Raising financial resources for high-speed rail development in the form of public-private partnership and lessons for Vietnam

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Abstract: High-speed rail (HSR) is considered as one of the breakthrough technologies in the field of passenger transport in the second half of the 20th century, however, the construction, maintenance and operation are very expensive, involving huge amounts of costs. In Vietnam, the Ministry of Transport has submitted to the Politburo to consider the investment policy of the North-South high-speed railway project with a total length of 1,508 km, with an estimated total investment of 58.71 billion [1]. This is the first project deployed in Vietnam, with the largest total investment in Vietnam's history, so it is necessary to carefully study in order to choose the method and source of investment capital, technical factors and suitable models with international development trends and conditions in Vietnam. The article studies the experience of mobilizing financial resources for the development of the HSR system in the form of a public-private partnership (PPP) in some typical countries in the world; based on the actual conditions of Vietnam to draw important lessons in choosing investment forms in line with development policies and actual resources, ensuring strategic and long-term vision.

1. Introduction

There are four modes of transport: road, rail, waterway and air to travel in North-South axis. To effectively exploit the transport system, it is necessary to promote and combine the strengths of the modes. However, the transportation system is still lacking in synchronization and the market share is not reasonable.

(1) Road transport: ensuring connectivity and supporting the collection of passengers and goods for other modes of transport in the supply chain, promoting high efficiency with short distances. In the period of 2010 -2020, other modes of transport developed slower than planned, so the demand for transport has been pent-up and put great pressure on the road. Currently, the road transports carry 94.23% of the total volume of passenger transport and 77.47% of the total volume of freight transport. Overcrowding, traffic jams, and traffic accidents are becoming problems.

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(2) **Railway transport:** promoting the efficiency of transporting bulk goods in the country and transporting passengers on high-density corridors (inner suburbs, suburbs, between densely populated areas) with fast speed and low cost. However, the infrastructure of the North - South railway route is seriously degraded, so the market share has decreased sharply. Cargo volume decreased from 7.28 million tons in 2010 to 5.74 tons in 2020, passenger volume decreased from 11.9 million passengers to 8.6 million passengers, market share accounts for less than 1%.

(3) **Domestic waterways:** mainly carry out the transportation of traditional goods with large volumes, which do not require fast time; low cost. The market share increased by about 4%, in line with the restructuring orientation of the transport industry. Regarding sea transport: promptly met the needs of the economy with 80% - 90% of the volume of export and import royalties, the total volume of goods through the seaport in 2020 was twice as high as in 2010, with the average growth of 9.18%/year.

(4) **Airway:** ensure international passenger transport and long-distance domestic transportation (effective for distances >1,000 km). The aviation industry has grown strongly in size, with a capacity of about 90 million passengers/year, increased 2.5 times compared to 2010 [report from the Ministry of Transport]. However, due to limited rail transport and the development of low-cost airlines, a large number of passengers are attracted, leading to overcrowding, delays, and cancellations taking place at an increasing rate. The above analysis shows that the development is not sustainable, unreasonable, and does not promote the inherent efficiency of various types of transport. Railway used to be a major transport industry, now the infrastructure is outdated, the capacity is close to saturation, but even if it is renovated and upgraded, it cannot meet the transportation demand after 2030 [4]. The expensive road industry plays a key role, causing the economy to suffer many consequences such as increased traffic accidents, environmental pollution, and high logistics costs compared to the region and the world: 20.8% of GDP, meanwhile Thailand is 10.7%, China is 15.4% and the world average is 11.7%. [2], [3]

The rapid socio-economic development on the North-South corridor leads to an increase in transport demand in the immediate period until 2030 and continues to increase rapidly for the following years, requiring capacity of the transport system always be strengthened. High-speed rail has many advantages over other transport industries such as large carrying capacity, high travel speed, short total journey time, safety, reliability, comfort, and environmental friendliness. Investment in building the HSR system is expected to create a strategic breakthrough and a new driving force for socio-economic development in the localities that the project passes through. Specifically: The HSR route will be the backbone, playing a key role (carrying passenger and goods) connecting with transport hubs, international integration with ASEAN countries, China; overcome the imbalance of the transportation system; meet transportation needs sustainably; enhance the competitiveness of the economy; urban restructuring and distribution of population and labor along the North-South corridor.

* **Policy of Vietnam government on the development of the HSR system**

From the early 2000s, master plan on development of railway transport in Vietnam to 2020 has oriented to build a high-speed railway on the north-south axis [4]. The Ministry of Transport has received support from the Korean and Japanese governments to carry out studies for the sections of the Hanoi - Vinh and Ho Chi Minh City - Nha Trang routes. However, there are many concerns about the feasibility, the huge amount of capital (at this stage, the total investment is expected to be 50 billion USD) and the efficiency of the project. It was not until 2017 that the concept of "high-speed railway" officially appeared in the Law of Railway No. 06/2017/QH14.
Currently, according to the railway network plan for the period 2021 - 2030, with a vision to 2050, railway has been identified as one of three strategic breakthroughs that need to be prioritized for investment. In particular, the North-South high-speed railway is the most important route, considered the "backbone", linking trade activities of urban chains and economic zones throughout the territory. [5]

In November 2021, the Ministry of Planning and Investment and the Ministry of Transport agreed on a plan to research and invest in a North-South passenger high-speed railway line, with a design speed of 250 km/h, operating speed of 180-225 km/h, then submitted to the Politburo for consideration and serve as a basis for reporting to the National Assembly for approval of investment policy.

In February 2023, the Politburo issued Conclusion 49-KL/TW with the orientation: By 2025, strive to complete the approval of the project investment policy; start construction of priority sections in the period 2026-2030 (including sections Hanoi - Vinh and Ho Chi Minh City - Nha Trang); before 2045, complete the entire line. Most recently, in May 2023, on the basis of the proposed investment scenarios, the Ministry of Transport researched and supplemented the passenger-cargo combination plan, as well as continued to review and refer to international experience, update and complete the pre-feasibility report. Thus, it is necessary and useful to promote research from other countries' experiences and draw lessons for Vietnam in this context. [5], [6]

2. Methods

The high-speed railway investment project was implemented for the first time in Vietnam on a large scale. Choosing the right financing mechanism is critical to project success. Around the world, this system has been developed in many countries since the 1960s and has achieved many achievements, with many successful projects but also failed projects. To find useful lessons for mobilizing financial resources by PPP method, the author uses the method of collecting data from domestic and foreign research, which are scientific articles, theses Master's thesis, international seminars, Vietnamese policies, reports from the Government, Ministry of Transport, Ministry of Planning and Investment.

Based on the collected data, analyzing and evaluating the overall traffic situation of the North-South axis, showing the need for high-speed rail development. The author also studies the policy of the State of Vietnam on the development of the HSR system, the current situation of the development of this system in the world, identifies the need to study experiences in some countries with developed HSR systems or economy and society have many similarities with Vietnam. Based on the synthesis of experiences in mobilizing finance in the construction and operation of high-speed railways in the form of PPP from other countries, the author draws necessary lessons for Vietnam.

3. High-speed rail system in the world

The world's high-speed rail has undergone a fairly long development for nearly 6 decades. Stalled during the Covid-19 pandemic, many countries are currently on the road to resumption of investment and development of new high-speed railways. Japan was the first country to develop this system, which began operating in 1964 connecting Tokyo and Osaka. Following Japan, in 1981, France ran TGV high-speed trains on the Paris - Sud Est and Paris - Lyon routes. In 1991, Germany developed the ICE system and began operating on the Hanover-Würzburg and Mannheim-Stuttgart sections. Italy and Spain follow in the footsteps of developing the HSR network, Spain is the country with the second largest HSR
length in the world, after China. In Asia, Korea started operating HSR in 2004, Taiwan in 2007 and China in 2008. By September 2020, more than 20 countries around the world have dedicated railways with maximum speeds from 200 km/h and more and most are in Europe and Asia, the total length of exploitation is 58,839 km, and 19,710 km is in the process of construction. Among the HSR lines in the world, the Tokaido Shinkansen line has the highest density of operations, the number of trains running in a day on this route on average is 350, the number of people traveling by train in this line is about 430,000 people a day. [7]

France was the first country to mobilize finance for an HSR project by PPP investment method in 2006. The financial source of the private sector is taken from the Investor's equity, and revenue from incentives on real estate and legally mobilized from Investors under BCC business cooperation contracts. European PPP high-speed rail projects also quickly followed. There have been many successful projects such as the LGV line connecting Le Mans with Rennes, which is 132km long, completed in 2016, the LGV SEA (LGV Sud Europe Atlantique) route connecting Tours and Bordeaux, 300km long, and the Perpignan – Figueres route across the French-Spain border which is 45km long. There are also some projects that have not been achieved as expected, such as the London-West Midlands route (UK), due to inadequate calculation of investment needs and costs. [7], [8]

Thus, in fact, many countries have invested in the HSR system under the PPP method, with different scope of private investment and activities. In the current context in Vietnam, one of the hot topics discussed is which financial source to invest? Using only government capital is not possible, when Vietnam's GDP in recent years averaged 401 billion USD, public debt is 43.1% of GDP. Therefore, the Ministry of Transport proposes to invest in the form of PPP, in which the state capital mobilizes 85.27%, including capital from land auctions at 50 stations (TOD) and public investment capital, the rest 14.73% is mobilized from private. This proposal is completely consistent with the government's orientation in the transportation development strategy, which is to maximize resources for infrastructure investment through the policy of socialization of investment with one of the channels are mainly in the form of PPP [3], [4]. This proposal is also based on reality, as of January 2019, the number of PPP projects in the transportation sector compared to the total number of PPP projects in Vietnam is 220/336, with a total investment of 672,345/1,609,335 billion VND. At the same time, the Law on Investment in the form of public-private partnership (No. 64/2020/QH14), effective from January 1, 2021, has built an effective legal framework to mobilize capital from the private sector in infrastructure projects, reducing pressure on the state budget. [1], [3], [8]

4. Experience in mobilizing finance in construction and operation of high-speed railways in the form of public-private partnerships in a number of countries with developed railway systems

The investment cost of the HSR system is very large (including infrastructure construction, operation and maintenance), the payback period is long, the financial efficiency is not high but the socio-economic efficiency is high, not to mention great impact but are difficult to quantify factors such as restructuring the development space, changing the market share structure of transportation majors, environmental pollution, etc.

Therefore, records from countries with developed railway systems show that most of the railway infrastructure network is invested by the government, the participation of the
private economy accounts for a small proportion. Some countries choose investment capital entirely from the government sector, some countries choose the form of PPP, in which public investment is the main part, for the infrastructure part, with a proportion of over 80%; while the private sector accounted for about 20% (vehicles, equipment).

*Experience in Europe*

Each country applies the form of PPP with a different scope of private investment and activities.

- **PPP for infrastructure only** (including civil works, electro-mechanical, construction and maintenance):
  
  + *France* is a country that applies many different financial models, develops in accordance with the external environment and the effectiveness of the project. During the first stage investment capital is completely borrowed from the government, and since the global financial crisis, the French government has transformed its financial model to attract private participation, a PPP policy framework for the HSR project was approved in 2006, with the goal of attracting 40 billion euros to complete 2,000km by 2020. There are two main PPP models:

    (1) The private sector is responsible for investment in construction and maintenance of the route according to the term of the PPP contract, and the government is in charge of operating and exploiting and sponsoring the risks. After the project is put into operation, public payments will be made to the private partner according to the established plan to cover the costs invested. For example, the 70km-long LGV Contournement Nîmes – Montpellier bypass project, completed in 2017 with a total cost of 2.3 billion euros, of which OCVIA group (a consortium of many construction companies) contributed 1.5 billion euros to the construction process. Of that, 1 billion euros comes from loans from 11 commercial banks. Once construction is completed, 80 percent of the debts will be refinanced during the operations phase of the concession. The public sector, including the EU, the French government, the region of Languedoc-Roussillon, the department of Gard and the cities of Nîmes and Montpellier will contribute the remaining 0.8 billion euros (Railway Gazette 2012d). [6]

    (2) Franchise to operate, collect fees for private investors. The private side bears design, construction and operational risks, including traffic risks. The French and EU governments finance 50% of construction investment costs (RFF 2010; Dutzik; Scheider and Baxandall 2011). Successfully applied with a number of routes such as LGV SEA (LGV Sud Europe Atlantique) connecting Tours and Bordeaux, 300km long with a concession period of 50 years since 2011. [9], [10]

  + *UK*: Apply the BOOT (Build Own Operate Transfer) contract. The HS1 project (HS1 is the 109km rail line between St Pancras International in London and the Channel Tunnel), costing £5.8 billion to build, was built by London and Continental Railways (LCR) and raised capital by selling government-backed bonds. After construction is completed, the rights are given to another investor for 30 years to operate and maintain, infrastructure ownership and land ownership rights remain with the state. At the end of the concession period all rights will revert to the government. HS1 receives revenues from track access charges sold on a commercial basis. The HSR2 project from London to the West Midlands has a similar model.

  The investment and operation process encountered some difficulties, causing the results to be not as expected due to the following reasons: Excessive demand forecasting and large costs due to vertically integrated construction, which made LCR group very difficult to maintain business. The British Government had to expand financial support, such as loan guarantees of £ 3.75 billion, payment of tolls and roads, financial support of a subsidy of 1.75 billion, in return the British Government has agreed to receive 35% of sales income from HS1’s activities. After the financial restructuring, the ownership and management of
the infrastructure are separated, the private unit pays the infrastructure rental fee according to the actual revenue. [2], [7]

+ Spain: in construction process, 40% of costs are financed by the State-owned infrastructure manager, 60% by private capital or long-term debt. Franchise exploitation and operation to Investors within 25 years.

- PPP for superstructure only: The South Netherlands-Belgium high-speed railway (HSL South) is under a Design, Build, Maintenance and Financing (DBMF) concession. The State provides financial support for electromechanical equipment, construction site and maintenance (accounting for 86% of investment costs) and apply the DBMF (Design-Build-Maintain-Finance) contract. After completing the project, the project will be implemented in two separate franchise methods: Franchise to exploit the superstructure (construction and maintenance of electromechanical aspects - track, signalling and electricity-only) to the investors within 25 years.; concessions to exploit the transport part, provide commercial services on train lines for investors within 15 years. [9], [11]

* Experience in Asia

- Japan: Japan's HSR investment system and management model is implemented in the form of PPP between Japan Railway Construction, Transport and Technology Agency - JRTT (state-owned) and private joint stock companies - JR (JR Center, JR East, JR West, ...). Regarding infrastructure investment: JRTT is responsible for the construction of HSR lines, owns the route and leases it to operators (JRs). Investment capital will be provided by the Government, of which capital from the central budget accounts for two-thirds and capital from the local budget for one-third. Regarding operation: JR companies are responsible for purchasing trains and operating to collect payback fees and pay infrastructure rentals.

To ensure the financial feasibility, the Japanese Government approves the investment in HSR project if it meets the following criteria: (i) Stable financial source; (ii) Revenue from ticket sales is sufficient to cover operating expenses; (iii) Effective investment, the benefits are greater than the costs; (iv) There is consent of the local government to terminate the operation of the parallel railway line.

- Taiwan: Select the form of BOT investment for the entire construction and equipment part. The winning THSRC investor undertakes the investment cost of construction and equipment, accounting for 80% of the total cost. However, there are some risks in the investment process, the Taiwanese government has had to rescue investors many times with policies such as reducing loan interest rates, buying more shares to raise the ownership level from about 20 to about 64% and extended the term of the project operation contract by 35 years to 70 years.

Some of the main reasons lead to failure: (i) excessive demand forecasting, when planning the operation, the number of passengers per day is estimated at about 240,000, but in reality, it is only 80,000 people. (ii) Unsuitable initial technology selection. (iii) Large cost burden due to vertically integrated construction. (iv) The connection between the station and other areas is not good. [2], [7]

5. Lessons learned for Vietnam

From the analysis of the above countries’ developing HSR systems experiences, some useful lessons can be drawn for mobilizing financial resources to invest in building HSR projects in Vietnam as follows:

* Lessons of successed cases

Regarding investment divergence: for Vietnam in the period of 2025-2030, it is necessary to focus resources on investing in the Phase 1 high-speed railway line, connecting Hanoi capital with Vinh and TP. Ho Chi Minh with Nha Trang.
Regarding investment resources: after studying countries with developed railway infrastructure, it is shown that most of these countries use the government budget to invest in infrastructure and this part accounts for a large proportion, only socializing investment in wagons, equipment system, exploiting and station. Therefore, it is necessary to concentrate state resources and attract ODA, concessional loans from international donors, promote socialization in railway business, transport support services; attract all economic sectors, including foreign investors, to invest in means of transport, supporting works for transportation activities (platforms, warehouses, cargo yards, loading and unloading vehicles).

Regarding capital allocation: the mobilization of capital from the auction of land along the railway line in the future needs to be carefully studied as the project has just built the route plan. There is no follow-up plan, and the localities have not yet made specific plans about urban development, industrial parks along the railway, so how real estate will be cannot be known yet.

Regarding the completion of the legal framework:

+ Quickly improve the legal system on capital mobilization and the use, management and exploitation of HSR projects, creating a healthy and equal competitive environment among economic sectors, as investing in construction of the North-South high-speed railway is a long process, requiring a large amount of capital and stable long-term mechanisms and policies. Vietnam's legal regulations still have many shortcomings and are not favorable for HSR development. There is no mechanism to separate the site clearance work into separate projects; Law on Public Investment only allows the government's capital contribution rate up to 50%.

+ Study, develop and issue a policy on concessions to exploit part of railway infrastructure to recover capital.

Focus on planning of urban areas and industrial parks in association with railway lines and stations to create new development space, improve competitiveness, promote efficiency in capital mobilization, exploitation, railway transportation.

* Lesson of failure

Taiwan's lesson: High-speed rail by itself is not enough to change the fortunes of the economy. Only when it is combined with additional policies related to connectivity to local and regional transport networks, or combined with land use planning, exploitation business in the station areas, leasing services of land, then the vast economic efficiency of high-speed railway can be fully promoted.

Since the investment rate for the construction of high-speed railway is 4-5 times higher than the investment rate for the construction of high-speed roads, it is necessary to determine that the government's capital plays the leading role. Expecting on private investment can lead to the same risks as Taiwan.

Lessons on accurate traffic forecasting: from Taiwan or UK projects, when the traffic is not as expected, PPP projects will be in a locked-in state and lead to project failure. Construction of a new HSR should only be considered when there are high expectations for rail transport demand.

6. Conclusion

The North-South high-speed railway project is a completely new project, first deployed in Vietnam, the survey, analysis, evaluation, decision and implementation need to be carefully researched and considered. All factors must be analyzed in order to have sufficient evidence for each option, selected scenario, especially financial resources. The article studies the experience of raising PPP capital in a number of countries with developed high-speed rail systems or whose economies and societies are similar to Vietnam's;
analyzes achievements and difficulties. Based on the actual conditions of Vietnam, this article draws important lessons in line with policies and actual resources in order to invest on schedule and achieve results according to the tasks set by the government.

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