The Laos-China Railway and Lessons for the Vietnam North - South High-Speed Railway Project

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Abstract

The study aims to assess the successes and drawbacks of the Laos-China railway, drawing lessons for Vietnam in constructing its North - South high-speed railway. It adopts a qualitative approach, analyzing secondary sources to examine the construction of the Laos-China railway and the current state of Vietnam's railway system. The findings indicate that the railway has brought multiple benefits to Laos, such as reducing commuting time, boosting trade, creating job opportunities for Lao residents, and strengthening regional connectivity, thereby enhancing Laos's role in Southeast Asia's economic network. However, Laos also faces significant challenges, including a substantial increase in public debt, a growing dependence on Chinese investment and technology, and adverse environmental impacts associated

with large-scale infrastructure projects. The study recommends that Vietnam should proceed cautiously in accepting foreign support, focus on infrastructure development in key areas, and thoroughly assess the social and environmental impacts of the North - South high-speed railway project to ensure sustainable and independent development.

Keywords: *Railway, China - Laos, Laos-China railway, Vietnam North - South Railway*

寮中鐵路及其對越南南北高速鐵路項目的啟示

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摘　要

本研究旨在評估中寮鐵路的成效與弊端，並為越南建設南北高速鐵路提供經驗借鑑。本研究採用質性研究方法，透過分析次級資料，探討中寮鐵路的建設歷程以及越南鐵路系統的現狀。研究結果顯示，該鐵路給寮國帶來了諸多效益，例如縮短通勤時間、促進貿易發展、為寮國居民創造就業機會，並加強區域聯通性，從而提升了寮國在東南亞經濟網絡中的角色。然而，寮國也面臨著重大挑戰，包括公共債務大幅增加、對中國投資與技術的依賴日益加深，以及與大規模基礎設施項目相關的負面環境影響。本研究建議，越南在接受外國援助時應審慎行事，集中力量推進關鍵地區的基礎設施建設，並全面評估南北高速鐵路項目的社會與環境影響，以確保實現可持續且自主的發展。

關鍵詞：鐵路、中寮、中寮鐵路、越南南北鐵路

I. Introduction

In the context of deepening globalization and international economic integration, large-scale infrastructure development has emerged as a critical driver for regional connectivity, trade expansion, and long-term economic growth. Among current prominent trans-border infrastructure initiatives, the Belt and Road Initiative (BRI), launched by China in 2013, is recognized as one of the most extensive and influential projects. It aims to strengthen economic connectivity between China and global regions through strategic investments in transport, energy, and infrastructure systems.

The Laos-China railway (LCR) is a part of BRI. This railway connects Vientiane, the capital of Laos, with Kunming in China's Yunnan province. It facilitates the transportation of goods and passengers both within Laos and across the border, reducing travel time and transport costs. The project is not only important for Laos's economic development but also has significant impacts on the Southeast Asian region, including Vietnam. As Vietnam is going to implement the North - South high-speed railway project, a mega-venture requiring immense capital investment that will highly likely necessitate the participation of foreign partners for funding, technology, and construction expertise, studying the experience of the LCR is of paramount importance in providing policy lessons.

Although Vietnam and Laos exhibit certain differences in geographical conditions, population size, and levels of economic development, both nations are developing countries in Southeast Asia and confront shared challenges when executing strategic infrastructure projects, particularly regarding massive capital mobilization, debt sustainability management, technology transfer assurance, and the maintenance of strategic autonomy in relations with external partners. Therefore, this study conceptualizes the LCR as a reference case to simultaneously analyze the opportunities and risks inherent in large-scale infrastructure projects involving foreign

capital and technology. By evaluating both the achievements and challenges posed by the LCR project, the study aims to derive policy implications that can assist Vietnam in implementing the North - South high-speed railway project in an efficient and financially sustainable manner, while minimizing adverse socio-environmental impacts and ensuring long-term strategic autonomy.

II. Theoretical Framework

Many developing countries confront a substantial infrastructure gap, whereas domestic financial resources, technological capabilities, and implementation capacities remain limited. Consequently, external financial sources, including Official Development Assistance (ODA), concessional loans, and foreign investments, play a critical role in supporting the construction of large-scale infrastructure projects.

Hubbard & Duggan argue that foreign aid and external debt foster development only when they help recipient nations enhance their domestic competitiveness and productive capacity; conversely, the inefficient utilization of such funds can lead to a debt spiral and prolonged dependency.[1] Against the backdrop of the BRI implementation, international literature has formed divergent perspectives regarding the impacts of Chinese-provided infrastructure loans. Hurley et al. contend that large-scale borrowing by nations with limited financial capacity can exacerbate risks to debt sustainability, while creating potential economic dependency and constraining the policy-making space of recipient states. From this perspective, the concept of debt diplomacy (or debt-trap diplomacy) is utilized to explain the nexus between infrastructure financing and strategic influence.

However, Brautigam argues that there is insufficient empirical

[1] Hubbard, R. G., & Duggan, *W. The aid trap: hard truths about ending poverty* (New York: Columbia University Press, 2009).

evidence to conclude that China deliberately utilizes BRI loans to seize the strategic assets of borrowing nations.[2] A growing body of recent literature suggests that debt risks associated with BRI projects cannot be explained solely by the strategic intent of the lender; rather, they must be situated within a broader context. This includes the recipient country's governance capacity, the economic feasibility of the projects, financial management mechanisms, and fluctuations in the global economic environment.

The expansion of Chinese-funded transport routes, economic corridors, and logistics networks can catalyze a process of increasingly China-centric integration. Within this framework, flows of trade, investment, finance, and technology tend to align more closely with the Chinese economy, potentially fostering relationships of asymmetric interdependence between China and participating nations. However, this integration does not automatically imply an inevitable loss of strategic autonomy for participating states. In practice, developing nations often face the dilemma of balancing the leverage of capital, technology, and connectivity opportunities from major powers against the preservation of their independent developmental decision-making. As a result, strategic autonomy is conceptualized as a nation's capacity to pursue its developmental objectives and national interests while maintaining control over strategic decisions, critical infrastructure assets, and key technological sectors.[3]

In addition to financial and geopolitical debates, environmental sustainability has emerged as a crucial research direction for large-scale infrastructure projects, particularly mega-railway ventures (Chester & Horvath, 2009). Although railway systems are generally considered a lower-

[2] Deborah Brautigam, "A Critical Look at Chinese 'Debt-trap Diplomacy': The Rise of a Meme," *Area Development and Policy*, Vol. 5, No. 1, 2020, pp. 1-14.
[3] Alfred Gerstl, *Hedging strategies in Southeast Asia: ASEAN, Malaysia, the Philippines, and Vietnam and their relations with China* (London: Routledge, 2022).

carbon mode of transport compared to road and air travel, the construction process of new rail lines can exert significant impacts on ecosystems, biodiversity, land use, and the livelihoods of local communities. Consequently, Hriday (2023) suggests that the evaluation of railway projects should adopt a life-cycle perspective, balancing long-term economic benefits and operational emission reduction efficiency against the adverse socio-environmental impacts arising during the construction phase.

Thereby, the assessment of the LCR extends beyond analyzing its contributions to regional connectivity, trade, and economic development; it also necessitates an examination of issues regarding debt sustainability, reliance on external capital and technology, as well as long-term socio-environmental consequences. This analytical framework is applied to evaluate the LCR as a case study, aiming to derive implications for the development of Vietnam's North - South high-speed railway.

III. The China - Laos railway

A. Overview of the China - Laos Railway

The LCR is a key part of the BRI, China's strategic initiative to connect Asia, Europe, and Africa through a wide network of transportation and infrastructure. This railway not only brings major benefits to China but also helps Laos, a landlocked country, expand its connection with the outside world.

The railway has a total length of 1,035 kilometers, with 422 kilometers running through Laos. It stretches from the capital Vientiane to Boten, a town near the Chinese border, which is linked to the Chinese railway network in

Yunnan province.[4] (Figure 1)

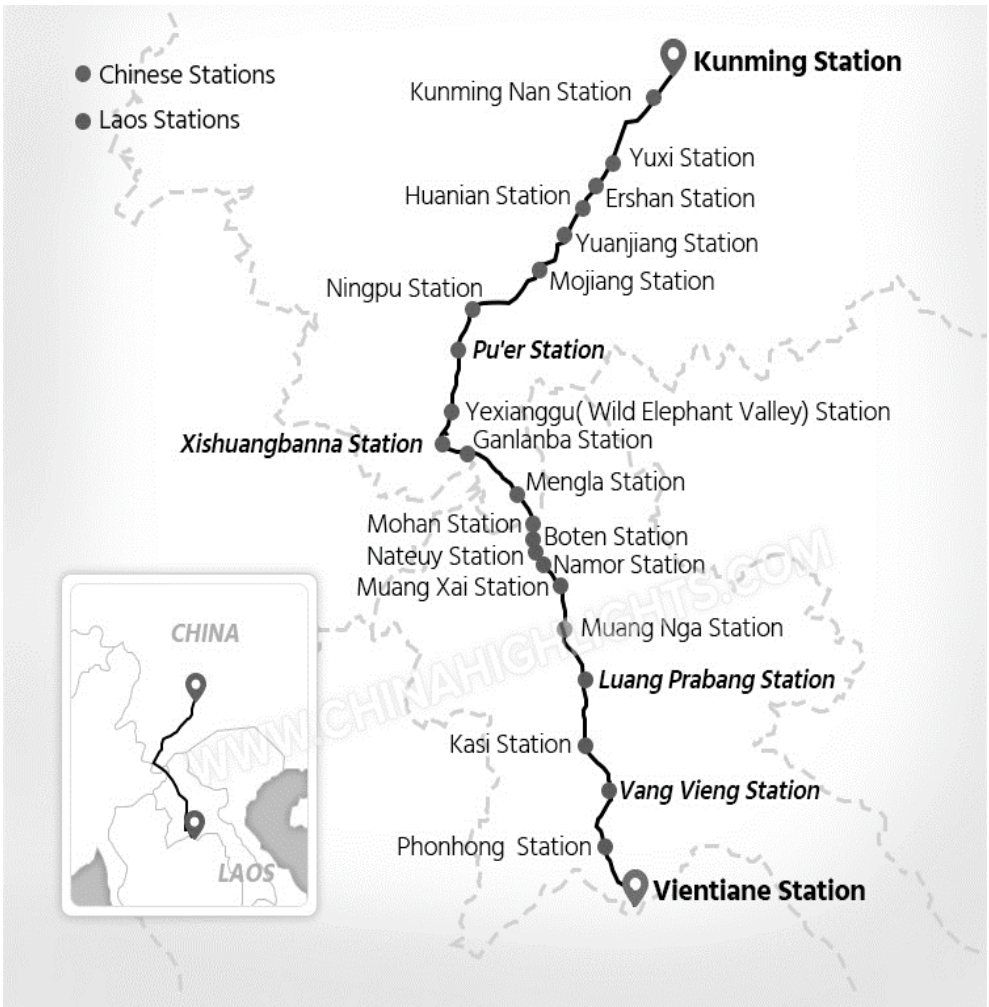

Figure 1: The China - Laos Railway

Source: "The Numbers of China-Laos Railway Trips Exceeded 16 Millions," *China Train Booking,* 2023, https://www.chinatrainbooking.com/news/lao-

The railway comprises a total of 24 stations, with the blue section representing the line within Laotian territory and the red part indicating the

[4] "China-Laos Railway Starts Operation", *Xinhuanet*, December 3, 2021, http://www.news.cn/english/2021-12/03/c_1310350441.htm.

line within Chinese territory, with Boten Station serving as the cross-border transfer point.

The railway uses a standard gauge of 1,435 mm and is built according to China's GB Grade 1 standards[5]. It operates EMU (Electric Multiple Unit) trains manufactured by China.[6] These trains can run at a maximum speed of 160 km/h for passenger transport and 120 km/h for freight transport, carrying loads of 2,000 to 3,000 tons per trip.[7]

Most of the railway passes through Laos's rugged mountainous terrain, which includes high mountains and deep valleys. As a result, many bridges and tunnels had to be constructed to ensure smooth travel at high speeds. Bridges and tunnels comprise 62% of the entire route, including 198 km of tunnels and 62 km of river and viaduct bridges,[8] specifically, 75 tunnels and 167 bridges.[9]

According to data from the Environmental Systems Research Institute, Inc. (ESRI) in 2022, the land along the China - Laos railway consists of 75.68% forest land, 9.12% grassland, 6.81% built-up areas, and 6.43%

[5] The GB (Guobiao) Standards are mandatory for all products sold or used in the Chinese market. They are issued by the Standardization Administration of China (SAC) and the National Committee of China for ISO and IEC. GB Grade 1 is part of the GB standards system, developed to ensure product quality and safety across various industries.

[6] Hafida Fahmiasari, "Analysis of the China-Lao PDR Railway Opportunities and Challenges of Mekong Logistics," *Mekong Institute*, 2023, https://mekonginstitute.org/wp-content/uploads/2023/08/B3-Analysis-of-the-China-Lao-PDR-Railway-Opportunities-and-Challenges-of-Mekong-Logistics.pdf.

[7] "Hoàn thành hầm chui xuyên biên giới, dự án đường sắt Lào-Trung Quốc," *Tạp chí Lào-Việt*, September 14, 2020, https://tapchilaoviet.org/tin-bai-noi-bat/hoan-thanh-ham-chui-xuyen-bien-gioi-du-an-duong-sat-lao-trung-quoc-20926.html.

[8] Ibid.

[9] "China-Laos Railway Starts Operation", *Xinhuanet*, December 3, 2021, http://www.news.cn/english/2021-12/03/c_1310350441.htm.

agricultural land.[10] (Figure 2)

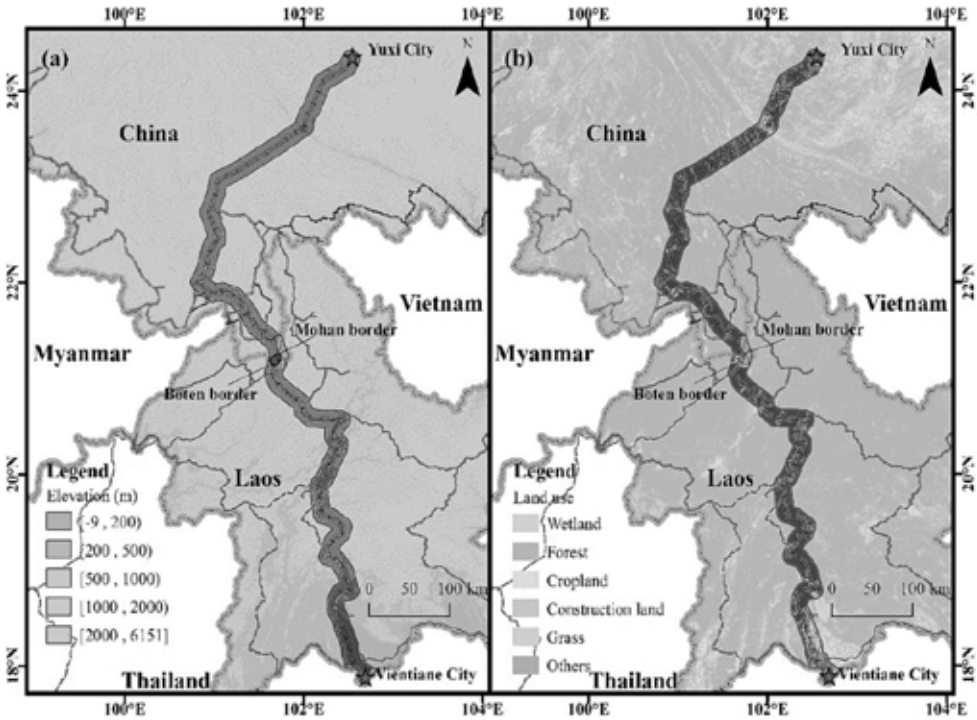

Figure 2：Land Use Types along the China - Laos Railway

Source: Xiao, C., Wang, Y., Yan, M., & Jeffrey Chiwuikem Chiaka, "Impact of Cross-border Transportation Corridors on Changes of Land Use and Landscape Pattern: A Case Study of the China-Laos Railway," *Landscape and Urban Planning*, Vol. 241, January 2024, p. 104924, https://doi.org/10.1016/j.landurbplan.2023.104924.

The main contractors responsible for the project include Sinohydro Group, China Power Construction Group, China Railway No. 5 Engineering Group, China Railway No. 2 Engineering Group, and China Railway No. 8 Engineering Group. All of these are state-owned enterprises managed by the

[10] Xiao, C., Wang, Y., Yan, M., & Jeffrey Chiwuikem Chiaka, "Impact of cross-border transportation corridors on changes of land use and landscape pattern: A case study of the China-Laos railway," *Landscape and Urban Planning*, Vol. 241, January 2024, p. 104924. https://doi.org/10.1016/j.landurbplan.2023.104924.

State-owned Assets Supervision and Administration Commission (SASAC) under the Chinese government. In addition, the Laos - China Railway Co., Ltd. (LCRC) is a joint venture formed by three of the above-mentioned Chinese state-owned companies, holding a 70% share. A state-owned enterprise from Laos also participates in the project, holding the remaining 30% share.[11] The project is being developed under a Build – Operate - Transfer (BOT) agreement. During the 50 - year concession period, the China - Laos Railway Co., Ltd. is responsible for maintenance costs and other project-related risks before handing it over to the Lao government.[12]

After China and Laos signed an intergovernmental railway cooperation agreement in 2015, the project officially broke ground in December 2016. After nearly five years of construction, the railway was completed at the end of 2021 and officially began operations in December 2021.[13] Specifically:

2015: The Chinese and Lao governments signed an intergovernmental railway cooperation agreement, marking the official start of the project implementation phase;

2016: Construction began in Luang Prabang, northern Laos, for the Lao section of the railway;

2017: The first tunnel on the railway line was completed in Vientiane province, with a length of 301 meters;

2018: The first T-shaped concrete beam of the railway was erected in

[11] "China Eximbank provides $480 million loan for China-Laos Railway Project," *Aiddata*, 2024, https://china.aiddata.org/projects/33726/.
[12] "Laos-China Railway project to be profitable after 23 years," *Laotian Times*, December 27, 2021, https://laotiantimes.com/2021/12/27/laos-china-railway-project-to-be-profitable-after-23-years/.
[13] "China-Laos Railway, a flagship project under BRI," *Xinhuanet*, December 3, 2021, http://www.news.cn/english/2021-12/03/c_1310349912.htm.

Vientiane, marking an important milestone as construction moved from foundation work to the upper structure;

2019: Work began on the railway's power supply system in Vientiane;

2020: Despite the COVID-19 pandemic, construction continued, extending the line from Vientiane to the transport hub of Luang Prabang in northern Laos, with annual construction targets met;

2021: The railway was completed on schedule and officially opened on December 3, 2021.[14]

Regarding construction cost, the China - Laos railway is one of the largest infrastructure projects Laos has ever undertaken, with a total investment of about USD 5.9 billion,[15] equivalent to more than one-third of the country's gross domestic product (GDP). (Figure 3)

[14] "China-Laos Railway, a flagship project under BRI," *Xinhuanet*, December 3, 2021, http://www.news.cn/english/2021-12/03/c_1310349912.htm.

[15] Jitsiree Thongnoi, "China-Laos Railway Brings Higher Mobility, Employment as Profit Concerns Linger," *The China Global South Project*, May 8, 2024, https://chinaglobalsouth.com/analysis/china-laos-railway-brings-higher-mobility-employment-as-profit-concerns-linger/, accessed on 21/09/2024.

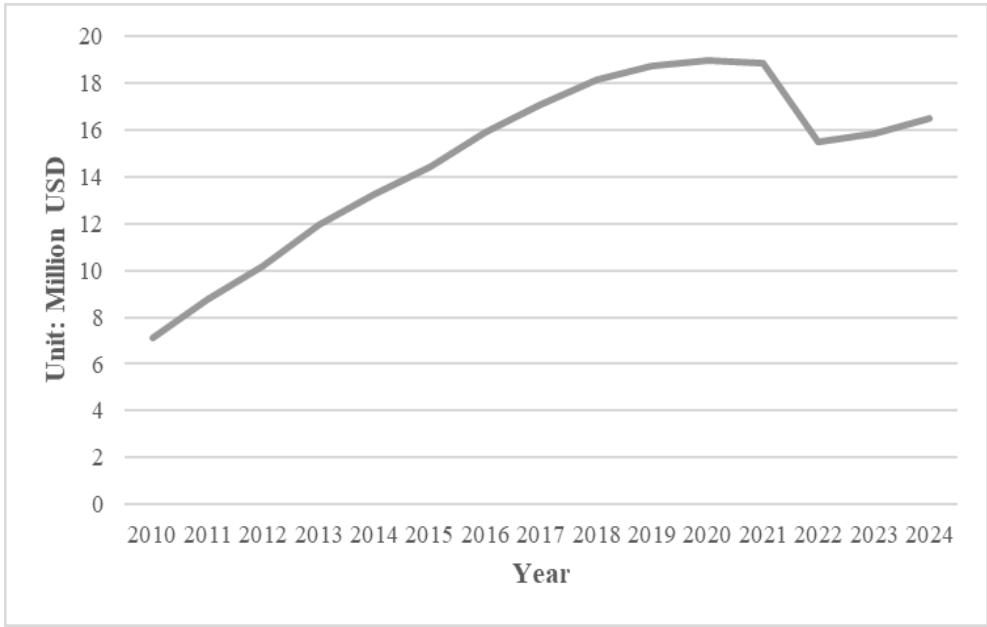

Figure 3：Laos's GDP from 2010 to 2023

Source: The graph compiled by the author based on data from the World Bank, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=LA.

Out of the nearly USD 5.9 billion in construction investment, 60% (around USD 3.54 billion) was financed through loans, while 40% (about USD 2.36 billion) came from government contributions by both China and Laos. Specifically, in June 2019, the Laos - China Railway Company (LCRC) secured a debt financing of USD 3.54 billion (about 22.45 billion RMB) from the Export - Import Bank of China (China Eximbank).[16] The Lao government and the Chinese government contributed USD 730 million and USD 1.63 billion in equity capital to the project, respectively.[17]

The USD 3.54 billion loan was backed by an equity commitment, asset

[16] Debt financing refers to the use of borrowed funds or credit by companies or governments to cover their expenditures. These expenditures are typically tied to the issuance of short-term or long-term bonds.

[17] "China Eximbank Provides $480 Million Loan for China-Laos Railway Project," op. cit.

mortgages, and a concession agreement. To provide its USD 730 million share in equity, the Lao government borrowed USD 480 million from China Eximbank at an interest rate of 2.3%, with a loan term of 25 years and a 5-year grace period. The government also agreed to provide the remaining USD 250 million from its own budget, paid in annual installments. The Lao government did not issue a sovereign guarantee for this loan. Instead, it pledged future revenue from one bauxite mine and three potash mines in Laos as collateral. In addition, before this loan agreement was signed, an intergovernmental framework agreement between Laos and China had already been signed on November 13, 2015.[18]

B. Benefits and Challenges of the China - Laos Railway

(A) Benefits of the Railway for Laos

First, the LCR has significantly reduced travel time. With a maximum speed of 160 km/h, the journey from Vientiane to Boten has been shortened from 15 hours to just 4 hours[19,] and the trip from Vientiane to Luang Prabang now takes only 2 hours[20]. Notably, the travel time between Kunming and Vientiane has been reduced from several days to just 10.5 hours.[21]

Second, the railway has boosted passenger and freight transportation between Laos and China. In 2023, the LCR in Laos transported over 4 million tons of goods, an increase of more than 83% compared to the same period in 2022, averaging about 11,204 tons per day. Of this total, 615,000 tons were shipped from China to Laos, while 3.474 million tons were exported from

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[18] Ibid.

[19] Tom Wilms, "Right on Track or off the Rails," *European Institute for Asian Studie*s, Policy Brief, No. 4, 2021, https://eias.org/wp-content/uploads/2021/12/The-Laos-China-Railway.pdf.

[20] "China-Laos Railway Fuels Tourism Boom in Laos," *Xinhuanet*, February 24, 2024, https://english.news.cn/20240224/73dfb3f3f5df4cc0a685198c713e1b24/c.html.

[21] "China-Laos railway to run cross-border passenger trains starting Thursday," *Vientiane Times*, 2023, https://www.vientianetimes.org.la/freeContent/FreeConten72_chinalaos23.php.

Laos to China. As of June 19, 2024, the total freight volume reached 2.63 million tons, up 32% from the same time in 2023, averaging 15,393 tons per day, with a peak of 22,217 tons in a single day.[22] Approximately 2,900 different product types have been transported along this route,[23] including fruits, grains, frozen seafood, electronic and mechanical parts, minerals, and new energy vehicles[24]. Statistical data indicate that Laos' export turnover to the Chinese market reached US$4.56 billion in 2024, recording a robust growth of 21.4 percent compared to the previous year; within this figure, agricultural exports alone surged by 20 percent year-on-year in 2023.[25]

In terms of passenger transport, nearly 2.6 million passenger trips were made in 2023, an increase of almost 86% compared to 2022, averaging 7,106 passengers per day.[26] In 2023, international passenger trains carried 111,000 travelers. The number of daily train services has also increased significantly on both sides: from 35 to 51 in China and from 4 to 12 in Laos. Daily passenger volume rose from 20,000 to 103,000 in China, and from 720 to 12,808 in Laos.[27] As of June 19, 2024, a total of 1.69 million passengers had traveled on the LCR line, an increase of 41.3% compared to the same period

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[22] Niem Chheng, "Laos-China Railway Revolutionises Travel and Boosts Socio-economic Growth," *The Star*, July 4, 2024, https://www.thestar.com.my/aseanplus/aseanplus-news/2024/07/04/laos-china-railway-revolutionises-travel-and-boosts-socio-economic-growth.

[23] "Lượng hàng hóa vận chuyển qua tuyến đường sắt Trung Quốc – Lào đạt 10 triệu tấn," *Tạp chí Lào - Việt*, September 18, 2024, https://tapchilaoviet.org/tin-ngay/luong-hang-hoa-van-chuyen-qua-tuyen-duong-sat-trung-quoc-lao-dat-10-trieu-tan-71206.html.

[24] "China-Laos Cross-Border Railway: Goods Handled for Over 8 Million Tonnes," *Agenzia Nova*, April 23, 2024, www.agenzianova.com/en/news/China-Laos-cross-border-railway-handled-goods-for-over-8-million-tons/.

[25] ASEAN Briefing, "Leveraging the Laos-China Railway for Trade," June 19, 2026, https://www.aseanbriefing.com/news/leveraging-the-laos-china-railway-for-trade/.

[26] Niem Chheng, "Laos-China Railway Revolutionises Travel and Boosts Socio-economic Growth," op, cit.

[27] "China-Laos Railway Transports More than 30 Million Passenger Trips," *Global Times*, March 14, 2024, www.globaltimes.cn/page/202403/1308838.shtml.

in 2023, averaging 9,864 passengers per day.[28]

Third, the improved convenience and reduced travel time have helped Laos boost domestic tourism and attract more international tourists. In the first nine months of 2023, Laos welcomed over 2.4 million foreign visitors, an increase of 285% compared to the same period in 2022. Among them, nearly 1 million came from Thailand, over 600,000 from Vietnam, and nearly 480,000 from China.[29] Monthly passenger numbers have risen significantly from just over 600,000 at the start of operations to more than 1.1 million.[30] By early 2025, the tourism sector recorded over 48.6 million passenger trips.[31] This growth has also created opportunities for related sectors such as hospitality, restaurants, and retail services.

Fourth, the railway has created job opportunities for the Lao population. In 2020, the construction of the China - Laos railway created 32,000 jobs for Lao workers. Since June 2020, the Laos - China Railway Company has recruited and trained Lao interns through nine separate training programs. More than 800 Lao staff, over 90% of those trained, have been assigned to specific roles, and Lao nationals make up 60% of the company's workforce.[32] In 2022, the railway had generated a total of over 110,000 jobs in Laos since it began operations.[33] Additionally, more than 3,500 Lao workers are employed in areas such as freight transport, logistics, security, cleaning, and

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[28] Niem Chheng, "Laos-China Railway Revolutionises Travel and Boosts Socio-economic Growth," op, cit.

[29] "China-Laos Railway brings booming tourism, business opportunities," *Global Times*, November 30, 2023, https://www.globaltimes.cn/page/202311/1302788.shtml.

[30] "China-Laos Railway Boosts Local Tourism, Employment," *Xinhuanet*, December 6, 2023, https://english.news.cn/20231206/9a1646de0e5a4f89bed299720daeecea/c.html.

[31] "Leveraging the Laos-China Railway for Trade," *ASEAN Briefing*, June 19, 2026, https://www.aseanbriefing.com/news/leveraging-the-laos-china-railway-for-trade/.

[32] Yang Han, "Tracks of Change Lead to Prosperity," *China Daily*, July 15, 2024, https://www.chinadaily.com.cn/a/202407/15/WS669454afa31095c51c50df6c_2.html.

[33] Xinhuanet, "China-Laos Railway promotes friendship, provides development opportunities," December 2, 2022, https://english.news.cn/20221202/63c5a49394fb4acc806d768d50a25540/c.html.

other related fields.[34] Furthermore, as sectors like logistics, urban transportation, trade, tourism, and other industries grow, the LCR has indirectly created over 100,000 job opportunities,[35] helping to reduce the country's unemployment rate.

Fifth, the railway has strengthened Laos' regional connectivity. Laos has become a key transit point for exports from Thailand to China. Thailand has increased its export of agricultural products, especially durian, to China via the LCR.[36] The shipping time from Map Ta Phut in Rayong Province, Thailand, to Guangzhou, China, has been shortened to just 5-6 days, helping to preserve the freshness of the produce compared to transport by road or water.[37] In the first five months of 2023, Thailand's agricultural exports to China via the China - Laos railway increased by 365%, thanks to faster transportation and the support of free trade agreements.[38] In 2025, trade activities at the Mohan border checkpoint (Yunnan, China) recorded robust growth, with the import volume of Thai durian and other tropical fruits increasing by 25% year-on-year, driven by the LCR.[39]

(B) Challenges for Laos

1. Domestic Challenges

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[34] "China-Laos Railway Demonstrates Huge Value after First Year of Operation," *Global Times*, December 2, 2022, https://www.globaltimes.cn/page/202212/1280993.shtml.

[35] "Resolving Global Dilemma: China's High-level Opening-up," *China International Import Expo*, July 16, 2024, https://www.ciie.org/zbh/en/news/exhibition/insights/20240716/45005.html.

[36] Apornrath Phoonphongphiphat, "Thailand's Rail Network to Link to Laos-China High-Speed Train," *Nikkei Asia*, June 16, 2024, https://asia.nikkei.com/Business/Transportation/Thailand-s-rail-network-to-link-to-Laos-China-high-speed-train.

[37] "First Transport Train to China via Laos Is a Boon for Thai Farmers," *Nationthailand*, April 19, 2023, www.nationthailand.com/business/corporate/40026793.

[38] Xinhua News Agency, "Thai Durian Shipments to China Surge as China-Laos Railway Boosts Trade," *Bangkok Post*, August 16, 2023, www.bangkokpost.com/business/general/2630505/thai-durian-shipments-to-china-surge-as-china-laos-railway-boosts-trade.

[39] "2025 Annual Report," *China Railway Engineering Corporation*, April 23, 2026, https://www.crecg.com/zgztywz/articleFileDir/2026-04/23/da6876460ba14af4873eade3c9ed2403.pdf.

First, a large number of unexploded ordnances (UXOs) left over from the Vietnam War have posed significant obstacles to the construction of the railway. During the war, the United States secretly expanded the battlefield into Laos to cut off the Ho Chi Minh trail, conducting 580,000 bombing missions between 1964 and 1973. This resulted in an estimated 270 million bombs dropped, with a total weight of 2 million tons, averaging eight bombs per minute over nine years. Approximately 80 million of these bombs (about 30%) failed to detonate.[40] Clearing these UXOs has not only made construction more difficult but also delayed the project's progress. The affected areas remain dangerous for both construction workers and local residents.

Second, public debt and financial risks have become a growing burden for Laos. After the railway was built, Laos' external debt rose by USD 507 million in 2022 and increased by another USD 950 million in 2023. In total, Laos' public and publicly guaranteed debt (including domestic and external debt) reached USD 13.8 billion in 2023, equivalent to 108% of the country's GDP. Of this, USD 10.5 billion was external debt, nearly half of which (48% or USD 5.09 billion) was owed to China.[41] The International Monetary Fund (IMF) has estimated that Laos' debt could reach as high as 123% of its GDP, about three times the normal level.[42] In 2024, although Laos' public debt decreased to 94.7 percent of GDP,[43] this remains an alarming figure for an agriculture-dependent developing country like Laos. Moreover, the loan from

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[40] "China-Laos Railway thrives despite Challenges," *The Diplomat Insight*, January 12, 2022, https://thediplomaticinsight.com/china-laos-railway-thrives-despite-challenges/.

[41] Marwaan Macan-Markar, "Laos Central Bank Shake-up Reveals Forex Crisis, China Dependence," *Nikkei Asia*, July 14, 2024, https://asia.nikkei.com/Economy/Laos-central-bank-shake-up-reveals-forex-crisis-China-dependence.

[42] RFA Lao and Taejun Kang for RFA, "Laos: Belt and Road Poster Child – or Problem Child?" *BenarNews*, September 29, 2023, https://www.benarnews.org/english/news/thai/belt-road-raises-laos-external-debt-09292023105722.html.

[43] International Monetary Fund, "Laos: General Government Gross Debt," *IMF DataMapper (World Economic Outlook Database)*, 2026, https://www.imf.org/external/datamapper/GGXWDG_NGDP@WEO/LAO?zoom=LAO&highlight=LAO.

the Export-Import Bank of China, with a relatively high interest rate (2.3% per year) and strict conditions, poses long-term financial risks, especially if Laos is unable to generate sufficient revenue to repay the debt. If the railway fails to operate efficiently and revenues fall short of expectations, Laos may face debt repayment difficulties, increased pressure on the national budget, and a heightened risk of falling into a debt trap. The government must therefore balance project operation with responsible public spending.

Third, Laos' small economy and limited population size also challenge the railway's efficiency. With a population of just over 7 million,[44] domestic demand for transportation and freight is not large enough to guarantee sustainable profitability for the project. Although the railway is expected to promote trade and logistics, Laos must attract more transit goods from neighboring countries and more international tourists, especially from Thailand, to fully leverage the railway's potential.

Fourth, the operation of the LCR requires a highly skilled workforce, which poses a challenge for Laos in terms of human resource development. The railway uses modern technology, which demands qualified personnel for effective management, operation, and maintenance. Therefore, Laos must actively develop its own training programs to produce human resources that meet the technical requirements of the railway.

Fifth, the project has had negative impacts on the environment and local communities. The railway passes through mountainous and tropical forest areas, meaning that construction required digging through mountains and clearing forests to build tunnels and bridges. This has caused environmental degradation in some parts of Laos. In addition, the construction of a high-speed railway required large-scale land clearance, which disrupted the lives of people living along the route and created difficulties in resettling displaced

[44] "Laos Population," *World Bank Organisation*, 2026, https://data.worldbank.org/indicator/SP.POP.TOTL?locations=LA.

communities.

2. External Challenges

First, the fact that Laos holds only 30% of the joint venture's shares while China holds 70% reflects an imbalance of control. This may lead to Laos having limited influence in important decisions regarding the operation and management of the railway, raising concerns over the country's lack of full control over one of its strategic infrastructure assets. Deeper integration into the regional economic network driven by China offers Laos numerous opportunities for economic development and enhances its connectivity status within the region. However, this intensifying integration into a China-led infrastructural and economic framework also raises questions regarding long-term strategic dependency. Due to the substantial disparity in economic scale and technological capability between the two nations, increased connectivity could foster a state of asymmetric interdependence. Within this dynamic, while both Laos and China benefit from economic cooperation, China potentially retains a significant advantage as the primary supplier of capital, technology, and key consumer markets. This dependency manifests in financial dimensions and also persists through the operation and maintenance of the railway system, technology transfer, and reliance on technical standards established by China.

Second, fluctuations in international markets may affect the railway's operational efficiency. The railway was built to help Laos connect with the region and expand access to the Chinese market. However, unpredictable global events, such as economic downturns or major disruptions like the COVID-19 pandemic, can lead to decreased demand for travel, freight transport, and imports in China, which in turn reduces the railway's utilization and lowers project revenues.

Third, while the LCR has improved Laos' infrastructure and made it easier to connect with China, it has also increased the country's dependence

on China. Since China plays a leading role in financing, designing, supplying technology, and constructing the railway, Laos risks becoming dependent on China not only financially but also politically. With rising public debt, if Laos fails to repay loans on time, it may be forced to make concessions, such as allowing China to exploit natural resources or granting it long-term rights to operate the railway. Although the Lao government did not issue a sovereign guarantee for the loan, it pledged revenue from one bauxite mine and three potash mines as collateral for the loan from China's Export-Import Bank.[45]

Fourth, despite its goal of becoming a regional transport hub, the China - Laos railway faces competition from other transport routes. Road and sea transport corridors through Thailand, Myanmar, and Vietnam could serve as alternatives if the LCR is not competitive in terms of cost or travel time.

Moreover, Laos has not yet fully tapped into the logistics potential of the ASEAN region due to limited connectivity. The railway must be better integrated with other regional transport networks to improve connectivity and optimize supply chains. If Laos relies solely on one railway line without sufficient transit hubs and supporting infrastructure, the project's profitability is unlikely to meet expectations.

IV. Vietnam's Railway System

A. Current Limitations of Vietnam's Railway System

First, most of Vietnam's railway infrastructure was built during the French colonial period and has hardly been upgraded since. As a result, the quality of tracks, bridges, and stations has severely deteriorated. While many countries around the world have already adopted fourth-generation magnetic rail technology, Vietnam still relies on outdated diesel-powered locomotives, considered second-generation technology, just one step ahead of steam

[45] "China Eximbank Provides $480 Million Loan for China-Laos Railway Project," op cit.

engines.[46]

Second, the speed of Vietnam's trains remains relatively low, ranging from 20 km/h to 100 km/h. On average, freight trains operate at 50-60 km/h, and passenger trains at 80-90 km/h.[47] These speeds are equivalent to or even slower than traveling by car, leading to long travel times between destinations. As a result, trains are a less attractive option for passengers, and the economic efficiency of train services remains low.

Third, despite efforts to improve the system, the railway sector struggles to attract private investment and lacks a long-term development strategy. This has led to accumulated losses and inefficient operations. Financial difficulties also limit the ability to maintain and expand infrastructure. Many upgrade and renovation projects have been delayed or left unimplemented due to a lack of funding.

Fourth, Vietnam's railway sector faces significant challenges in meeting the country's "Net Zero" carbon emissions target by 2050, as committed by the Prime Minister at COP26[48]. Most railway lines still rely on diesel locomotives, which emit high levels of greenhouse gases. Transitioning to more sustainable transportation options is essential. Continuing to use diesel engines not only harms the environment and hinders emissions reduction goals but also reduces Vietnam's ability to access international financing and partnerships for sustainable development.

Due to these limitations, Vietnam urgently needs a high-speed railway system powered by clean energy in order to catch up with global trends and

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[46] Tổng cục thống kê, "Đường sắt Việt Nam qua một số chỉ tiêu thống kê," *Dữ liệu và Số liệu Thống kê*, June 2023, https://www.gso.gov.vn/du-lieu-va-so-lieu-thong-ke/2023/06/duong-sat-viet-nam-qua-mot-so-chi-tieu-thong-ke/.

[47] Ibid.

[48] Minh Quang, "Cam kết của Việt Nam tại COP26 và NDC cập nhật," *Bộ Tài nguyên và Môi trường*, November 9, 2023, https://www.monre.gov.vn/Pages/cam-ket-cua-viet-nam-tai-cop26-va-ndc-cap-nhat.aspx.

regain the railway sector's former competitive advantages.

B. The North - South high-speed railway project

Vietnam has set a goal to build the North - South high-speed railway to connect the two ends of the country. This is one of the nation's strategic infrastructure projects aimed at: (i) reducing pressure on the existing road and air transport networks; (ii) promoting regional economic growth and enabling sustainable development for provinces and cities along the North - South axis; and (iii) aligning Vietnam with regional and global trends in modern infrastructure development.

The high-speed railway is planned to have a design speed of 350 km/h, use standard gauge tracks (1,435 mm), and be fully electrified.[49] The total length is expected to be about 1,541 km, passing through 20 provinces and cities. Of the route, 60% will be on bridges, 10% in tunnels, and 30% on embankments. It will start from Ngoc Hoi Station (Hanoi) and end at Thu Thiem Station (Ho Chi Minh City). The entire line will have 23 passenger stations and 5 freight stations at key hubs connected to Hanoi, Ho Chi Minh City, and major seaports, with the capability to carry freight when needed. The high-speed rail will reduce travel time from Hanoi to Ho Chi Minh City to just 5.5 hours. Travel time between Hanoi and key cities like Vinh, Da Nang, and Nha Trang will be shortened to approximately 1.3 hours, 2.7 hours, and 4.3 hours, respectively, much faster than existing trains or passenger cars. Some short-haul routes may even be faster than air travel when waiting time is taken into account.[50] The project is planned to be constructed in three phases: the Hanoi - Vinh segment and the Vinh - Nha Trang segment are

[49] Sputnik Việt Nam, "Đường sắt cao tốc Bắc – Nam mất hơn 33 năm hoàn vốn, vì sao Việt Nam vẫn làm?" *Sputnik News*, October 20, 2024, https://kevesko.vn/20241020/duong-sat-cao-toc-bac--nam-mat-hon-33-nam-hoan-von-vi-sao-viet-nam-van-lam-32468541.html.

[50] VTV Digital, "Phương án dự kiến của Đường sắt tốc độ cao Bắc – Nam," *Thời sự VTV*, September 23, 2024, https://vtv.vn/kinh-te/phuong-an-du-kien-cua-duong-sat-toc-do-cao-bac-nam-20240923122526326.htm.

scheduled to start in 2027, while the Nha Trang - Ho Chi Minh City segment is expected to begin in 2028. The goal is to basically complete the entire project by 2035.[51]

Although the North - South high-speed railway project has been discussed since 2010, it has not yet been implemented due to several key reasons:

First, the construction cost is very high and requires substantial funding. Preliminary estimates put the total cost at about USD 67.34 billion (approximately VND 1,713 trillion), equivalent to USD 43.7 million per kilometer.[52] This accounts for nearly 30% of Vietnam's average GDP from 2010 to 2023, and about 16% of the country's GDP in 2023. While USD 43.7 million per kilometer is around the global average for high-speed rail, the total length of 1,541 km presents a major financial challenge for Vietnam.

Second, managing and operating a complex project like a high-speed railway is a significant challenge for Vietnam. Effective capital management, construction supervision, and safety assurance require a highly skilled and experienced workforce, something that remains limited in Vietnam.

Third, the project will affect land use in the areas it passes through, so careful consideration is needed for land clearance compensation and the resettlement of displaced residents.

V. Recommendations for the Vietnam North - South High-Speed Railway Project

The experience of the LCR demonstrates that the ultimate challenge for

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[51] Ngọc An, "Thủ tướng: Làm đường sắt tốc độ cao Bắc - Nam theo hướng tuyến ngắn nhất, tốc độ 350km/h," *Tuổi Trẻ Online*, July 11, 2024, https://tuoitre.vn/thu-tuong-lam-duong-sat-toc-do-cao-bac-nam-theo-huong-tuyen-ngan-nhat-toc-do-350-km-h-20240711120058O1.htm.

[52] Tuần Phùng, "Đường sắt tốc độ cao Bắc - Nam tốc độ 350km/h đang nghiên cứu thế nào?" *Tuổi Trẻ Online*, September 25, 2024, https://tuoitre.vn/duong-sat-toc-do-cao-bac-nam-toc-do-350km-h-dang-nghien-cuu-the-nao-20240925123452867.htm.

developing nations when executing large-scale infrastructure projects is balancing the leverage of external resources with the preservation of long-term strategic autonomy. For Vietnam, this is of paramount importance as the North - South high-speed railway project demands massive capital investment, cutting-edge technology, and extensive operational expertise. It serves as a practical case study from which Vietnam can draw important lessons in developing the North - South high-speed railway, one of the country's largest infrastructure projects.

A. Exercise Caution When Receiving External Support

The LCR project significantly increased Laos's public debt due to its heavy reliance on a large loan from China, which accounted for 70% of the total investment. This has exposed Laos to financial risks and increased dependence on China.

To avoid falling into a similar situation, Vietnam should carefully evaluate its financing model for the North - South high-speed railway. With an estimated cost of around USD 67.34 billion, this is a substantial investment that requires the Vietnamese government to reallocate public spending and seek external financial support during the implementation phase.

In terms of funding, Vietnam can take advantage of ODA from countries such as Japan, South Korea, and the European Union; concessional loans from international organizations like the World Bank, the Asian Development Bank (ADB), the Asian Infrastructure Investment Bank (AIIB); and initiatives like the Global Gateway. Vietnam should diversify its sources of funding to reduce financial risks and ensure independence in project management, avoiding over-reliance on any single country. Regardless of the chosen partner, Vietnam should play an active role in negotiating terms such as interest rates, repayment periods, and lending conditions to ensure transparency and alignment with national interests, while minimizing financial and public debt risks.

Regarding contractors, several domestic companies now have the capacity to undertake large-scale projects. Therefore, Vietnam can encourage local enterprises to participate in the investment, construction, and operation of the North - South high-speed railway. This would not only reduce dependence on foreign contractors but also strengthen the capabilities of Vietnamese firms.

In terms of technology, Vietnam can consider receiving support from countries with extensive experience in high-speed railway development, such as Japan, France, China, and South Korea, in the form of technology transfer and training of Vietnamese personnel to serve the project.

Furthermore, in high-tech sectors such as high-speed rail, prolonged reliance on foreign experts during the system's design, operation, maintenance, and upgrading phases can constrain the recipient nation's technological autonomy. Therefore, Vietnam needs to intensify investments in training domestic engineers, technical experts, and managers, while demanding knowledge and technology transfer from foreign partners. This approach plays a critical role in building endogenous capacity and minimizing long-term technological dependency.

B. Prioritize High-Speed Railway Development in Areas with High Demand and Strong Connections to Key Economic Zones

Choosing the right areas for infrastructure development is crucial for operational efficiency. The LCR connects the Chinese border to Vientiane, following a key economic corridor to optimize connectivity between Laos and China. For Vietnam, the top priority should be linking major cities such as Hanoi, Vinh, Hue, Nha Trang, Da Nang, and Ho Chi Minh City, areas with high transport and tourism demand and strong economic growth potential.

Additionally, it is crucial to establish connecting routes between the high-speed railway and key industrial zones. These zones play a vital role in production and the supply chain, with significant demand for cargo

transportation. Efficient transportation links will create strong economic momentum and strengthen the national logistics network. Moreover, the potential for international connectivity should be considered, enabling Vietnam to integrate into regional transport systems, enhance trade advantages, and boost national competitiveness.

C. Carefully Assess Environmental and Social Impacts

One of the biggest challenges of large-scale infrastructure projects is their negative impact on the environment and society, such as deforestation, soil erosion, and population displacement. The LCR led to a significant loss of forest land and drew criticism for insufficient environmental impact assessments. The project also disrupted the lives of local communities due to poorly handled resettlement issues.

In Vietnam, past environmental and social impact assessments have often been superficial, failing to account for long-term impacts on the environment, society, and economy. With a large portion of the proposed railway passing through forests and mountainous terrain, the North - South high-speed railway must be developed with caution to avoid repeating Laos's mistakes. Before construction begins, Vietnam needs to conduct a thorough environmental and social impact assessment to ensure the project does not cause serious damage. Construction and management plans should align with international standards and Vietnam's sustainable development commitments. This is especially important given the European Union's plan to impose environmental taxes on polluting imports starting in 2026 and Vietnam's commitment to achieving net-zero emissions by 2050. If the North - South railway fails to meet environmental standards, Vietnam may face increased export costs to the EU and reduced access to international financing and cooperation on sustainable development. Therefore, Vietnam should prepare plans to cut emissions during the construction and operation phases, such as promoting green and sustainable infrastructure development.

Furthermore, land clearance is a major challenge in national infrastructure projects, particularly regarding land compensation. Preliminary estimates show the project will require about 10,827 hectares of land and the resettlement of approximately 120,836 people.[53] Construction will thus face significant challenges in site clearance and impact communities along the route, including resettlement, loss of farmland, and livelihoods. As a result, solutions such as land clearance, resettlement support, and vocational training must be integrated early in the project planning phase.

VI. Conclusion

The China - Laos Railway represents one of the most significant infrastructure projects in Southeast Asia in recent years, illustrating both the opportunities and challenges that developing countries face in implementing large-scale transportation projects. The project has substantially improved Laos' connectivity with China and the broader region by reducing travel and transportation time, facilitating trade and tourism, creating employment opportunities, and strengthening the country's position within regional logistics networks. At the same time, it has revealed several challenges, including mounting public debt, potential dependence on external financing and technology, governance constraints, and adverse environmental and social impacts.

For Vietnam, where the existing railway system continues to suffer from outdated infrastructure, limited technological capacity, and insufficient transport efficiency, the North-South High-Speed Railway constitutes a strategic investment for enhancing national competitiveness, promoting economic growth, and modernizing the country's transport system. Nevertheless, given its enormous financial scale, long implementation period,

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[53] Sputnik Việt Nam, "Đường sắt cao tốc Bắc – Nam mất hơn 33 năm hoàn vốn, vì sao Việt Nam vẫn làm?" *Sputnik News*, October 20, 2024, https://kevesko.vn/20241020/duong-sat-cao-toc-bac--nam-mat-hon-33-nam-hoan-von-vi-sao-viet-nam-van-lam-32468541.html.

and wide-ranging socio-economic implications, the project requires thorough preparation based on comprehensive assessments of economic viability, financing mechanisms, technological capability, human resource development, and environmental and social sustainability.

Drawing lessons from the China-Laos Railway, Vietnam should adopt a prudent, proactive, and sustainable development approach. This includes diversifying financial resources and international partners, safeguarding national autonomy in project management and operation, prioritizing transport corridors with strong demand, and integrating rigorous environmental and social impact assessments from the earliest stages of project planning. Only by balancing economic growth objectives with financial sustainability, economic sovereignty, and sustainable development can the North-South High-Speed Railway become a transformative driver of Vietnam's industrialization and modernization while strengthening the country's regional connectivity and integration into global value chains.

This study also suggests that the success of cross-border infrastructure projects depends not only on investment scale or technological sophistication but also on institutional capacity, financing structures, governance arrangements, and the ability of recipient countries to effectively operate and maximize project benefits after completion.

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