

THE EFFECT OF THE CHINA-LAOS RAILWAY ON THAILAND'S TRADE TO CHINA

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ABSTRACT

This paper aims to investigate the effect on the trade volume of Thailand's exports to China by the China-Laos railway after its completion. This study will help Thai exporters and China importers with valuable information about the China-Laos railway. First, the authors study Thailand's export industries and export destinations in China from the literature review. Then, the authors' research information the China-Laos railway development and volume of the freight from Thailand to China through in-depth interviews and secondary data. The authors calculate the value of the export trade per freight volume for projecting the trade volume when the additional transport capacity is available by the China-Laos railway. Linear regression is used to calculate the trade per volume and confirm the fitness for the use of the trade per volume value. The trade per volume is used for estimating the amount of trade that can utilize the capacity the China-Laos railway connection will provide. Finally, the author calculates the amount of trade that the China-Laos railway can bring in the early, middle and late term, and predicts the proportion of Thailand's export trade to China that the China-Laos railway can share. This proves the effect of China-Laos railway on Thailand's export trade to China. In addition, the paper also discusses the advantage that the China-Laos railway will bring to Thai exporters in terms of the cost -effectiveness and added freight capacity.

Keywords: Effect, China-Laos Railway, Export, Thailand, China, Freight Volume

INTRODUCTION

Background

With the establishment of the ASEAN Free Trade Area and the signing of the Regional Comprehensive Economic Partnership (RCEP) agreement, China began to pay more and more attention to trade cooperation with Southeast Asian countries (Bin & Men Grong, 2018; Thaiprayoon, Sriyakul & Jermsittiparsert, 2019). China and Thailand are important trade partners. In 2019, bilateral trade reached US 80 billion. The transportation modes of the trade from Thailand to China mainly focus on sea and land. Sea transportation is the dominant mode of trade in Thailand, accounting for 92% of all modes of transportation (zhou, 2016). However, sea transportation is limited by port congestion and weather. Therefore, if Thailand can have rail transportation, it will relieve the pressure on Thailand's ports and improve transportation efficiency. Laos is a neighbor of China and Thailand, has a relatively small trade volume with both countries (Yang, 2011). The completion of the China-Laos railway will mainly affect the trade between China and Thailand. The author will study how much trade the China-Laos railway can bring to Thailand in the future after its completion. The impact of the China-Laos railway can be seen in the proportion of the railway's trade volume to Thailand's total exports to China (Zhangjie & Wang, 2019). First, the authors study Thailand's export industries and export destinations in China from the literature review. Then, the authors research information of the China-Laos railway development and the volume of freight from Thailand to China through in-depth interviews and secondary data. Next, this paper uses linear

regression to forecast how much the China-Laos railway trade volume can bring in the coming years. After that, the authors will calculate the trade volume as a percentage of Thailand's total exports to China, and discuss how much transportation cost can be reduced theoretically after the construction of China-Laos railway, which will prove the impact of the China-Laos railway.

Research Significance

Transportation has always been critical issues affecting Thailand's export to China. However, there are only few studies have involving rail transport and. no paper on the impact of the China-Laos railway on Thailand. This paper involves the China-Laos railway, an important cooperation between China and Southeast Asian countries. The authors will mainly study the impact of the China-Laos railway on China-Thailand trade, and this will demonstrate prove that the railway will can serve as an important mode of connection transportation for Thailand's export trade to China. Thai exporters can reasonably allocate export goods and export mode according to their condition subtilize the added capacity made available by the railway. This paper also can provide the theoretical basis for the future trade volume of the China-Thailand railway.

LITERATURE REVIEW

China-Laos Railway

The China-Laos Railway is an essential part of the Pan-Asia Railway, the opening of the China-Laos railway will connect the regions along the railway, forming a new economic growth pole and breaking the original economic spatial layout (Tao, 2017). This will promote the formation of regional economic integration and significantly promote the economic growth of China and ASEAN. The China-Laos railway connects Kunming, China, with Vientiane, Laos. The railway has a total length of more than 900 kilometers. The mainline in China has a length of 509 kilometers, and Laos has 414 kilometers (Qiumeng Xu & Liu, 2018). The designed speed is 160 km/h. There are 7 stations in the China section and 11 stations in the Laos section, as depicted in Figure 1 and 2. The freight train speed is 120 km/h. There will be 18 trips a day, including 4 trains for passengers and 14 for freight. The passenger fare is 0.04 USD/person/km, and the freight price is 0.07 USD/ton/km. (Huang, 2020). The China-Laos railway adopts the international railway standard, with a track spacing of 1,435 mm. The railway has 170 Bridges and 72 tunnels, with a bridge to tunnel ratio of 63% and a single carriage carrying a weight of 50-60 tons (Zhang, 2016). The planned final freight capacity should reach 19 million tons/year after being put into operation. The head of the construction of the China-Laos railway predicted that the upstream traffic of the line (from Vientiane to Boten) could reach 2.59 million tons/year in the initial stage, 3.62 million tons/year in the short term, and 6.45 million tons/year in the long term (Wang, 2017)



FIGURE 1
CHINA SECTION OF THE CHINA-LAOS RAILWAY

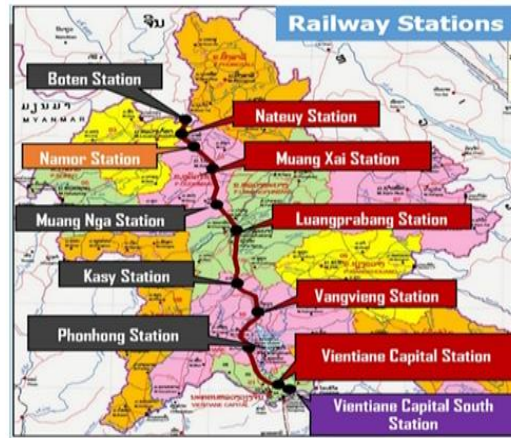


FIGURE 2
LAO SECTION OF THE CHINA-LAOS RAILWAY

Exports from Thailand to China

Since 1975, China and Thailand have established diplomatic ties, and the two countries have signed several agreements, including the China-Thailand Free Trade Agreement, the China-ASEAN Free Trade Area, the Greater Mekong Sub-Region Economic Agreement, and the Regional Comprehensive Economic Partnership Agreement. The total volume of bilateral trade between the two countries has been increasing, and the trade status has been improving (Lin, 2017). China has been Thailand's largest trading partner for nine years in a row. In 1992, Thailand's export trade to China was only \$385,927,589. By 2019, Thailand's exports to China trade reached \$28,068,462,812. The main factors affecting the export trade between Thailand and China include the exchange rate of two currencies, trade agreements and tariff barriers, trade competition from other countries (Sithrirajvongsa, 2017). Vietnam is one of the main competitors affecting Thailand's export volume to China. There are also many problems in China-Thailand trade, the main problems include 1. The development of bilateral trade is unbalanced, with Thailand's trade deficit widening (Yang, 2011). 2. Bilateral trade is more competitive than complementary (SRI-INNOP, 2016). 3. Differences exist in political systems and cultures. 4. Lack of absolute advantages in human cost and logistics costs (Thangthokit, 2009).

METHODOLOGY

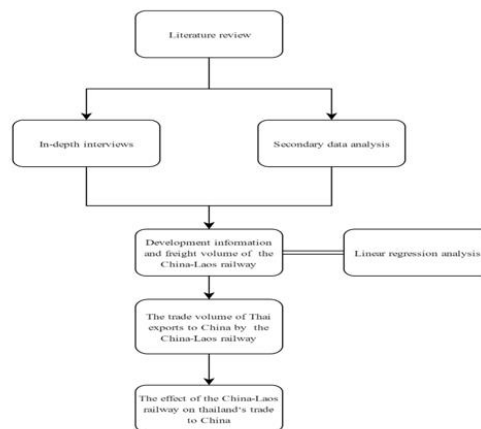


FIGURE 3
RESEARCH FLOWCHART

Research Flowchart

Firstly, the author obtains the trade volume and freight volume of Thailand's export to China through literature review. Then the freight volume and development information of the China-Laos railway are obtained by in-depth interview method and secondary data analysis. The experts in the in-depth interview include teachers majoring in logistics, principals of China-Laos railway project and managers of logistics companies. Next, the linear regression equation is used to verify the linear relationship between freight volume and trade volume, and the linear equation between them is obtained. The trade volume of the China-Laos railway is calculated by input the freight volume of the railway into the linear equation. Finally, this study analyzes the impact of the China-Laos railway on Thailand's export trade to China and discusses the advantage that the China-Laos railway will bring to Thai exporters in terms of the cost-effectiveness and added freight capacity.

Linear Regression Analysis for this Study

This paper is a one-dimensional equation, which includes one independent variable and one dependent variable. The independent variable is the freight volume exported by Thailand to China, and the dependent variable is the trade volume exported by Thailand to China. First of all, the relationship between independent variables and dependent variables is verified, and the existence of a one-dimensional relationship between them is proved. Then the freight volume of the China-Laos railway after its completion is imported into this equation. This will be able to predict the amount of trade Thailand can export to China in the next few years after the completion of the China-Laos railway. The paper will find the impact of the China-Laos railway on China-Thailand trade from the analysis of trade volume.

RESULT AND DISCUSSION

China-Laos Railway Development Information and Freight Volume

The China-Laos railway will be opened to traffic in December 2021. As the author studies the impact of the China-Laos railway on Thailand's export to China, this paper will mainly consider the upward transit volume (from Vientiane to Boten), which will reach 2.59 million tons (within 5 years) in the initial stage and 3.62 million tons (within 5-10 years) in the short term. The long-term target is 5.46 million tons (10 years later) (Li Jia, 2014). The main components of the volume include the Freight traffic volume of trades between Southwest and Northwest China and Singapore and Malaysia, the Freight traffic volume produced by enterprises in Thailand, the Freight traffic volume of trade between Southwest and Northwest China and Southern Laos (Cacchiani, Jiang & Toth, 2016). The summary is in Table 1.

Composition	Preliminary Stage	Short Term	Long Term (Thousand tons)
Freight traffic volume of trades between Southwest and Northwest China and Singapore and Malaysia	1,240	1,650	2,480
Freight traffic volume produced by enterprises in Thailand	1,200	1,770	2,600

Freight traffic volume of trade between Southwest and Northwest China and Southern Laos	150	200	390
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Source: CREGC Architectural & Construction Engineering Co., Ltd, Feasibility study report of China-Laos railway project

Export Freight Volume and Trade Volume

Thailand is an important trading partner of China. In 2000, the export volume of Thailand to China was only 281,630,492 US dollars, but by 2019, the export volume of Thailand to China has reached 28,068,462,812 US dollars, the freight volume of Thailand's exports to China has reached 31,937,894,963 kg. The trade volume and freight volume of Thailand's exports to China from 2000 to 2019 is shown in Table 2.

Year	Trade Volume (US dollar)	Freight Volume (Kg)
2000	2,816,304,972	3,237,132,152
2001	2,862,718,112	3,328,741,991
2002	3,554,360,382	4,181,600,449
2003	5,701,476,618	6,707,619,551
2004	7,097,953,563	8,253,434,376
2005	9,134,204,228	10,379,777,532
2006	11,774,180,471	13,533,540,771
2007	14,872,545,725	16,900,620,142
2008	15,997,870,399	18,388,356,780
2009	16,123,831,401	18,322,535,683
2010	21,473,195,343	24,401,358,344
2011	27,402,402,319	32,238,120,375
2012	26,899,634,089	31,278,644,290
2013	27,238,223,902	32,426,457,026
2014	25,084,369,426	29,511,022,854
2015	23,732,457,481	27,920,538,213
2016	23,799,611,178	28,674,230,335
2017	29,505,999,885	33,823,110,678
2018	30,175,446,054	33,262,621,395
2019	28,068,462,812	31,937,894,963

Source: UN trade and General administration of customs people's republic

Forecast of the China-Laos Railway Trade Volume for Thailand

Linear regression analysis is used to calculate the value of the export trade per the the freight volume and establish that there is a to relationship between export freight volume (independent variable) and export trade volume (dependent variable) and then establishes a one-to-one equation with a goodness of fit. The result is shown in Table 3.

	Unnormalized Coefficient		Normalized Coefficient	T	Significance	VIF
	B	The standard error	Beta			
(constant)	1,966,862,397	1,010,677,104		1.946	0.068	
Export freight volume	0.826	0.044	0.976	18.563	0.000	1.000
R Square			0.953			
F			344.584			
P			<0.001			
Dependent Variable Trade Volume of Export						

The independent variable is export freight volume, and the dependent variable is the trade volume of Export. The calculation results in Table 3 are interpreted as follows:

- 1) The independent variable can explain 95.30% of the variation degree of the dependent variable, and the model fitting degree is 95.30% >30% (Lange, 1989).
- 2) The linear regression model is F=344.584, F is the variance test of the regression model as a whole, P<0.05, The probability of coincidence is less than 5%, which can negate the null hypothesis, and the difference between the two groups is significant. The independent variable can affect the dependent variable.
- 3) The significance test value of the constant is 0.068>0.05, The probability of coincidence is more than 5%. Therefore, the constant has no statistical support. The constant value has no support of statistical significance is due to the fact that when there is no freight the trade must be zero. Hence, we use the equation with no constant. The results are in Table 4.

	Unnormalized coefficient		Normalized Coefficient	T	Significance	VIF
	B	The Standard Error	Beta			
Export Freight Volume	0.864	0.005	1.000	18.563	0.000	1.000
R Square			0.989			
F			31,691.221			
P			<0.001			
Dependent variable: Trade volume of export						

The calculation results in Table 4 are interpreted as follows

- 1) The independent variable can explain 98.90% of the variation degree of the dependent variable, and the model fitting degree is 98.90%>95.30%, Therefore, we can think that the equation without constant term can better express their relationship.
- 2) The linear regression model is F=31,691, F is the variance test of the regression model as a whole, P<0.05, The probability of coincidence is less than 5%, which can negate the null hypothesis, and the difference between the two groups is significant. The independent variable can affect the dependent variable.
- 3) B value in the linear regression equation is 0.864, which means that the independent variable has a significant positive influence on the dependent variable by increasing export freight volume by 1 kg and the dependent variable by 0.864 dollars.

The regression equation between independent variables and dependent variables is as follows:

$$y=0.864 \quad (1)$$

Then, the residuals of the linear regression model are normal distribution, which means that the calculation results of the model are accurate and reliable. Next, we use the value of 0.864 export trade per freight volume to estimate the trade when the added capacity by the China-Laos railway

connection becomes available. The estimated trade volume of the China-Laos railway is summarized in Table 5.

Time period	Export Freight Volume (Kg)	Trade Volume of Export (US dollars)
Preliminary stage (Within 5 years)	1,200,000,000	1,036,800,000
Short term (Within 5-10 years)	1,770,000,000	1,529,280,000
Long term (10 years later)	2,600,000,000	2,246,400,000

Thailand's export to China has been maintained at \$25 billion to \$30 billion from 2011-2019, and in the three years has been maintained at about \$28 billion. The World Trade Organization predicts that by 2035, Thailand's exports to China will reach \$35 billion (Qiu, 2014). Therefore, we can assume Thailand's export volume to China will be between US \$28 billion and US \$35 billion from 2020 to 2035 (Jia, 2014; Valinluck, 2019). The authors can use formula 2 to calculate how much of Thailand's trade could be shared by the China-Laos railway. The share ratio of the China-Laos railway will be 3.43%-4.29% before 2025. Then, in 2025-2030, the sharing rate will reach 5.06% - 6.32%, and after 2030, China-Laos railway transportation will reach saturation, and the sharing rate will reach 7.43%-9.29%.

$$\text{Share Ratio} = \frac{\text{Trade Volume of the China-Laos Railway}}{\text{Thailand Exports Trade}} \quad (2)$$

The China-Laos railway is from Boten Station to Kunming Station. At present, Thailand mainly uses land transportation through this area. The author then compares the existing land transport with the China-Laos railway on transportation performance in Table 6.

The Mode of Transportation	Transport Capacity (Ton)	Distance	Cost* (Dollar/Ton/Km)	Time (Hour)
Road transportation	35	840	0.16	14
the China-Laos railway	4,000	922	0.07	8.2

*: Costs only consider transport costs and loading and unloading costs

Source: CREGC Architectural & Construction Engineering Co., Ltd, Baohan International Logistics Co., Ltd

Next, the article takes into account the same amount of goods transported on the existing route as on the China-Laos railway, so the author can compare the cost in Table 7.

The Mode of Transportation	Road Transportation	The China-Laos railway
Preliminary stage (Within 5 years)	1,200,000 tons/year	1,200,000 tons/year
Cost(dollar)	161,280,000	77,448,000
Reduction	83,832,000	

Short term (Within 5-10 years)	1,770,000 tons/year	1,770,000 tons/year
Cost(dollar)	237,888,000	114,236,000
Reduction	123,650,000	
Long term (10 years later)	2,600,000 tons/year	2,600,000,000 tons/year
Cost(dollar)	349,440,000	167,804,000
Reduction	181,626,000	
Percentage of savings	51.98%	

As can be seen from Table 6, the transportation capacity of China-Laos railway is far greater than that of road transportation, and the transportation time is shorter than that of road transportation. Then, the Table 7 shows that if the China-Laos railway is completed and replaces the road transportation to transport 1.2 million tons of goods a year, the railway will only need the cost of \$77,448,000, which will reduce \$83,832,000 compared with the road transportation, reducing the cost by 51.98%. The cost reduction will bring a significant advantage to Thai exporters.

CONCLUSION

This paper analyzed and discussed the effect that the China-Laos railway connect will have on Thailand's export trade to China. First, the linear regression was used to determine the value of the export trade per the freight volume. Then, the trade value and the proportion of trade sharing were estimated when the added capacity by the China-Laos railway connection becomes available. Before the construction of the China-Laos railway, road transport has accounted for 8% of Thailand's exports to China, mainly to the southwest and southern provinces of China. This mega project will mainly replace road transportation after completion. The share ratio of the China-Laos railway will be 3.43% - 4.29% in the beginning, with the continuous improvement of the railway system, the trade volume shared by the China-Laos railway will reach 7.43% - 9.29% in 2030. The China-Laos railway will significantly reduce the cost and transportation time compared to the existing roads transportation. The analysis results in this paper will provide the Thai government with valuable information for effectively promote the use of this railway. In addition, the information will also, helps Thai exporters to take advantage of a more cost-effective additional freight capacity to China. The China-Laos railway connection will become a major transportation route for, the goods exported from Thailand to the southwest and south China, and play a significant role in promoting the export trade between Thailand and China.

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