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Research on mobilization and effective utilization of capital for high-speed rail system development in countries: some issues for Vietnam

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ABSTRACT
The construction project of the high-speed rail (HSR) line on the North-South axis has extremely immense scale, with complex technical-technological standards, deeply and long-term impacting the country's economic and social development. This marks the first implementation of such project in Vietnam, thus requiring thorough and comprehensive research and evaluation. The selection of an appropriate financial mechanism is crucial to the project's success. The Vietnamese government is currently implementing a socialization policy in the transportation sector in general, and the North-South HSR project is proposed to be executed through a public-private partnership (PPP) model. In this framework, the state budget plays a leading and decisive role; external resources are deemed vital for breakthroughs. However, aspects such as how to mobilize funds, how the private sector participates, how it is managed, how the capital is repaid, whether to opt for limited-term transfers or lease of asset exploitation rights, over how many years... have yet to be addressed. Researching the mobilization and utilization of financial resources in countries with developed HSR systems, the authors observe varying investment and operational methods in each nation. Even within a single country, different financial models are applied in distinct phases. Alongside the successes achieved, there are instances of failed projects resulting in substantial losses. Hence, in addition to analyzing experiences in mobilizing and using funds for construction investment of HSR systems in other countries, the article also assesses the advantages and challenges for Vietnam. These are vital suggestions to aid the Vietnamese government in drawing lessons and selecting appropriate forms of mobilization and use of capital in line with the country's actual resources, exploiting the potential and advantages of the country.

1. Introduction

In the world, high-speed railways have been developing for nearly six decades. Japan was the first country to develop this system, starting the operation in 1964. Currently, more than 20 countries worldwide have dedicated railroads with the maximum speed of 250 km/h and above, most of which are located in Europe and Asia [1]. *Research from countries with developed railway infrastructure demonstrates the important role of the Government in successfully mobilizing and utilizing investment capital, with limited involvement of private economy. Some countries choose to invest entirely with state funds, while others opt for PPP models, where public investment predominates,* accounting for over 80 % (infrastructure costs), and the private sector contributes about 20 % (vehicles, operational equipment). During the process of operation, a few projects are operated and managed directly by the Government, others were mostly chosen to lease operational rights to investors under BOOT, DBMF, BTL contracts and so forth [2]. However, the duration and scope of concession agreements vary between countries.

In Vietnam, since 2010, the Government has submitted to the National Assembly a feasibility study report for the high-speed rail project with a total investment of 56 billion USD, but it was not approved. The project's financial feasibility was deemed too low, its social benefits were not clearly defined, and the required capital was excessively high, accounting for over half of Vietnam's GDP, posing a heavy debt burden for future generations.

Since 2010, rapid socioeconomic development along the North-South corridor has led to an increase in transportation demand. According to forecasts, the demand for travel along the North-South axis is expected to reach approximately 195 million passengers per year in 2030. However, the maximum capacity at this time for road, air, and maritime transportation only amounts to pracically 138 million passengers per year. The railway system suffers from outdated infrastructure, weak management systems, and a transportation market share of less than 1%, leading to significant imbalances in the transportation infrastructure and posing numerous risks and challenges to the socioeconomic landscape [3]. To effectively exploit various means of transportation, it is essential to leverage and integrate the strengths of each mean.

The HSR system offers numerous advantages over other transportation sectors such as large carrying capacity, high travel speed, shorter total travel time, safety, reliability, convenience, and environmental friendliness. Investment in HSR construction is expected

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to be a breakthrough, creating new momentum for the socioeconomic development of the regions that the project passes through. It aims to address the imbalance in the transportation system, meet sustainably transportation needs, and enhance the competitiveness of the economy.

Currently, the concept of "high-speed rail" has been officially introduced in the Railway Law No. 06/2017/QH14. In the railway network planning for the period of 2021-2030, with a vision to 2050: Completing investment preparation and mobilizing resource to commence construction of several new railway lines, prioritizing the North-South High-Speed Railway (NSHSR) before 2030. Affirming the determination of the State and Government, the Politburo issued Conclusion 49-KL/TW in February 2023, with the direction: By 2025, striving to complete the approval of the investment project's principles; commencing prioritized sections during the 2026-2030 period (including the Hanoi - Vinh and Ho Chi Minh City - Nha Trang sections); and completing the entire line before 2045 [4, 5].

The Ministry of Transport is presently soliciting feedback on three scenarios for the North-South railway, including two scenarios of high-speed trains at 350 km/h for passenger transportation and freight backup, with a total investment of about 70 billion USD [6]. This is a substantial amount for the Vietnamese economy. While both central and local budgets are already constrained, they are exacerbated by expenditures related to Covid-19. Private capital (including investor equity and bank loans) is facing obstacles due to stringent financial regulations. Therefore, studying on the mobilization and utilization of financial resources from countries with developed HSR systems, based on specific conditions in Vietnam, to identify advantages and disadvantages, hence drawing lessons for construction and project operation is of critical importance.

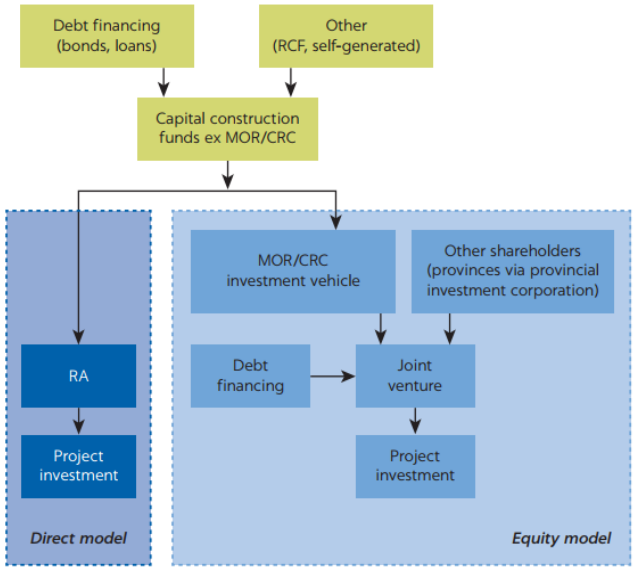
2. Experience in mobilizing and utilizing capital for the construction and operation of high-speed rail systems

2.1. China

China has the world's longest HSR system and advanced technology. Notwithstanding starting construction relatively late (the first line connecting Beijing to Tianjin was completed in 2008), China's HSR sector has rapidly developed both domestically and internationally. By 2023, the length of this system had exceeded 42,000 km, accounting for over 70 % of the total length of high-speed railways worldwide [7]. This success can be attributed to flexible investment policies in mobilizing and efficiently utilizing government capital.

Before 2004, Chinese government typically used the direct investment model. The Ministry of Railways (MOR) provided the funding and the local Regional Administration (RA) was responsible for implementing the project (Figure 1).

Since 2004, most major projects have utilized *the equity model,* with 50 percent equity from joint venture partners and 50 percent loans from domestic banks (such as China Development Bank) at an interest rate of 5 % per annum. Additionally, there is limited participation from international banks. The China Railway Corporation (CRC) is primarily responsible for project implementation and financial mobilization. Under this approach, CRC, through its subsidiaries like China Railway Investment Corporation or the local Regional Administrations (RAs), establishes joint ventures (JVs) with local governments (typically provincial governments), occasionally involving third-party entities, such as Ping An Insurance Group Co. Ltd. in the Beijing-Shanghai HSR company, China National Offshore Oil Corporation in the Beijing-Tianjin Intercity Railway Company, and Fosun Group in the Hangzhou-Shaoxing-Taizhou HSR company. This model is also referred to as the "railway and local government cooperation" model (Figure 1).



Note: CRC = China Railway Corporation; MOR = Ministry of Railways; RA = Regional Administration; RCF = Railway Construction Fund (which is funded by a surcharge on railway freight).

Figure 1. Direct and equity financing model [8].

The operational process involves two types of JV models. One is the ticket revenue model: The JV collects revenue from passenger tickets, engages in contracts with the RA for train operations and infrastructure maintenance, and compensates the RA for its services. The other model is the access charge model: The JV collects access charges for the use of lines and stations by train operators and enters into contracts with the RA for infrastructure maintenance. The RA organizes the train service and retains the revenue from passenger tickets, bearing revenue risk. These HSR JVs are akin to tolled expressway companies - essentially asset management entities responsible for overseeing construction, utilization, and maintenance of the asset, as well as debt servicing [8].

Capital mobilization strategy: From 2004 to 2015, China mobilized approximately ¥2.5 trillion (US$370 billion). This was financed from a combination of the equity contribution from MOR/CRC and local governments, bank loans taken by the JVs (mostly from the major national and provincial development banks), central budget, and

construction bonds of various types to finance the MOR/CRC equity contribution. The local government contributed land acquisition and resettlement, as well as support for material supply, facilities, and relief from local taxes. In some cases, private capital was also mobilized. China National Offshore Oil Corporation has taken a 19 percent share in the Beijing–Tianjin line, and the Ping An Insurance Group Co. of China Ltd. has taken a 14 percent share in the Beijing–Shanghai line.

The basic strategy is to encourage the construction and operation of railways by private capital through promoting structures such as sole proprietorship and joint ventures, as well as the ownership and management rights. The public–private partnership model can also be used to attract investment by combining transport revenue and related development revenue. This model appears to be having some success with the more promising lines: Jinan to Qingdao is the first HSR line based on local government capital, and Hangzhou to Taizhou is the first HSR line financed over 51 percent by private capital.

At the more macro level, a railway development fund has been formed that combines seed capital from the central government with investments by longterm investors wanting a stable and reasonable return. Support will also be given for eligible enterprises to raise funds with corporate bonds and debt financing instruments, and permit major projects to issue renewable bonds. Financial institutions can also support the construction of railway projects through lending against assets such as mineral rights and franchises.

Sources of finance from operating the HSR system: In addition to ticket sales revenue, China HSR has already been trying to broaden its sources of revenue. Advertising, parcels, and station and on-train businesses are well-established. Land development also holds promise. HSR stations and surrounding areas should form part of a comprehensive land development plan. This type of planning will not only improve railway revenue but also encourage coordination between the layout of the railway station and external transport, city roads, and public transport.

Financial incentive policies in operations: Improving financial returns through increasing revenue, providing government subsidies; and reducing costs; and restructuring debt by grouping lines and by reprofiling principal repayment. Specifically:

(1) Policies on passenger rail fares: Before 2016, ticket prices were determined by the government and fairly low. Only five out of sixteen 200–250 kph lines could cover their operating and maintenance costs, excluding interest. The remaining lines did not generate enough revenue to offset operating and maintenance expenses, let alone interest and principal payments. Since 2016, HSR fares may be adjusted to reflect market conditions. The CRC is empowered to adjust ticket prices on lines with speeds exceeding 200 km/h. However, high-speed rail fares in China are still much lower compared to other developed countries. The average ticket price per kilometer of high-speed trains in China is 0.04 euros, considerably lower than Spain's 0.19 euros, France's 0.22 euros, Germany's 0.27 euros, Italy's 0.25 euros, and Japan's 0.22 euros [7].

(2) Incentives for cost reduction: On the cost side, HSR companies in China receive preferential tax treatment, with the first three years of operations being exempt from enterprise income tax and the next three years having tax reduced by 50 %. Interest on railway bonds receives preferential tax treatment, and CRC continues to enjoy the preferential tax policies of the state toward the former MOR, as well as concessions from local governments.

(3) Providing government subsidy: The State Council required CRC to establish an explicit mechanism for subsidies for rail passenger transport and studied ways of using financial subsidies to compensate for passenger service losses. The central government implemented a transitional passenger traffic subsidy to CRC. In addition, for some railway projects controlled by private capital, the central government's dedicated fund may be supported by interest discounts and investment subsidies. Where projects with public welfare benefits are undertaken by private capital, there should be a reasonable compensation system. However, these policies need careful design to also encourage operators to increase transport revenue and control operating cost.

(4) Grouping lines. HSR lines could be organized into a few large groups so that the main lines can support their feeder branches. Doing so does not change the underlying financial fundamentals but does enable more profitable lines to support less profitable lines. It is a reasonable approach, because up to 30 percent of traffic on the main lines originates from or is destined to those feeder lines.

(5) Debt reprofiling. HSR debt may be restructured to extend the tenor of the loans or backload principal repayment to better match the growth in demand over time. Debt service pressure on HSR projects is largest at the start of operations and the commencement of principal repayment. Alternative debt schedules can better match the profile of repayments to the profile of cash generated by the project by putting more principal repayment at the end of the loan [8].

China's ambition: In 2013, China initiated the "One Belt, One Road Initiative" (BRI), aimed at promoting the global export of railway technology. By mastering the technology, domesticating equipment manufacturing, benefiting from low labor costs, and implementing mechanization in railway construction, China's construction costs for high-speed rail lines are lower than those in European countries. Over the span of 10 years (2013 – 2023), the number of railway contracts signed with foreign partners increased from 35 to 140, with the value rising from 31.6 billion USD to 95.3 billion USD. Through the BRI initiative, China has opened up more potential markets for its companies. These companies share common traits: they are all state-owned railway companies, involved in both investment and operation activities (from constructing railway lines to manufacturing locomotives and train cars). Some of these companies have become major construction contractors globally due to their large scale and diversified operations, such as China Railway Construction Corporation (CRCC) and China Railway Engineering Corporation (CRECG) [9].

2.2. Japan

The investment and operation management model of Japan's High-Speed Rail (HSR) is implemented through a Public-Private Partnership (PPP) between the Japan Railway Construction, Transport and Technology Agency (JRTT), a state-owned entity, and private joint-stock companies (JR) such as JR Center, JR East, JR West, etc.

The investment process: The JRTT company is responsible for constructing the infrastructure. Upon completion, JRTT owns the railway line and leases it to private companies (JR) for operation. The investment capital is provided by the government, with 2/3 coming from the central budget and the remaining 1/3 from local budgets. Additionally, the Japanese government seeks funding from the World Bank (the Tokaido Shinkansen project borrowed $80 million from the World Bank, with an interest rate of 5.75 % per annum, a grace period of 3 years, and a loan term of 20 years) [10].

Operations process: JR companies purchase train fleets, operate them, collect fees to recover investments, and simultaneously pay infrastructure rent.

To ensure financial feasibility, the Japanese government approves HSR investments if they meet the following criteria: (1) Stable financial resources are secured for the project; (2) Project operating costs are offset by ticket revenue; (3) Investment is cost-effective, with benefits outweighing costs; (4) Construction is invested in by the operator - JR; (5) Consent is obtained from relevant local authorities regarding discontinuation of railway operations [11].

2.3. Taiwan

From the inception of the "North-South High-Speed Rail Construction Project" in 1980 to the selection of contractors for the project (in 1996), commencement (in 1998), and operation (in 2007), it has been a lengthy process. The Taiwanese government advocated for capital mobilization through a PPP model with a business operating license term of 35 years, from 1998 to 2033. The land planning duration is set at 50 years. After the expiration of the business license, it will be transferred back to the state either with compensation or without. The Taiwanese Ministry of Transportation has issued the "Regulations Encouraging Citizen Participation in Transportation Construction" to attract private investment [12].

In addition to benefits such as high transport capacity (3.7 times that of the Zhongshan Highway, 2.5 times that of Highway No. 2), and shortening the travel time from Taipei to Kaohsiung from 5 hours to just 90 minutes, the project encountered several obstacles. The Taiwanese government had to intervene *multiple times to rescue investors* through policies such as reducing loan interest rates, purchasing additional shares to increase ownership from around 20 % initially to about 64 %, and extending the operating contract from 35 years to 70 years. Some of the main reasons for Taiwan's failure in applying the PPP model to the North-South High-Speed Rail project are as follows:

(1) The passenger forecast during the operational phase was inaccurate: The Taipei - Kaohsiung line was initially forecasted to have 240,000 passengers per day by 2008, but by 2014, this number only reached 130,000 passengers per day, leading to an accumulated loss of NT$46.6 billion (US$1.51 billion) by the end of 2014. By 2015, the Taiwanese government had to intervene by injecting an additional NT$30 billion into the Taiwan High-Speed Rail Corporation [11].

(2) Technology selection: Initially, the Taiwan High-Speed Rail Corporation (THSRC) - the winning bidder, chose a hybrid electrical system combining the TGV high-speed trains from France with the ICE trains from Germany. During the construction process, THSRC faced difficulties in investment capital, and the wheel derailment and overturning accident involving the ICE trains in Germany prompted THSRC to reopen the bidding process for technology selection. Eventually, Japanese technology was chosen based on technical aspects, reliability, and the commitment of funding from the Japanese government. This violated the contract with the European Rail Alliance, and THSRC had to compensate its partners with NT$2.1 billion.

Furthermore, due to the transition of the electrical system, it took time to adjust to compatibility with other systems, prolonging the construction period. The operational process also encountered difficulties, leading to increased costs. French and German train drivers (hired by Taiwan) were only allowed to speak English with Taiwanese traffic controllers, but they operated Shinkansen trains with Japanese systems of characters, signals, etc., on tracks initially designed by British and French engineers [6, 12].

The significant burden of costs due to integrated vertical construction: Since THSRC undertook civil construction work except for a section of the line in Taipei, the investment amount is substantial, with annual depreciation and interest costs putting pressure on profits. This is the main factor causing THSRC to face challenges in continuing its operations [11].

The connection between the stations and surrounding areas is not well-established: When constructing the high-speed rail line, the Taiwanese government hoped that the project would promote balanced development between regions. Over 1,500 hectares of land have been planned for the construction of urban areas adjacent to the main stations, with a total expected investment of billions of USD. However, the lack of a satellite transportation system and communication infrastructure has hindered urban development.

2.4. Korea

Previously, South Korea's railway lines were managed by the National Railroad Administration. This agency handled all tasks from railway construction to ticket sales and train operations. However, the government recognized that if this agency continued to manage the operation of a new, modern system like high-speed rail, it would be difficult to implement and upgrade technology. Therefore, the government established the Korea High-Speed Rail Construction

Authority to operate independently, overseeing all projects related to high-speed rail, including technology acquisition. Currently, South Korea is one of the leading countries in Asia with a modern railway network.

Alongside its successes, South Korea also has had failed HSR projects. In September 2018, the high-speed rail line connecting Seoul with Incheon International Airport, the main gateway to South Korea, had to be shut down after 4 years of operation. The reason was a miscalculation of demand. One year before its cessation, 77 % of the train seats were empty [6].

2.5. Countries in Southeast Asia

China's *"The one Belt, one Road Initiative"* policy will connect its HSR system (from Kunming) to Singapore through Laos, Thailand, and Malaysia.

Laos: The section from Kunming to Vientiane, spanning over 1,000 km with a total estimated investment of USD 5.9 billion, was completed on 3/12/2021. Of this, 60 % of the project's total investment comes from loans from the Export-Import Bank of China [1]. However, Laos is facing the risk of excessive debt from China, as it had previously incurred a debt of USD 1.5 billion. This has compelled the Laotian government to transfer some rights to land and other resources to China, yielding to the developers of Chinese economic zones [13].

Thailand: Recognizing the benefits of integrating its domestic high-speed rail system with the China-Laos railway, Laos is keenly aware of the need to limit China's influence. Therefore, in 2020, Thailand prioritized Phase 1 for the development of a high-speed passenger rail line from the capital Bangkok to Nakhon Ratchasima, spanning 253 km with a total cost of USD 1.67 billion and a design speed of Vtk = 250 km/h (instead of making a large investment to connect Bangkok to Nong Khai - a province bordering Laos in Northeastern Thailand).

Indonesia: The construction project of a 138 km high-speed railway connecting Jakarta and the city of Bandung in West Java province has been continuously delayed due to excessively high costs, prolonged land acquisition efforts, and political instability. Initially estimated at a total investment of USD 5.5 billion, with 75 % of financing provided by the China Development Bank, the project's costs later escalated to USD 6.1 billion (due to doubled material and labor costs in Indonesia over the two-year delay). Insurance costs for the project also increased as insurance companies deemed it a high-risk endeavor. While the Chinese government has not confirmed additional funding due to the cost escalation, the Indonesian government remains highly supportive of the project. The mainline officially opened in October 2023, with a total investment of USD 7.3 billion, despite facing significant financial challenges [6].

2.6. Europe

In Europe, countries such as France, Spain, Italy, and Germany have well-established high-speed rail systems with renowned names such as TGV (Train à Grande Vitesse) in France, ICE (Inter City Express) in Germany, and AVE (Alta Velocidad Española) in Spain. Financing for HSR projects is sourced from various entities, including government agencies (federal, state, and local authorities), state-owned companies, and private investors through two main approaches: Full public financing or Public-Private Partnerships (PPP) with significant government contributions [13 - 15].

(1) Full public financing: This model was very popular in Europe during the early stages of HSR development, such as the original French TGV systems (including the South-East, Mediterranean, European East and Rhine–Rhône), Belgium, Germany, Spain and Italy. Public financing can be direct (approximately 40 percent of EU rail infrastructure is done this way), or through a combination of direct government support and finance by national railway companies (as in Italy and France). Examples where HSR was fully financed by the public sector include most of the European HSR network, such as the original French TGV systems (including the South-East, Mediterranean, European East and Rhine–Rhône), Belgium, Germany, Spain and Italy.

There are two main categories of public financing alternatives used for HSR: accumulated public funds or government borrowing. Accumulated funds are broadly derived from consolidated tax revenue, or infrastructure levies, while public sector borrowing includes general bonds, infrastructure bonds, infrastructure revenue bonds, or public trading enterprise borrowing. The most common form of public sector borrowing is via long-term bonds [2, 13 - 15].

(2) PPP finance:

PPP finance is a relatively recent trend in the field of HSR. Private sector financing typically involves private debt, private equity, or a combination of both. In European HSR projects, three types of PPP schemes are observed, with varying degrees of private sector involvement, as outlined in Table 1 below. In these schemes, the government plays a dominant role in providing financial support and sharing revenue risks with investors during the operation and exploitation phase.

Table 1. Some PPP investment projects in Europe [2, 16].

Investment Method	Investment Scope			Operational Scope			HSR Exemples	Financing comments
	Civil Works	Electro- mechanical	Rolling Stock	Construction	Operation	Maintenance		
Broad based PPP	X	X	X	X	X	X	Russia (Moscow - Saint- Petersburg)	50 percent government financing for construction cost; 30-year concession for operation, with availability payments by government, i.e. government takes on patronage risk (more akin to France's "partnership" model).
PPP for infrastructure only	X	X		X		X	France	Two PPP models: • Concession (refers here to a model where private parties take on patronage risk) • Partnership (where government takes on patronage risk, makes availability payments).
	X	X		X		X	Spain (Olmedo - Ourense and Madrid - Badajoz)	40% of the construction costs are sponsored by the State-owned infrastructure management agency. 60% of the funding comes from private investment or long-term debt. Concession for operation and management is granted to the investor for 25 years, with payments from the Government. The Government bears the revenue risk during operation.
	X	X		X		X	UK - France (Channel Tunnel Rail Link)	Government backed private bond issue, operated via 30-year concession.
	X	X		X		X	UK (Tunnel Rail Link/ High Speed 1)	Build Own Operate Transfer (BOOT) type PPP. Full private financing (combination of private equity and debt) of construction. 99-year private concession to operate (amounting to indirect state subsidy).
PPP for superstructure only		X		X		X	Netherlands-Belgium High-Speed Line South	Sub-structure fully state financed. Design, Built, Maintain and Finance (DBMF) type PPP. Includes two separate concessions: a 25-ear track concession (for availability of superstructure), and a 15-year transport concession for provision and operation of train services on commercial basis.

3. Advantages and challenges for Vietnam in mobilizing and utilizing funds for the construction and operation of high-speed rail systems

3.1. Advantages

- The rapid socio-economic development demands an enhanced transportation system. The imbalance among transportation modes has led to high logistics costs in Vietnam (about 5 % of GDP), traffic accidents, environmental pollution, etc. The North-South high-speed rail has many advantages over other transportation sectors and will sustainably meet the increasing transportation demand [17].

- The determination of the Government and the Ministry of Transport: Since 2002, within the master plan for the development of Vietnam's railway transportation, there has been a direction to construct a high-speed railway line along the North-South axis. Currently, according to the railway network plan for the period 2021 - 2030, with a vision to 2050, the North-South high-speed railway is identified as a crucial route, linking the trading activities of urban chains and economic zones across the entire territory. In February 2024, the Ministry of Transport proposed to the Prime Minister the establishment of a Steering Committee for the construction of the North-South high-speed railway and other important national railway projects; and the establishment of a Consulting Team comprising representatives of

ministries, agencies, experts, and scientists from related fields to assist the Steering Committee in its work.

- Vietnam's elongated terrain, with a narrow coastal plain, makes the North-South transportation corridor the backbone of the country's socioeconomic development. This corridor passes through many major cities, with distances ranging from 300 to 500 kilometers, which are highly suitable for HSR development. Specifically, among the 20 provinces/cities traversed by the project, there are 10 urban areas with populations exceeding 500,000 inhabitants, such as Hanoi, Thanh Hoa, Vinh, Da Nang, Thua Thien Hue, Quy Nhon, Nha Trang, Bien Hoa, and Ho Chi Minh City [11].

- The Law on Public-Private Partnership (PPP) Investment, passed by the National Assembly in 2020 along with a series of guiding documents, marked a significant improvement in Vietnam's legal system regarding PPP. This contributes to establishing a more transparent and stable legal framework for attracting infrastructure development funding from the private sector.

- Furthermore, there are several factors that positively influence the mobilization and utilization of funds for the HSR system, such as political and social stability, macroeconomic stability, and public support.

3.2. Challenges

- Vietnam's economic scale is still modest, with limited accumulation capacity. Therefore, maintaining high levels of investment in infrastructure will affect macroeconomic balance and the overall development of the economy. Additionally, substantial investments in infrastructure lead to pressure on high public debt ceilings, reducing access to low-cost borrowing sources such as Official Development Assistance (ODA).

- Vietnam has not yet established a long-term process or strategy to attract investment for the development of infrastructure projects in general, and HSR projects in particular. The domestic capital market is weak, making it difficult to access international capital markets.

+ The capital attraction process helps investors grasp the implementation steps, understand what needs to be done at each stage, identify responsible parties, determine the outcomes of each phase, and devise comprehensive investment strategies. A scientific process instills confidence and boosts investment attraction.

+ The macro-level investment attraction strategy for HSR development is highly essential. Investing in HSR requires a significant amount of capital and has a long payback period—this is the most concerning aspect for private investors. Macro-level policies on investment attraction strategy provide investors with a holistic view, thereby instilling confidence for increased investment capital.

- Vietnam has not yet developed specific policies for the development of HSR, especially policies for the exploitation and utilization of capital in the construction and operation process. Due to its large scale and long payback period, as well as being implemented for the first time, this project will entail various risks.

- The legal system and legal framework regarding the investment, construction, management, and operation of HSR projects are not commensurate with the scale of the project.

4. Lessons

4.1. Lesson from failure in capital mobilization and utilization

- Some HSR projects have failed due to difficulties in mobilizing investment capital as well as recouping capital after operation. Lessons from HSR projects such as Seoul - Incheon (South Korea) and Taipei - Kaohsiung (Taiwan) show that: HSR construction investment is a long-term process, requiring large capital amounts and stable mechanisms and policies. There needs to be a very high level of political determination from the State and Government, with a prerequisite being the allocation of capital, establishment of capital structures, and mobilization of various resources for phased investment in each section of the railway line, according to the planned roadmap.

- The HSR system itself is not the sole factor in transforming the economic landscape; it is only when it is combined with policies related to its connectivity with local and regional transportation networks, or integrated with land use planning, business operations at station areas, leasing of premises, and terminals that the full economic benefits of the new high-speed rail can be fully realized.

- The investment preparation process requires careful calculation of revenue, costs, technology selection, and operational speed range. Particularly, within the total investment cost, contingency costs need to be meticulously calculated to avoid capital overruns. Decisions regarding train operating speeds and the coordination between freight and passenger trains need to be analyzed based on the benefits and investment costs, as well as future transport demand and the specific terrain characteristics of particular sections of the route.

- The lessons from China offer valuable insights, yet Vietnam must engage in collaborative efforts focused on aligning interests and distributing risks. While leveraging funds and technology from China can yield numerous advantages, it also carries inherent risks. It is crucial to meticulously examine the investment experiences gained from China's railway initiatives in Southeast Asia. Presently, the prudent approach involves inviting a diverse array of investors from different nations, provided Vietnam can objectively evaluate project effectiveness based on the capacity to optimize foreign borrowing capital.

4.2. Lesson from success in capital mobilization and utilization

- It is necessary to identify the state's capital as the leading role, especially in undertaking the investment in constructing railway infrastructure components (including land clearance, foundation construction, tunnel construction, bridge construction, and rail and switch systems). At the same time, encouraging domestic and foreign investors with the capability to participate in providing rolling stock,

equipment and control systems, investing and operating services around the station and terminal areas.

- Forming urban chains along the route: Revenue from ticket sales for passengers is hardly enough to offset the investment costs. Additionally, for the HSR system to compete with air travel on long-haul routes, the lessons from Japan and Europe suggest developing commercial real estate projects along the high-speed rail line to ensure sufficient revenue generation.

Raising capital through land auctions along the railway route requires careful study because the new project involves developing a route plan that has not yet been planned. Localities have not yet specifically planned for urban and industrial development along the railway, so it is unknown how real estate will be positioned [13].

Additional policies are needed regarding the concession of infrastructure operation rights or leasing of railway infrastructure operation rights to recover capital; integration with the local transportation network.

The investment option selection must ensure: the application of proven modern technology; reliability, efficiency, and availability metrics; maintenance and safety control by Vietnamese resources.

- The process of construction and implementation of the project requires consensus, collaboration, and genuine engagement from multiple sectors across various fields. It is necessary to formulate a comprehensive and cohesive strategy and plan for the development of the high-speed rail system, akin to China's HSR system, with specific targets and measures aligned with the economic development goals by 2030 and the vision for 2050.

5. Conclusion

Investing in the construction of the North-South HSR system is a long-term process that requires a significant amount of capital and stable, long-term policy mechanisms. Mobilizing and utilizing funds for construction and operation is imperative, especially in conditions where budgetary resources are limited and credit is increasingly tightened. Research articles study the experience of mobilizing and using funds in countries with developed high-speed rail systems or economies and societies similar to Vietnam, such as China, Japan, South Korea, Taiwan, some European countries, and some Southeast Asian countries; analyzing both successes and failures. Based on Vietnam's practical conditions, the article highlights the advantages, challenges in mobilizing and using funds, along with important lessons in choosing implementation methods that are appropriate to policies and actual resources, leveraging the country's potential and advantages.

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