

Rail transport policy, budgetary and factors accelerating toward the rail freight modal shift among stakeholders in Thailand

นโยบายการขนส่งทางราง งบประมาณภาครัฐ และปัจจัยเร่งการเปลี่ยนรูปแบบการขนส่งสินค้า สู่ทางรางของผู้มีส่วนได้ส่วนเสียในประเทศไทย

Oranicha Buthphorm

Ph.D. Candidate

Faculty of Logistics and Digital Supply Chain, Naresuan University

อรณิชา บุตรพรหม

นิสิตระดับปริญญาเอก คณะโลจิสติกส์และดิจิทัลซัพพลายเชน มหาวิทยาลัยนเรศวร

E-mail: oranichab59@nu.ac.th; Ph: + 086-231-3474

วันที่ได้รับบทความ : 12 มีนาคม 2567

วันที่แก้ไขปรับปรุงบทความ

ครั้งที่ 1 : 2 พฤษภาคม 2567

ครั้งที่ 2 : 5 กรกฎาคม 2567

วันที่ตอบรับตีพิมพ์บทความ : 7 กรกฎาคม 2567

Dr. Vatcharapol Sukhotu

Associate Professor

Faculty of Logistics and Digital Supply Chain, Naresuan University

ดร. ว้ชรพล สุขโหด

รองศาสตราจารย์ คณะโลจิสติกส์และดิจิทัลซัพพลายเชน มหาวิทยาลัยนเรศวร

E-mail: vatcharapols@nu.ac.th; Ph: + 081-174-1251

Dr. Thammanoon Hengsadeekul

Lecturer, Faculty of Logistics and Digital Supply Chain, Naresuan University

ดร. ธรรมนุญ เฮงษฎีกุล

อาจารย์ประจำ คณะโลจิสติกส์และดิจิทัลซัพพลายเชน มหาวิทยาลัยนเรศวร

E-mail: thammanoonh@nu.ac.th; Ph: + 089-326-3987

(Correspondence)*

Abstract

This research aims to 1) study government transport policies and budgets for increasing rail freight transport, and 2) study the factors promoting rail freight transport in Thailand. The objective 1 used qualitative research by analyzing the content of policies related to promoting rail freight transport and the related budgets, and the objective 2 used quantitative research by using open-ended questionnaires to survey 15 primary stakeholders and 69 secondary stakeholders. The research results found that 1) The Thai government has a plan to develop transportation and logistics systems at present as an action plan for increasing rail freight transport, which is consistent with the master plan, the National Economic and Social Development Plan, and the 20-year National Strategy. The important project is to develop an intercity rail network to connect with neighboring countries. The budget allocation for expanding the rail system at present is in 2 forms: the first form is the budget allocated to the State Railway of Thailand through the annual budget and the development of integrated logistics and infrastructure systems; the second form is the allocation of funds for the intercity rail network development plan by the government since 2015; and 2) factors that promote rail freight transport from the open-ended questionnaire survey, 8 main factors and 43 approaches were found, in which key stakeholders ranked infrastructure and public relations as the most important, followed by services and laws. Secondary stakeholders ranked laws as the most important, followed by logistics facilities, infrastructure, public relations, and policies. The results of this study can be used as a guideline for rail freight service providers and railway regulators to promote opportunities to increase rail freight volume through the factors and approaches obtained from this study.

Keywords : Transportation Policy, Budgetary Instruments, Modal Shift, Rail Freight.

บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อ 1) ศึกษานโยบายการขนส่งภาครัฐและงบประมาณเพื่อเพิ่มการขนส่งสินค้าทางราง 2) ศึกษาปัจจัยที่ส่งเสริมการขนส่งสินค้าทางรางในประเทศไทย โดยวัตถุประสงค์ข้อ 1 ใช้การวิจัยเชิงคุณภาพด้วยการวิเคราะห์เนื้อหา นโยบายที่เกี่ยวข้องกับการส่งเสริมการขนส่งสินค้าทางรางและงบประมาณที่เกี่ยวข้อง และวัตถุประสงค์ข้อ 2 ใช้การวิจัยเชิงปริมาณ ด้วยแบบสอบถามปลายเปิดทำการสอบถามกับผู้มีส่วนได้เสียหลัก 15 ราย และผู้มีส่วนได้เสียรอง 69 ราย ผลการวิจัยพบว่า 1) รัฐบาลไทยมีแผนในการพัฒนาคมนาคมขนส่งและระบบโลจิสติกส์ในปัจจุบันเป็นแผนปฏิบัติการเพื่อการขนส่งสินค้าทางรางเพิ่มขึ้นซึ่งสอดคล้องกับแผนแม่บท แผนพัฒนาเศรษฐกิจและสังคมแห่งชาติและยุทธศาสตร์ชาติ 20 ปี โครงการสำคัญคือการพัฒนาโครงข่ายรถไฟระหว่างเมืองเพื่อเชื่อมโยงกับเพื่อนบ้าน โดยการจัดสรรงบประมาณเพื่อขยายระบบรางในปัจจุบันมี 2 รูปแบบ ได้แก่ รูปแบบแรกงบประมาณที่จัดสรรเพื่อการรถไฟแห่งประเทศไทยผ่านงบประมาณประจำปีและการพัฒนาระบบโลจิสติกส์และโครงสร้างพื้นฐานแบบบูรณาการ รูปแบบที่สอง การจัดสรรเงินทุนสำหรับแผนพัฒนาโครงข่ายรถไฟระหว่างเมืองโดยรัฐบาลตั้งแต่ปี พ.ศ. 2558 และ 2) ปัจจัยที่ส่งเสริมการขนส่งสินค้าทางรางจากการสำรวจโดยแบบสอบถามปลายเปิดพบ 8 ปัจจัยหลัก และ 43 แนวทาง ซึ่งผู้มีส่วนได้ส่วนเสียสำคัญจัดอันดับโครงสร้างพื้นฐานและการประชาสัมพันธ์สำคัญที่สุด รองลงมา คือบริการและกฎหมาย ส่วนผู้มีส่วนได้ส่วนเสียมองเห็นว่ากฎหมายสำคัญที่สุด รองลงมา คือสิ่งอำนวยความสะดวกด้านโลจิสติกส์ โครงสร้างพื้นฐาน การประชาสัมพันธ์ และนโยบาย ผลการวิจัยนี้สามารถใช้เป็นแนวทางสำหรับผู้ให้บริการขนส่งสินค้าทางรถไฟและหน่วยงานกำกับดูแลรถไฟ เพื่อส่งเสริมโอกาสในการเพิ่มปริมาณการขนส่งสินค้าทางรางผ่านปัจจัยและแนวทางที่ได้จากการศึกษานี้ต่อไป

ศัพท์สำคัญ : นโยบายการขนส่ง งบประมาณ การเปลี่ยนรูปแบบการขนส่ง สินค้าทางราง

Introduction

The numerous ways that rail freight transport is superior to road freight transport include improved road safety, fewer emissions of harmful gases (Kaack et al., 2018), and lower costs, particularly when it comes to low-value freight being transported over long distances. Rail transportation is six times lower in cost than air freight, 90% more environmentally friendly, and faster than the sea, thus becoming a global priority. Numerous benefits come with using railway transport systems, including reduced costs, dependability, damage and accident rates, reduced carbon emissions, and positive environmental effects (Chai et al., 2018; Xu et al., 2022). Given the severe global competition, the costs associated with logistics and the global supply chain, technological disruption, and environmental consciousness. In both the local and global economies, the cost and dependability of products delivery have grown increasingly important. As a result, in an effort to become more competitive and reduce logistical costs, several nations are pushing the railway transportation infrastructure. Despite being expensive to construct, operate, and maintain, railway infrastructure connects major economic hubs, geographical areas, and nations—a connectedness that is essential to expansion (Guimarães et al., 2023). For instance, in 2013, China's Belt and Road Initiative (BRI)—which comprises of two main components—the land-based "Silk Road Economic Belt" and the sea-based "21st century maritime Silk Road"—provided proof of the importance of railway infrastructure. With BRI, China is connected to Central Asian nations, the Middle East, West Asia, and Eastern Europe along the Silk Road economic belt, which eventually extended to West Europe. According to the Aid Data report, USD843 billion was used to finance 13,427 projects across 165 countries (Martadinata et al., 2024).

In Thailand's context, the transport statistics show that the share of Thai rail freight transport is meager, at 1.44%, while the volume of highway transport is around 80% (Ministry of Transport, 2022). Thailand's the incapacity to take use of the benefits of rail freight has reduced the country's competitiveness and raised its logistical expenses. The achievement of a long-term, sustainable transportation system is a key goal in the Master Plan under the National Strategy on Infrastructure, Logistics, and Digital 2018–2037, in addition to competitiveness. With the modal shift from road to rail, it is believed that substantial aid to grow rail freight from 2% to 10% of the Gross Domestic Product (GDP) by 2037 (Office of Transport and Traffic Policy and Planning, 2022).

To the best of authors' knowledge, there is no other study focusing on the rail policy, budgetary, and stakeholders' guidelines on the point of view toward to double track railway project could boost the modal shift from road to rail in Thailand. Despite well-recognized significance of the rail transportation on infrastructure, logistics facilities, and legal only without considering the guidelines for rail freight modal shift (e.g. note Worathanakul et al., 2010; Bura, 2016; Patjakreng and Kunnot, 2017; Renliang et al., 2018; Rangarikam et al., 2018; Nuallaong et al., 2020; Thanawaritwatthana et al. (2020); Wichitphongsa, 2020; Boonyarit et al., 2021; Simma et al., 2022; Krainara and Sirikijpanichkul, 2022). This is research lacuna in the literature related to the issue of rail transport and factors to boost modal shift from road to rail, especially from the perspective of the stakeholder in the context of modal shift. Therefore, this study aims to fill up the research gap, by conducting a qualitative content analysis on the rail transport policy, budgetary, and quantitative survey questionnaires research to explore the factors and guidelines accelerating toward the rail freight modal shift in Thailand. Consequently, the identification of factors and guidelines is necessary to highlight and propose adequate policies, practical which enable the freight shifting from road to rail to policymakers, educators, and rail freight operator for the near future.

Purpose of the study

- 1) To identify the government policy and budget instruments implemented in Thailand with the aim to achieve a modal shift from road to rail freight
- 2) To explore factors and guidelines for accelerating a rail freight from the stakeholders' perspective

Literature Review

Transport Policy Theory

According to Rodrigue (2020), proposed that the transport policy is creating a collection of ideas and concepts that are designed to accomplish particular goals about the state of the social, economic, and environmental situations as well as the efficiency and effectiveness of the transportation system. Appropriating resources for transportation in an efficient manner, including overseeing and controlling current transportation operations, is the aim of transportation policy. But the necessity for the transportation system to lower its impact on the environment also gives us a chance to examine the equality results of the system and how they may be improved more closely. It is obvious that reforming transportation systems to more evenly share costs and benefits is essential to addressing transportation-related disparities and the consequences they cause (Randal et al., 2020).

Public Expenditures Theory

Public sector theories clarify that efficiency is related to the seamless operation of public operations. Coordination, collection, and oversight of government revenue and spending in relation to service delivery to stakeholders are all aspects of efficiency (Ikubor et al., 2021). The appropriate functioning of economic operations is a social responsibility of the public sector. Furthermore, the objectives of the government could include various and involve several parties. Thus, efficiency and equality should direct public expenditure in order to prevent chaotic (Ewetan, 2012). An equitable share of public benefits among stakeholders is what equity is all about. The law of growing state spending, frequently referred to as Wagner's law, serves as the foundation for the relevant public expenditure theory used in this study. According to the theory, government expenditure typically increases as income growth does in any given nation (Ikubor et al., 2021).

Stakeholder Theory

Academic interest in a stakeholder approach has expanded and increased since 1984. Four subfields have seen the majority of study on the stakeholder concept: corporate governance and organizational theory, corporate social responsibility and performance, normative theories of business, and strategic management (Jones et al., 2002). A new topic that has been connected to public sector project stakeholders is project governance. The notion of governance brings up concerns about social and economic accountability, collaborative attempts to reduce power imbalances across involved organizations, and accomplishing goals without relying on the government structure (Meso et al., 2009). Since the definition of a stakeholder is "any group or individual who can affect, or is affected by, the achievement of the firm's objectives" (Freeman, 1984), the idea of a stakeholder has been introduced and used in a variety of academic fields, including construction project management. Stakeholder-related issues have been getting more attention as project success and performance criteria have evolved. This is because different stakeholders have different stakes in the projects that are being developed, and all stakeholders' opinions and concerns matter when decisions about the projects need to be made (Bryde & Brown, 2005). This study employs stakeholder theory as a critical-diagnostic tool to pinpoint the stakeholders' points of view that are susceptible to a breakdown in the rail freight modal shift in order to increase rail freight volume on government targets, lower logistics



costs to GDP, and increase competitiveness. The SRT officer and the OTP officer, for instance, are key stakeholders. The community, the chamber, the educational institution, the federal government of Thai industries, the media, and local government agencies represent the secondary stakeholders, who would want to know how rail infrastructure might increase Thailand's rail freight volume.

Rail Transport Infrastructure Concept

The notion of transport infrastructure capacity is complex and includes a number of elements that are necessary for contemporary civilization to function and be generally well-off. Because it is so widespread, transportation infrastructure is essential to maintaining freight mobility, making delivery services more accessible, and allowing for the smooth transfer of commodities. Particularly at the regional and municipal levels, where spatial economic units are usually arranged, transportation facilities play a major role as accelerators for economic growth at various geographical extents (Polyzos & Tsiotas, 2020). Global economies benefit from safe, dependable, and reasonably priced train services. Freight trains require lines and tracks, shunting yards, freight terminals, and associated equipment and facilities to handle rolling stock and freight/cargo shipments as part of its rail infrastructure (Teodorovic and Janic, 2016).

Principles of Modal Shift

According to Rodrigue (2020), the principles of modal shift often take places over three phases; Inertia phase, modal shift phase, and maturity phase. Firstly, the inertia phase, for a few users, the slow modal shift happens as part of a tax incentive. The tax incentive may be in the form of upfront funding for the development of related services. The actual modal share is often lower than the modal share expected. The underperformance of the modal shift is due to the accumulated investment and assets in the current mode and terminals. New transport ventures are likely to be the first to adopt a modal shift, as they are willing to take a chance on an untested distribution system for the opportunity to be the first. Secondly, the modal shift phase, as the industry realizes its benefits, this phase is a quick change from one mode to another. The new transportation method gradually moves from an underperform to an overperforming circumstance. Users and authorities may be caught off guard as they fight to deal with the additional infrastructure investments. Lastly, the maturity phase, a new modal share stability is reached when the market opportunities are realized. The incentives for modal shift are lessened and the disparity in comparative advantages has been identified.

Rail Transport Accelerating Factors for Modal Shift

Research on shifting from roads to rail has been concentrated globally. The literature on rail freight modal shifts and the various factors to increase rail freight volume is summarized in this section. Below are some of the many rails modal shift issues that have been recently covered in academic journals and research papers.

Table 1 Some accelerating factors for modal shift from road to rail freight

Factor	Literature no. (References below)																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Policy	X	X									X											
: Climate/Emission		X			X	X	X					X	X	X			X					
: Tariff			X																			
: investment								X														
Cost				X			X		X							X	X					
Time				X			X						X			X						
Reliability				X									X			X						
Cargo value				X																		
Operation					X	X																
Logistics Facility					X				X						X							
Infrastructure						X		X	X		X											
Performance						X					X											
Legislation																			X	X	X	
Public Relation																		X				X
Rail Rate/price										X												
Service											X											
Safety													X									
Flexibility													X									
Customer				X																		
References	1. Takman & Gonzalez-Aregal (2024); 2. Björk et al. (2023); 3. Mohri & Thompson (2022) 4. Shen et al. (2022) 5. Cempirek et al. (2021); 6. Wu et al. (2021); 7. Boehm et al. (2021); 8. Cohen-Blankshtain (2021); 9. Kaddoura et al. (2024); 10. Ko et al. (2023); 11. Halim (2023); 12. Zuo et al. (2023); 13. Gohari et al. (2022); 14. Gupta & Dhar (2022); 15. Boonyarit et al. (2021); 16. Wichitphongsa (2020); 17. Thanawaritwatthana et al. (2020); 18. Kaleli et al. (2021); 19. Charoenpanyaying (2017); 20. Chobphol. (2016); 21. Charanwanitwong and Fraszczyk (2018); 22. Chuarund (2019)																					

Research Methodology

In order to obtain a more thorough and in-depth comprehension of the data, the researcher employed a mix of research methodologies in this study, which focuses around the notion of expanding the amount of rail freight transportation. While qualitative study employs content analysis focus to define and understand of rail transportation policy, and budget allocation, quantitative research is used to uncover various factors which foster the expansion of rail freight transportation.

The 20-Year National Strategy (2018–2037), the 20-year transportation system development strategy (2018–2037), the National Economic and Social Development Plan (NESDP) (National Economic and Social Development Council, 2023), the Transport Infrastructure Development Strategy (2015–2022), and the budgetary allocation from the budget bureau were evaluated using the qualitative content analysis method. Non-static material is collected, organized, and examined in qualitative content analysis in order to elucidate its significance. In order to identify trends, content analysis was utilized in this study to categorize the data into words, concepts, and themes. To maintain uniformity, the study was conducted utilizing the four-step technique proposed by Bengtsson (2016).

Meanwhile, the quantitative method was employed to answer the second objective and a survey questionnaire was used to collect opinions on the method of rail freight modal shift for Thailand. Data were collected through open-ended questionnaires, which implies that identical questions with open-ended answers were posed to each respondent. The questionnaires were presented to five experts for validation of research instrument validity with the content validity method using the index of item objective congruence (IOC), and the result was 0.8. Pilot study in this research was proceeded in December 2022 via online questionnaire survey. The reliability and Cronbach's Alpha value of dimension were ranged from 0.70 to 0.92, indicating they were acceptably congruent with the objectives set. Preparing interview questions by separating them into two parts: personal data and opinions on the government of Thailand's dual-track railway project with guidelines for promoting Thailand's expanding rail freight industry. Below the examples of open-ended questions;

What are your expectations from the current double-track railway project?

The double-track railway project can promote trade and expand the Thai economy, or not?

How? Does the double-track railway project have the potential to support rail freight transportation? How?

In Thailand, what are the factors that stimulate the shift from road to rail freight transport?

Will the rail freight quantity be in line with the government's expectations? And how?

Data collection involved the populations for the intercity railway project based on the socio-economic potential of the region theory are deemed to be the populations of the research, including 1) the key stakeholders of the SRT, and the OTP and 2) Secondary stakeholders as the local government agencies, the community, the chamber, institution of education, the Office of Commercial Affairs, the federal government of Thai industries, and the media. Creswell (1998) defines the sample size as between 20 and 30 individuals, while Charmaz (2006) recommends that the sample size be at least 25 individuals. The data collection took place from February to April 2023, the open-ended questionnaires was distributed through the local government agencies, community, education institute, the chamber, the commercial affair, media, and the federal of Thai industries whom participated in the workshop on the “Deploying the policies into integrated practices in transport and logistics at the regional and national levels”, held by the office of Transport and Traffic Policy and Planning, Ministry of Transport. There was held in Songkhla province, Phra Nakhon Si Ayutthaya province, Chiang Mai province, Nakhon Ratchasima province, and Khonkaen province. In summary, the samples were drawn with 84 correspondents the 15 key stakeholders (17.86%) and 69 secondary stakeholders (82.14%) (Figure 1). (Office of Transport and traffic policy and planning, 2014)

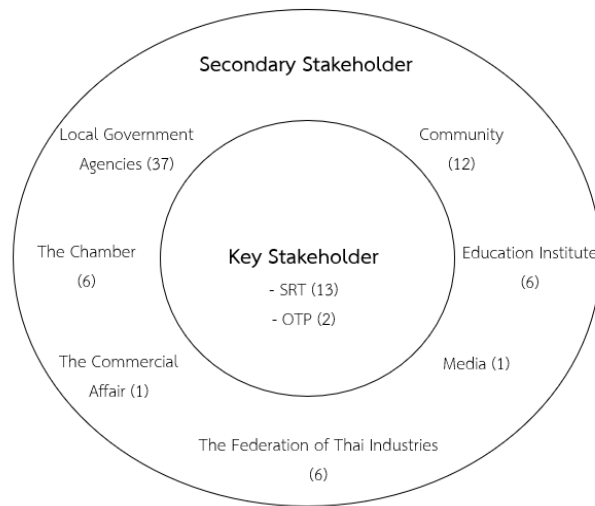


Figure 1 The Samples

Using the content analysis method tool, which is one of the quantitative data analysis tools, one can determine the elements promoting a shift from road to rail mode by analyzing and interpreting text data content and fine-tuning associated ideas and categories. Next, the frequency and percentage descriptive statistical data were used. This method works incredibly well for expressing other data, such as the relative frequency of survey answers (Lavrakas, 2008).

The clustering process employed in this study was based on the distance between data frequency intervals. A set of items is grouped into clusters using the unsupervised learning technique of clustering, to make the clusters as similar as possible to one another and as different from one another as possible. A collection of patterns is to be grouped using cluster analysis based on similarity (Irani et al., 2016). The basis for the cluster linkage approach is the cluster average, which determines the average distance between all pairwise comparisons of characteristics. For instance, cluster I and cluster J will unite to form a single cluster if their mean distance from one another is less than their mean distance from other clusters. For the second purpose of this study, the primary data is first analyzed in terms of frequencies and percentages to interpret the stakeholders’ profile of the sample and with parameters related to the modal shift from road to rail.

Results

1. The governments’ transport policy and budget instruments implemented in Thailand with the aim to achieve a modal shift from road to rail freight

The primary aim of the initial research objective was to utilize qualitative content analysis in order to gain a deeper understanding of transport policy and budget. To begin with, the researchers provide an overview of the transportation policy with the objective of enhancing the rail freight system. Subsequently, the second part will focus on presenting the allocated budget for the development of rail freight in Thailand.

1.1 Thailand Rail Transport Policy

The railway industry is governed by stringent government regulations and oversight to ensure the provision of train services in countries with adequate infrastructure and markets. Nevertheless, the expenses associated with constructing, maintaining, and managing rail transportation are considerable. Governments invest in rail projects with the aim of leveraging the rail transport system to lower transportation costs and enhance national competitiveness. Consequently, the government allocates resources and provides support across various sectors annually in alignment with state policies. This part presents a review of four present public policy instruments for enhancing rail freight in Thailand: the 20-Year National Strategy (2018-2037), the 20-Year Transportation System Development Strategy (2018-2037), the National Economic and Social Development Plan (NESDP), and Thailand's Transport Infrastructure Development Strategy (2015-2022), respectively.

Thailand's 20-year National Strategy (2018–2037)

Thailand's first national strategy based on the Constitution of Thailand (2017), is a key step towards achieving the country's vision to become a prosperous, sustainable and stable developed country. The issue at hand is about building the competitiveness of Thailand's infrastructure in order to link Thailand and the world. It's an issue that drives Thailand's 20- year transportation system development (2018–2027) strategy and the NESDP (National Economic and Social Development Council, 2019).

The 20-year transportation system development strategy (2018-2037)

The conceptual framework for developing transportation systems is green and safe transport, efficient transport to reduce the cost of transportation and logistics, building a network connecting domestic and international transport systems, and equal and equitable access to transportation systems. A vision for sustainable transportation that aligns with economic goals is designed to boost the economy and the country's competitiveness. The first strategy is to integrate transportation systems, infrastructure development, and management for efficiencies, such as building a linking railway system between an airport and a port (National Economic and Social Development Council, 2017).

The National Economic and Social Development Plan (NESDP)

Thailand's national economic and social development plan (NESDP) is over 70 years old and has 13 editions. The 11th edition has a development strategy that promotes shifts in transport modes to reduce transportation costs, including rail and water, promotes multimodal transportation, builds infrastructure to connect transport modes, and reduces logistics costs to less than 15 % of GDP. Whereas the 12th edition has a 20-year national strategic framework plan (2017–2021) with sustainable development goals (SDGs) and Thailand 4.0 objectives, the infrastructure and logistics systems are mainly focused on reducing energy consumption and logistics costs. The development of the rail and water transportation systems is a major step forward, and the railway system is the country's main transit and transportation network. Currently, the 13th edition of the NESDP (2023–2027) has the goal of promoting the railways as a means to transform Thailand into a regional logistics hub, and railway infrastructure development is recognized as a trade gateway (National Economic and Social Development Council, 2023).

Thailand's Transport Infrastructure Development Strategy (2015-2022)

To be in line with the 11th NESDP and the existing transportation infrastructure needs and conditions, as well as the rising demand for transportation infrastructure services, the main aims of the master plan are to strengthen social and economic security, improve road safety, and improve quality of life, as well as improve competitiveness and develop potential benefits for the ASEAN economic community (Office of Transport and Traffic Policy and Planning, 2014). In 2015, the government established a strategy to develop infrastructure in transport. Transport of the corresponding country with the concept of the 11th Development Plan, which will be used as a framework for investment in developing infrastructure in transportation in the period of 8 years (2015–2022). There are four primary objectives, each comprising five plans. Thailand's transport infrastructure development strategy for 2015–2022 is to improve the intercity railway network. The government plans to upgrade rail infrastructure and facilities, as well as create a double-track railway network (standard gauge) in seven lines with extensions to borders, for the intercity rail network. In addition, the government has long-term plans to construct 12 additional railway lines, totaling 1,588 kilometers, with a budget of over 300,000 million baht between 2028 and 2037 (State Railway of Thailand, 2019). Furthermore, transport and logistics activities such as the Inland Container Depot (ICD, Dry Port, Transport Transformation Center, Truck Terminal, and Container Yard (CY) were considered in the plan (Office of Transport and Traffic Policy and Planning, 2014).

1.2 The government budget allocation for development the rail freight system

It was found that the policy was transformed into a strategic plan for infrastructure development, as mode shift from roads to rails. And from reviewing the budget allocation strategy, it was found that it was allocated to the Ministry of Transport (MOT), and the MOT was allocated to relevant agencies. Whereas, the projects that are considered for rail transport must be included in the projects specified under the OTP's rail system development master plan and considered together with three agencies: the NESDB, the Office of the Public Sector Development Commission, and the Budget Office.

At present, the government allocates funds for the development of the rail system it can be divided into two forms: firstly, the budget allocated to the SRT, which is the budget for the development of the rail system that has been allocated throughout, and secondly, the expenditure budget for the integrated development of infrastructure and logistics systems, which has been allocated for the SRT since 2017. Secondly, the government bears all operating expenses for the intercity network development plan from Thailand's transport infrastructure development strategy 2015–2022, which has been allocated since 2015 (State Railway of Thailand, 2010) as shown in Table 2.



Table 2 Thai Government's Budget Allocation to the State Railways of Thailand and Intercity Rail Network

Type of Allocation/NESDP	8th (1997- 2001)	9th (2002- 2006)	10th (2007- 2011)	11th (2012- 2016)	12th (2017- 2021)	13th (2022- 2026)	14th (2027- 2031)
SRT: Annual budget	23,674.35	40,778.56	29,161.11	39,756.03	11,885.71	2,105.94**	
SRT: Integrated budget for infrastructure development and logistics system					11,360.62*	15,567.96**	
Intercity train network development plan				94,095.31***	400,522.65		367,471.00
Total	23,674.35	40,778.56	29,161.11	133,851.34	423,768.98	17,673.90	367,471.00

Sources: Budget Bureau (2023)

*Data available for 2018-2021, **Data available for 2022-2023, ***Data available for 2015-2016

In conclusion, the study investigated the country's transportation policy in relation to the rail transport system in this case. It was found that the plan was intended to identify the problem of high logistics costs in relation to GDP, which has decreased the ability for the country to have a competitive advantage. Therefore, it is crucial that the infrastructure for rail transit be developed. A budget was then created to support the expansion of the rail infrastructure through the development of the intercity rail network and the integrated budget for the advancement of logistics and transportation systems.

2. The factors and guidelines for accelerating a rail freight from the stakeholders' perspective

In this part, shows the results of quantitative method, collected data by the open-ended questionnaires, which based on the findings of a study the research team distributed with the samples of 15 key stakeholder and 69 secondary stakeholders. We adopted content analysis and refined related concepts and categories regarding the opinions on guidelines for the modal shift from road to rail. Then the data present with the descriptive statistical of frequency and percentage. The summary of significant factors and guidelines was as follows:

Table 3 Identifies 8 factors and 43 guidelines accelerating rail freight by the stakeholders

Factor(s)	Guideline (s): Key Stakeholders	Guideline (s): Secondary Stakeholders
Infrastructure	<ul style="list-style-type: none"> - Rail transportation network in all regions (2) - Investing in a new locomotive (2) - Accessibility and inclusive (1) - Spur line (1) 	<ul style="list-style-type: none"> - Enhance capacity (5) - Availability of wagons (1) - Accessibility (3) - Connectivity (3)
Legislation	<ul style="list-style-type: none"> - Increase liberation (1) Encourage the private sector to the rail industry (1) 	<ul style="list-style-type: none"> - Reform the law to enable more private enterprises to offer train services (1) - Eliminate SRT's monopoly (1) - Strengthen market competition and fairness price (7) - Build restrictions on-road transportation (2) - Tax incentives and privileges (7)
Policy	<ul style="list-style-type: none"> - The budget to be supported by the government (1) 	<ul style="list-style-type: none"> - Clear and prompt policy (3) - Partial transportation expenses by government subsidy (3) - Trade Promote (2) - Terminal Oriented Development (1) Integrated policy (1)
Public Relations	<ul style="list-style-type: none"> - Advantages of rail transportation (5) - The government's Strategic and transparent (1) 	<ul style="list-style-type: none"> - Advantages of rail transportation (9) - Shared goals and value (1) - Information sharing (1)
Operation	<ul style="list-style-type: none"> - Fast and cost-effective (1) 	<ul style="list-style-type: none"> - Invest in technology and innovation systems for cost reduction (4) - SRT's flexible system (2) - Strengthen freight workforce and development (1) Technical equipment (1)
Customer	<ul style="list-style-type: none"> - MOU with large enterprise (1) 	<ul style="list-style-type: none"> - Customer-oriented (2) - Improving data and research (1) - Partnering with stakeholders across the supply chain (1) - Logistics service provider oriented on cost reduction (1)

Table 3 Identifies 8 factors and 43 guidelines accelerating rail freight by the stakeholders (Cont.)

Factor(s)	Guideline (s): Key Stakeholders	Guideline (s): Secondary Stakeholders
Logistics Facilities	- Rail network systems of linked locations (nodes) (1)	- Logistics facilities center connectivity (6) - Sufficient container yards and trans shipment yards (4) - Distribution Center (3)
Service	- Reliability in service efficiency (3)	- Reliability (5) - Technology and innovation involve (1)

Remark: The frequency is shown in brackets.

The results of a research that questioned key stakeholder and secondary stakeholders on the most successful methods to shift freight traffic from the road to the rail. The eight factors were found to include legislation, infrastructure, public relations, logistical facilities, operation, customer, policy, and service. Whereas, the infrastructure had the greater out of the eight factors; there were eight guidelines in total, followed by seven guidelines regarding legislation, six guidelines regarding policies, five guidelines regarding public relations, operations, and customer, four guidelines concerning logistics facilities, and the least number of guidelines three regarding service.

Subsequently, we shall introduce the cluster of factors as seen by the key and secondary stakeholders. Table 4 shows the key stakeholder's factors are divided into four clusters. The first cluster contains six frequencies of infrastructure and public relations, denoted as CK1, the second three frequencies of service, denoted as CK2, the third two frequencies of legislation, denoted as CK3, and the fourth cluster contains one frequency of customer and logistics facilities, policy, and operation, denoted as CK4.

Table 4 Key Stakeholders Factors Distribution

Item	Factors	Key Stakeholders (15)			
		Rank	Frequency	% of Total	Cluster
1	Infrastructure	1	6	40.00	CK1
2	Public Relation	1	6	40.00	
3	Service	2	3	20.00	CK 2
4	Legislation	3	2	13.33	CK 3
5	Customer	4	1	6.67	CK 4
6	Logistics Facilities	5	1	6.67	
7	Policy	5	1	6.67	
8	Operation	5	1	6.67	
Total				100	

Table 5 shows the secondary stakeholder's guidelines are divided into four clusters: the first cluster contains 18 frequencies in legislation denoted as CS1, the second cluster contains 13, 12, 11, and 10 frequencies in logistics facilities infrastructure, public relations, and policy denoted as CS2, the third cluster contains 8 frequencies in operation denoted as CS3 and the fourth cluster contains 6 and 5 frequencies in service and customer denoted as CS4.

Table 5 Secondary Stakeholders Factors Distribution

Item	Factors	Key Stakeholders (15)			
		Rank	Frequency	% of Total	Cluster
1	Legislation	1	18	26.09	CS1
2	Logistics Facilities	2	13	18.84	CS2
3	Infrastructure	3	12	17.39	
4	Public Relation	4	11	15.94	
5	Policy	5	10	14.49	CS3
6	Operation	6	8	11.59	
7	Service	7	6	8.70	CS4
8	Customer	8	5	7.25	
Total				100	

Using open-ended surveys, we identified the strategies and elements that each stakeholder group pointed out in this area. It was discovered that the two categories of interested parties held differing viewpoints, which might be a result of their disparate interests. The majority of secondary stakeholders expressed the belief that the law will drive the shift in transportation modes and increase the volume of rail freight transport, despite the key stakeholders' agreement that infrastructure and public relations were the most crucial factors.

Discussion and Conclusion

The study's findings allow for the following discussion on transport policy theory, public expenditures theory, stakeholder theory, rail infrastructure concept, and the significance of each factor and its influences to modal shift from road to rail in Thailand.

1. Transport policy theory and public expenditures theory

Efficient and effective creation of social, economic, and environmental progress is the goal of transportation policy (Rodrigue, 2020). Examples of these policies include the Paris Agreement, which aims to reduce environmental pollution, or the BRI, which connects nations and generates trade benefits by investing over USD843 billion from over 165 countries (Martadinata et al., 2024). In Thailand, the issue is brought up when developing policies for rail transport in an effort to decrease expenditures. Drawing from the qualitative research, shows there are funds set aside for the modal shift from the road to the rail system in addition to the annual expenditure budget allotted to the SRT for the development of the rail system, with 26,928.58 million baht of integrated budgets for infrastructure development and logistics system budgets between 2018 and 2023. Moreover, the government of Thailand has set aside funds for the intercity rail network with a budget of more than 862,088.96 million baht since Thailand's transport infrastructure

development strategy for 2015–2022. However, research by Boehm et al. (2021), who tested the viability of a shift to Europe's rail system by comparing high-speed freight trains with trucks, discovered that while high-speed rail is 70% more expensive than trucks, it emits 80% less pollution, respectively.

2. Stakeholder Theory and rail infrastructure concept: The methods guidelines for accelerating rail freight modal shift from the key stakeholder and the secondary stakeholder:

2.1 The key stakeholder

Based on the perspectives of 15 key stakeholders, we discovered that infrastructure and public relations (CK1), together with service (CK2), are the most effective methods for shifting road freight to rail freight, according to SRT and OTP government employees.

CK1: Infrastructure

Overall, respondents mentioned that extending a rail network to all regions and accelerating the construction of a double track so it is capable of being executed as soon as possible. Additionally, it provides a sufficient number of efficient locomotives and carriages needed for satisfying customer demand and simply enabling access within a factory radius, according to several respondents. It is according to the study of improving rail infrastructure to enhance rail freight competitiveness (United Nations Economic Commission for Europe, 2019). In addition, Halim (2023) has found that by 2030, rail freight share may account for up to 20% of all commodities carried, indicating a significant change in the demand for transportation from road to rail. This finding is supported by his modeling conducted in Indonesia. He identified one of the key policy approaches to raise the percentage of rail freight: developing enough rail infrastructure.

CK1: Public Relation

While several respondents believe SRT must have good public relations, SRT is obligated to guarantee that the service delivery time for customers is as specified, along with the numerous benefits of rail transportation. Providing information for improved comprehension and encouraging enterprises to recognize the value and advantages of using the rail system. Some of the key stakeholders point out that, given that it promotes democracy and good governance, public relations are an essential instrument for the government. This is consistent with the research of Kaleli et al. (2021), who mentioned that poor rail service management could be one cause of the railroads' limited impact, but promoting adequate rail transportation will encourage more enterprises to use it. To simplify and make the delivery of knowledge to the public more convenient, stronger communication mechanisms should be developed and fully integrated into the system. Last but not least, the SRT and the public sector need to raise awareness of the project and do more publicity (Tungpathomwong, 2018).

CK2: Service

This study found that trust in the service and guarantee is increased by quick, bulk loading, and cost saving. To offer flexible service and friendly one-stop service so that customers can quickly and easily access services. This regard is consistent with the fact that delivery time, safety, reliability, flexibility, and frequency were the decision criteria for intermodal freight transportation (Kaddoura et al., 2024). In the same direction, Zeybek (2018) stated that the largest quality gap relates to "transit time," which is perceived as the most important dimension of the operational quality of freight services.

2.2 The secondary stakeholder

Surveying sixty-nine secondary stakeholders, we found that the most effective way to move from road freight to rail freight depends on legislation (CS1), which is followed by CS2, the logistics facilities, infrastructure, public relations, and policy, as revealed by local government agencies, the community, the chamber, the educational institution, the Office of Commercial Affairs, the federal government of Thai industries, and the media.

CS1: Legislation

According to stakeholder analyses, providing tax incentives and amending transportation pricing rules to be appropriate and compatible with the dynamics of transportation and product characteristics will encourage entrepreneurs to use more railways. Several suggestions were made to cut down on land transportation; restrictions should also be put on trucks. In this issue, some scholars have suggested that modernizing the law governing railroads be done on an independent basis at a cost acceptable for the situation (Charoenpanyaying, 2017). Similarly, Jain et al. (2019) found that EU-level regulation can be an effective tool for encouraging the shift toward multimodal services, which include rail. The bottom line, according to respondents, is that the MOT and the Department of Rail Transport (DRT) or other bodies together could contribute most to simplifying the regulations.

CS2: Logistics Facilities, Infrastructure

Several secondary stakeholders mentioned that the logistics facilities center on connectivity, sufficient container yards and transshipment yards, and a distribution center that is developing truck terminals, dry ports, and transshipment yards to supply rapid and economical service. In consist with, Boonyarit et al. (2021) used GIS to pinpoint the location of the container yard (CY) for rubber products in Southern Thailand in order to switch from road to rail mode. The analysis showed that when switching from road to rail freight, the more CY, the cheaper the transportation cost. Additionally, Krainara and Sirikijpanichkul (2022) used the cluster analysis approach K-means with decision criteria related to sugar factories in North Eastern Thailand and discovered that the corporation may save 73.48% on transportation costs by using intermodal railway yards via rail. However, in this context, Kaddoura et al. (2024) discovered that the number of train departures per origin-destination relationship, train and terminal capacities, and other constraints all have a substantial impact on the demand for intermodal transportation.

CS2: Public Relations

By sharing information before, during, and after the project, explicitly and empirically contrasting rail systems with roads to reach the targeted customer, news distribution, marketing, and public relations can increase knowledge of the transportation benefits of using rail systems, such as safety and environmental friendliness. In this perception, The SRT relies on communication to develop an image through the framework of the annual organizational plan. The SRT emphasizes proactive communication outside the organization by specifying communication issues to be connected and covering relevant country strategies, transportation strategies, business rehabilitation plans, and other policies related to showing the image of the railway to the people, society, and nation (Chuarund, 2019).



CS2: Policy

This study found that some respondents pointed out that the government must support the budget with a clear, rapid, real-time strategy and be ready to react promptly to changing surroundings. This is consistent with Li and Zhang (2020) assertion that a subsidization policy should be adopted to stimulate rail freight expansion. In addition, the Halim (2023) research in Indonesia highlighted several key policy reforms that may be implemented to increase rail freight volume. Instead, an analysis of a multimodal logistics policy in the Indian context was carried out by the team of Gupta and Dhar (2022) and their main thrust was that it should be designed in line with the clean energy electricity policy and the national railway policy. Similarly, China has established many climate change mitigation measures, and understanding emissions is critical for meeting energy-saving targets by 2030 (Zuo et al., 2023). This is congruent with the fact that researchers from the United States and Canada focused on modal shifts in terms of energy usage, greenhouse gas emissions, and costs per ton per km (Bickford et al., 2014; Liu et al., 2019; Ramani, 2019). Additionally, the respondents are also positive that it needs to be agreed upon by all parties. In this issue, the Secretariat of the Senate has advised the MOT to take note of regulations regarding the integration of pertinent operations.

Our analysis of the quantitative data reveals that the opinion ranking among key stakeholders and secondary stakeholders was found to differ. Given that the nature of the roles of the two groups is different, the key stakeholders here are the actual owners of the double-track railway project, while the secondary stakeholders play a role in the project indirectly or farther away and are the beneficiaries or indirectly affected by the double-track railway project. In short, to guarantee modal shifts, policy, infrastructure, and legislation are focused on responding quickly to find rapid and efficient tools. These included five other factors that were found through a survey of both key and secondary stakeholders, and each of them has current research supporting it. While, in this study, we define the SRT and the OTP as key stakeholders, whereas local government, companies, the media, and educational institutions are considered secondary stakeholders. The primary stakeholder is the customer, who intends to employ the train infrastructure, logistics facilities, operations, service, etc. To effectively complete the guidelines for Thai rail freight stakeholders, the study project's next phase will cover the perspectives of the primary stakeholders.

Conclusion

As Thailand has set a target of increasing the percentage of freight transported by rail from 2% in the previous year to 10% by 2037, the government allocated funds for the railway system's development in two different ways. Firstly, the budget is allocated to the SRT with an annual budget and an integrated budget for the development of infrastructure and logistics systems. Secondly, the government contributes to the total operating costs of the Intercity Network Development Plan through Thailand's Transport Infrastructure Development Strategy 2015–2022. This study has demonstrated that the budget allocated can be used to strategically support a modal shift in rail freight operations. It has also identified eight distinct factors of key stakeholders and secondary stakeholders' perspectives, which can be grouped together as follows: Infrastructure, Legislation, Logistical Facilities, Public Relations, Service, Customer, Policy, and Operation. Increased rail freight volume, infrastructure, and public relations are the most significant themes, followed by service and law, as recommended by key stakeholders. On the other hand, legislation is the most influential, followed by the cluster of logistics facilities, infrastructure, public relations, and policy, followed by the operation, which was the opinion of the secondary stakeholder. Regulators and implementors should reevaluate present instruments, tools, and legislation to establish an enabling environment for developing railway projects since they mainly depend on political incentives and regulatory frameworks.

Recommendations

Policies Implications

Based on the quantitative data gathered for this study, the DRT must act promptly to implement the draft Rail Transport Act in order to improve rail freight transport and create regulations that might result in a 10% increase in rail freight transport volume by 2037. The enactment of this law has to provide the market liberalization approach competition of rail freight incentives for the private sector to use railroad lines on a greater basis, participate in rail transportation services more frequently, and create rules allowing for more freight transportation trips. Regulators and policymakers should prioritize assuring fair competition, which includes competitive pricing, especially for roads that are 300 kilometers or longer. Moreover, based on the qualitative data, Thailand may benefit greatly from China's BRI by utilizing its rail transport system to boost its economy. Because trains can transport as much cargo as ships in half the time, they can also carry twice as much. This means that China can utilize the BRI project to expand its export markets and create a more global supply chain network that can match its goals for cost reduction and customer response. Like in China, there are lesson learned for the Thai government to use the rail system to promote both domestic and international trade: 1. A well-defined government policy and transport policy; 2. Adequate finance and investment support in the form of public expenditures. The foundation for the construction of the Thai government's infrastructure is these two key items.

Managerial Implications

As a result of the Thai government's large-scale investment in railway infrastructure development, government agencies directly involved in railway construction, such as SRT and DRT, should have proper railway construction project management in place, from the development of railway construction plans to the inspection of the signaling system to make sure it's ready for operation. Next, to ensure the handling capacity and inadequate equipment for rail operations such as rolling stock, locomotives, rail cars, etc., it will enhance rail service performance and bring more customers, respectively.

Future Research

In addition, to complete guidelines for rail freight stakeholders, this paper can be used as the basis for further research for the primary stakeholder, who intends to employ the train infrastructure, logistics facilities, operations, service, etc. accordingly. In conclusion, to adopt a national infrastructure strategy and allocation budget while at the same time offering an attractive rail service, the goal and budget require an integrated view of the stakeholder's different requirements and their interaction.

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