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Identifying factors affecting the success of rail infrastructure development projects contributing to a logistics platform: A Thailand case study

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ABSTRACT

This research identified factors affecting the success of rail infrastructure development projects contributing to Thailand's logistics platform. Projects included in this research were double tracking the existing railways and the construction of new routes. Most projects were in the preparatory stage. The researchers extracted 24 factors from the literature review and categorized them into five dimensions. AHP and fuzzy AHP were deployed and leading success factors were identified. It was found that a rail development master plan has the highest influence on a project's success. The researchers recommend that the Thai government should establish a large-scale, long-term, integrative rail master plan for not only freight transport but also passenger services, since both cannot be solely developed. Along with the initiation of the rail master plan; stimulation should proceed in parallel on: a transit-oriented development scheme; promotion of local market development for a rail parts and assembly industry; implementation of public-private partnerships; and the institution of a new rail regulative agency.

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Introduction

Thailand has encountered a continuous recession in railroad usage for several years. Before the 2000s, investment in rail infrastructure was not encouraged. Major investments during 1980–2000 were mainly infrastructure improvements and maintenance with few double tracking and triple tracking projects. The awakening of the government's concern about the country's high logistics cost per gross domestic product (GDP) with a low proportion of freight transported by rail (approximately 2% of freight

transported domestically) has pushed the National Economic and Social Development Board (NESDB) to launch national logistics strategies and a master plan to bring down the cost by 2 percent by 2020. The Ministry of Transport (MOT), which has played an important part in achieving NESDB's goal, finally turned its focus on rail development after over four decades of highway development concentration.

Over the last 10 years, the MOT has initiated many rail infrastructure development projects. However, a shift in government's policies resulted in instable project direction and administration. The public also questioned the capability of [State Railways of Thailand \(SRT\)](#) to handle mega projects. Most importantly, impacts on the country's logistics system, cost, and performance are still in doubt. Therefore, this research aimed to identify the factors affecting the success of rail infrastructure development

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projects contributing to Thailand's logistics platform by using the analytical hierarchy process (AHP) and to propose recommendations for rail infrastructure development projects in the future.

The contents of this research are arranged as follows. The first section is the research introduction; the second section describes the railway development background in Thailand and includes a related literature review; the third section illustrates the associated rail infrastructure development projects, AHP model, calculation assumptions and the approach for AHP and fuzzy AHP; the fourth section presents the results from calculations; the fifth section discusses the results and implications; and the last section presents conclusions and future studies.

Background and Literature Review

Background

The first railway in Thailand was built in 1891, linking Bangkok (the capital city of Thailand) to Nakhon Ratchasima (a major city in the northeast). The construction was completed in 1896 and the first train operations started immediately. During the 1900s–1940s, railroads were the most popular mode of transportation in Thailand and investment in rail infrastructure was intensified. By 1946, Thailand had 3,258 km of railroad network which connected 46 provinces. Rail infrastructure and operations were regulated by the Department of State Railway, a government agency.

After the end of World War II, the Department of State Railway was transformed to a state enterprise following a World Bank recommendation in 1951. Investment in Thailand's transportation infrastructure shifted from rail to road in accordance with the country's economic and social development plans. Most rail investment was to repair and maintain the existing infrastructure. There were some double and triple tracking railroads projects during the 1990s but no new networks were added.

During the 2000s, the government turned its attention to rail infrastructure development because of the low proportion of domestic freight transported by rail and the high logistics cost per GDP (14.2% in 2014). In 2012, the Ministry of Finance proposed a Bill Authorizing Loan for Transportation Infrastructure Investment. It was expected that the new transportation infrastructure could lower the national logistics cost per GDP by at least 2 percent.

However, due to recent change in cabinets, the direction of rail infrastructure development has been unsettled.

Additionally, one of factors hindering the project's administration in the past came from SRT, which is the state enterprise that initiates and administers rail projects, maintains rail infrastructure, and operates inter-city rail passenger and freight services. A state enterprise review indicated SRT had an operating loss with a total accumulated net loss of THB 104,003 million (approximately USD 2,962 million) and consequently had a critical operating status ([State Enterprise Policy Office \[SEPO\], 2015](#)). The amount of domestic freight carried by rail during 2004–2015 dropped by 18 percent ([Figure 1](#)). The maintenance center of SRT reported that the proportion of locomotives available for operations was approximately 70 percent as of March 2016 ([SRT, 2016a](#)). About 80 percent of rolling stock could be used for freight transportation in 2015 ([SRT, 2016b](#)). Other operating performance parameters, including train punctuality, load factors, assets valuation, and investment management ability, were all below the targets set and evaluated by TRIS Corporation Limited under the regulation of SEPO, Ministry of Finance ([SEPO, 2015](#)). An attempt was made to restructure SRT's debt as well as to sustainably improve SRT's performance. In December 2009, the cabinet approved the new SRT organizational structure to establish three new business units: rail operations, maintenance, and assets management.

After the organizational restructure, the MOT and its think tank agency, the Office of Transport and Traffic Policy and Planning (OTP) continued to legislate for a new government agency to regulate rail transport ([Ministry of Transport, 2016](#)). The transformation should encourage SRT's operations and the rail operations' market at the same time. It is expected that the transformation should eliminate approximately three quarters of SRT's debt, especially debt from infrastructure investment since the infrastructures and associated assets will be transferred to the government. The MOT is currently drafting the act to establish the Department of Rail Transport or DRT ([Ministry of Transport, 2016](#)).

Literature Review

Common research tools used in rail operations are either optimization models for network and capacity problems or mathematical models with cost and price functions. Little research has been associated with rail infrastructure development, investment, and policy using surveys or a literature review, or a combination of both.

Semi structured interviews were used by [Lehies \(2012\)](#) whose research presented the implementation and

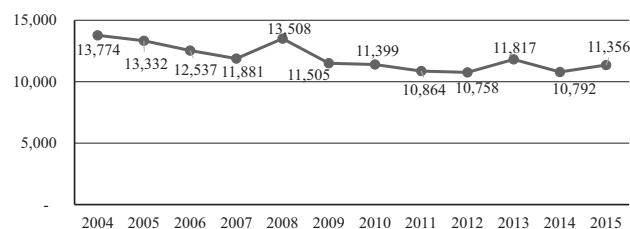


Figure 1 Volume of domestic freight carried by rail 2004–2014 (unit: thousand tonnes)

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