldwide, HSR lines under construction total 14,559km while 8,390km are under planning.

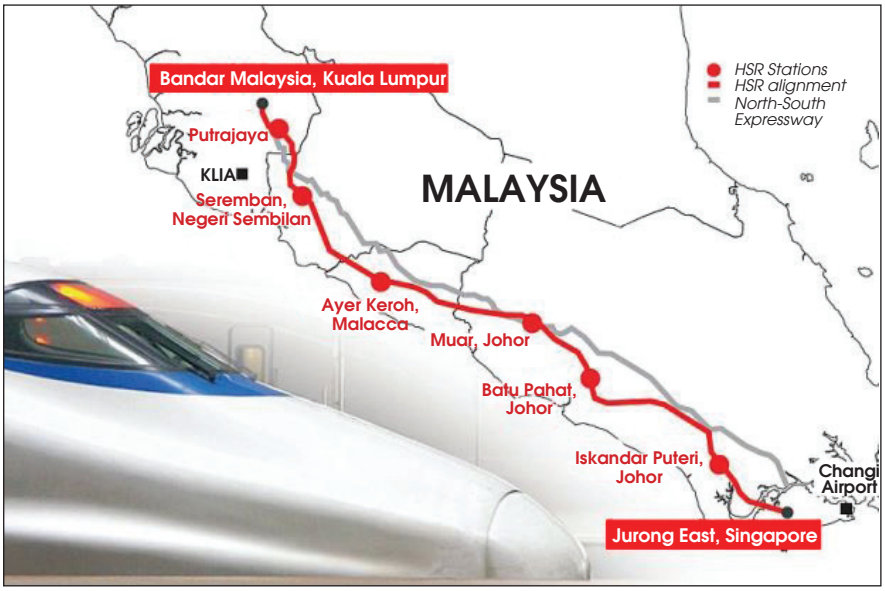

Figure 1: The seven proposed HSR Stations
Source: MYHSR Corporation Sdn. Bhd.

Figure 2: HSR Station, Seremban, is inspired by Sri Menanti Palace.
Source: MYHSR Corporation Shn Bhd

Besides China, the next largest operators of HSR lines are Japan (2,892km), Spain (2,871km) and France (2,036km) while US (362km) and UK (113km) have shown little interest. However, by the end of 2017, would be served by the HSR and eight more countries would be making them accessible, including Russia and Argentina.

In analysing optimal transport mode conditions, the HSR works best when the distance between two points is greater than 100km but less than 500km (USHSR Association, 2017). See Figure 3. See also De Rus (2012, pp. 11-12).

Who then benefits from the HSR? Can economic benefits be measured from the HSR?

With regards to economic geography (urban land economics), a study of the benefits of investing in HSR can be found in "new economic geography theories", where the dynamic impact of an external element such as HSR is discussed (Venables, 2005; Ahlfeldt, 2017).

In this article, we ask two basic questions related to the HSR.

1. What are the expected common economic benefits?
2. How are these economic benefits measured?

COMMON ECONOMIC BENEFITS

Most literature on the subject have been positive as to the contributions of the HSR and tend to tout the HSR as the 21st century transport solution to a number of urban traffic woes.

In their proposal to build the Alberta High Speed Rail, researchers from Transportation Economics & Management Systems, Inc. (TEMS, 2008) categorised economic benefits into user benefits and community benefits.

User benefits: This refers to time and cost savings that arise from using the HSR instead of other transport modes such as car, train or plane. Broadly, HSR users may observe at least eight benefits, according to Markam and Green (2017): Less smog in the city, reverse sprawl, increased walkability, more efficient use of time, reduced congestion (less chance being caught in traffic gridlocks), reduced dependence on foreign oil (use renewable source of energy), safer than driving (HSR is the safest form of transportation) and promoted economic boost.

A researcher from the University of Las Palmas, Spain, suggested six other economic benefits in the user category: Lower travel time, higher comfort and reliability, reduced probability of accidents, release of extra capacity to other modes of transport, improved environment and encouraged regional development (De Rus, 2008).

Community benefits: This refers to benefits reaped when firms have accessibility to this new mode of transport and, in the process, engage in newfound or better business opportunities. Properties located near HSR stations will see an increase in value. Data obtained from firms located near Kyushu Shinkansen in 2004 before and after the opening of the HSR, indicated that sales and productivity rose for firms nearer to the new stations. Bernard (2014) also found that the HSR could foster a better buyer-supplier network, thus reducing business costs: "The findings suggest an important role for enhanced transport infrastructure in facilitating face-to-face interactions and improved matching between suppliers and customers".

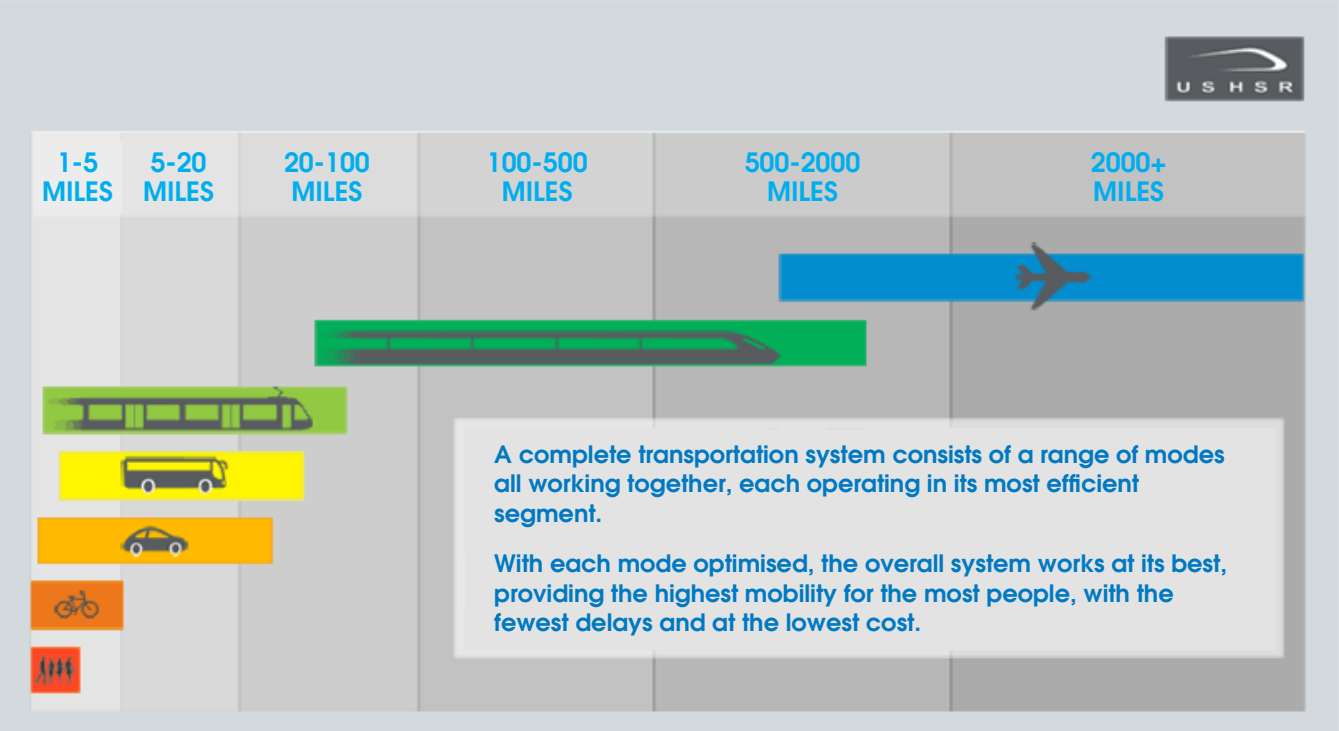

Figure 3: A complete transportation system
Source: US High Speed Rail Association

Based on their research conducted on the Cologne and Frankfurt HSR Line built in 2002, Ahlfeldt and Feddersen's spatial economic analysis (2010) of two new HSR stations in the smaller towns of Montabaur and Limburg alongside these two major big cities, showed evidence of economic growth. "Counties adjacent to new intermediate stations experience 2.7% shift level in GDP due to exogenous treatment in variation accessibility," Ahlfeldt and Feddersen explained. See Figure 4.

Similar findings were observed by a team of World Bank researchers based on its review of the recent China HSR projects (Amos, Ballock and Sondhi, 2010). The HSR was also noted to be particularly good for cities located 150-300km apart in the eastern plains of China.

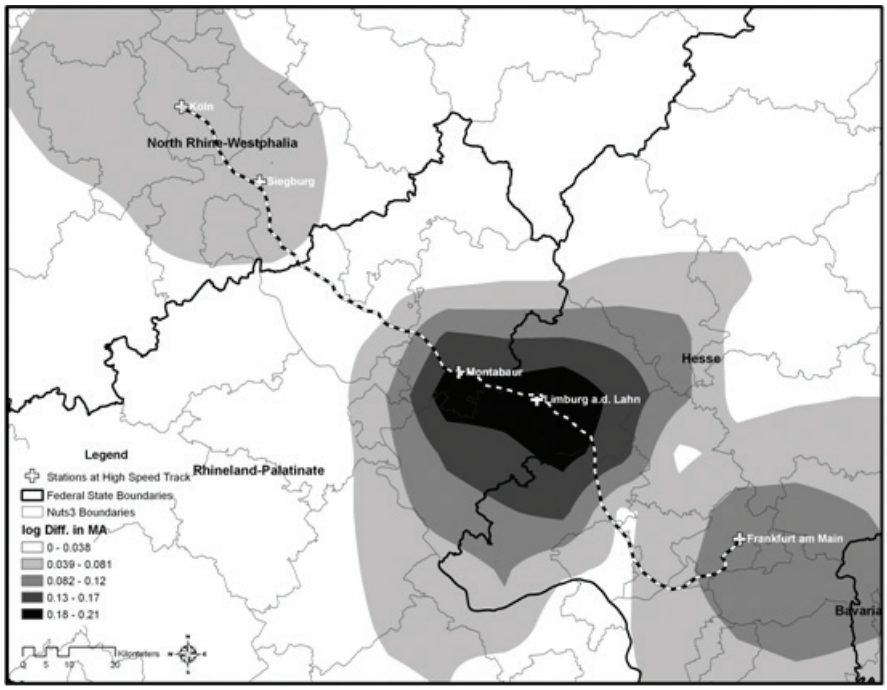

Figure 4: Accessibility impact
Source: Ahlfeldt and Feddersen (2010, p. 17)

MEASURING ECONOMIC BENEFITS

De Rus (2008) showed a simple cost-benefit model of evaluating the HSR (Figure 5): Annual social benefits must be greater than the sum of investment costs, annual fixed maintenance and operating costs as well as annual maintenance and operating costs depending on passenger trips.

In considering whether public funds should to be used in building the HSR line, De Rus (2008) argued that one key rationality exists: That the HSR line can alleviate traffic congestion on the road, rail or air. One example was China where the implementation of the HSR networks took years of studying and planning: "Official State planning began in the 1990s and the first line, the Qinhuangdao-Shenyang Passenger Railway opened in 2003," (Burton, 2017).

If economic benefits are aplenty, what about viability? As a recent World Bank report asserted, "a developing country must reasonably expect at least 20 million passengers per year with significant purchasing power, just to have the possibility of covering the working expenses and interest costs of providing that capacity with high speed service and probably double that number of passengers to have any possibility of recovering the capital cost," (Amos, Ballock, and Sondhi, 2010). Very few HSR lines, however, achieve 20 million passengers per year.

The social profitability of the investment in HSR requires the fulfilment of the following condition:

$$\int_0^T B(H)e^{-(r-g)t}dt > I + \int_0^T C_f e^{-rt}dt + \int_0^T C_q(Q)e^{-(r-g)t}dt, \qquad (1)$$

where:

$B(H)$: annual social benefits of the project.
C_f: annual fixed maintenance and operating cost.
$C_q(Q)$: annual maintenance and operating cost depending on Q.
Q: passenger-trips.
I: investment costs.
T: project life.
r: social discount rate.
g: annual growth of benefits and costs.

Figure 5: Simple cost-benefit model of evaluating HSR
Source: De Rus (2008)

Amos, Ballock and Sondhi (2010) estimated the costs of the HSR (construction cost and rolling stock capital) to be in the region of US$35-70 million per km. Assuming an average cost of US$40 million per km, then the KL-Singapore HSR Project may cost US$14 billion (40 x 350km = 14,000 million).

CONCLUSION

The HSR may best serve pairs of cities located 300-500km apart. The KL-Singapore HSR may be an economically viable transport option, as evidenced by the Cologne-Frankfurt line and the Kyushu Shinkansen. The "silver bullets" as the trains are popularly called in the West, will solve four urban planning woes at once: Energy, climate, safety and capacity.

The HSR promises to be business-friendly and can offer hassle-free travel, time-saving and fast mobility. The viability constrain, however, is the high infrastructure cost which may require a long payback time. Yet, the potential commuters of the KL-Singapore HSR have reasons to believe they will stand to benefit from this "game changer" when it is completed in 2026. ■

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Author's Biodata

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