

# TRANSPORT COST DISTORTION: THAILAND TRANSPORTATION ON THE ROUTE OF NSEC

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## Introduction

Located in the heart of the South-east Asia region, Thailand is expected to be extensively affected by the intensive trans-regional commercial competitive resulting from the ASEAN Economic Community (AEC), one of the three pillars under the Declaration of ASEAN Concord II that will be officially initiated within 2015. Aiming empower the economic strength and the competitiveness of the region to level those of globalization, the transition to single market with free trading of such a scale, however, concerned the governments of members. The large gaps of the productivity, market size, competitiveness, including the local government policies of the members is likely to generate complicate issues, both socially and economically. One area concerned by Thai government is the logistics issues, especially the goods transportation costs, which play a very significant role in market competitiveness. It is believed that there are a variety of hidden transportation costs absorbed and subsidized by different parties, depending on different policies and management methods employed by different local agencies and governments. The differences can be disadvantageous and probably crucial for some local business and industries who are located in the areas that regulate higher subsidiary in hidden costs, in terms of transportation cost which in turn reflects their total cost, selling price and finally profit, than those in lower rates of subsidiary.

This project is proposed to investigate the hypothesis described above. The study aimed to identify the transport costs distortions of the Thai industry using the North-South Economic Corridor (NSEC) route, which starts from Kunming of China (837 km.), Laos PDR (250 km.), Thailand (2,191 km.), and Malaysia (775km.) and ended in Singapore.

The industries expected to be beneficiary along the route include agriculture, contract farming and agro-processing industry, industries using local-natural resources, light industries, construction material industries and service industries, including tourism and logistics. There are several international agreements signed between Thailand and neighboring countries regarding to the NSEC. For example, the Agreement of China People Republic, Thailand and Lao People's Democratic Republic indicate that there will be cooperation and reduction of custom services concerning the transportation of both products and people via the borders. It is clear that there are efforts from ASEAN members and neighboring countries have been initiating forms of cooperation in order to reduce the logistics process and costs to assist the private industries and services in the region for some periods in preparation to eventually move into the actual borderless market.



Normally, the cost elements, namely the typical *Business Operating Costs (BOC)*, are those incurred to the transportation of products and taken into account by private sectors who transport goods and products. However, the hidden *Non-business Costs (NBC)*, which are not directly realized by the traders, but instead subsidized by other parties such as the government and the public, are usually neglected. The amounts and proportions of these costs not only affect the competitiveness of the industries but also reflect the inequalities and subsidies taken by each region.

### Methodology

Goods and product transportation cost, or *Full Cost*, is comprised of two types of expenses. In the current study, the typical *Business Operating Costs (BOC)* are those incurred to the logistics corporates who run the logistics business, and eventually transferred to the customers. The hidden *Non-business Costs (NBC)* are costs incurred by or related to the transportation activities of but absorbed or subsidized by other parties instead of the logistics corporates and customers. They can be written as:

$$Full\ Cost = [Typical\ Business\ Operating\ Costs] + [Hidden\ Non-business\ Costs] \quad (1)$$

#### • The Cost Structures

Both types of cost can be broken into *fixed* and *variable* cost categories. In this study, there are 6 fixed costs and 5 variable costs for the *BOC*, while the *NBC* is comprised of 4 fixed costs and 4 variable costs. They are shown in the following table.

Types of Cost	Fixed Cost	Variable Cost
<b>BOC</b>	Vehicle Depreciation	Vehicle Maintenance
	Vehicle Insurance	Fuel
	Vehicle Registration Fee	Tire
	Driver Salary	Grease & Lubricant
	Supplies Expense	Goods Insurance
	Undeclarable Expense	
<b>NBC</b>	Road Construction	Road Maintenance
	Street Lighting Electricity	Traffic Services
	Traffic Planning	Accident Cost
	Land Value	Environmental Cost

While the values of most variables can be collected and analyzed straight-forwardly, there are some of those must be estimated using different models and techniques. Due to the limited space, two models of costs derived in the research were deliberately chosen and presented here. Firstly, the Accident Cost was calculated based on the models from Ozbay *et al.* (2007) and Berechman (2009), as follows.

$$C_{acc} = 127.5Q^{0.77} M^{0.76} L^{0.53} + 114.75Q^{0.85} M^{0.75} L^{0.49} + 198,900Q^{0.17} M^{0.42} L^{0.45} \quad (2)$$

$Q$  = Traffic Volume per day (unit)

$M$  = Distance (km.)

$L$  = Number of Traffic Lane

The model is derived for the condition of the studied route as:

$$C_{acc} = A Q^{\alpha_2} M^{\beta_2} L^{\phi_2} + B Q^{\alpha_2} M^{\beta_2} L^{\phi_2} + C Q^{\alpha_2} M^{\beta_2} L^{\phi_2} \quad (3)$$

or,

$$\ln C_{acc} = 4.280103 + 0.701182 \ln L - 0.393079 \ln QH - 0.566836 \ln N \quad (4)$$

Then, the Environmental Cost was defined in the current study as the impact and cost caused by carbon emission values.

$$C_{air} = Q (\beta_0 + \beta_1 F) \quad (5)$$

$$\begin{aligned} Q &= \text{Traffic Volume (unit/month)} \\ F &= \text{Fuel Consumption (litre/km.)} \\ \beta_0, \beta_1 &= \text{Constant Coefficients} \end{aligned}$$

The values of  $\beta_0$  and  $\beta_1$  are based on the values of carbon emissions that in turn are dependent to types and conditions of vehicles. Semi-trailer trucks was chosen to be the representative of traffic vehicles type. The volumes of the CO<sub>2</sub> Emission produced in yearly average value therefore can be calculated based on the CO<sub>2</sub> conversion factors from The Department for Environment, Food and Rural Affairs of UK, which indicated that the emission rate of as much as 2.63 kilo-carbon was produced from every litre of diesel truck with 0.33 litre per km. consumption rate.

For CO emission rate, the calculations from *A Modal Comparison of Freight Transportation Effects on Gener*, UK were applied and shown as follows.

$$CO = 0.085 \text{ (g/metric ton - km.)} \quad (7)$$

The price of carbon based on EU market in the 2010, which was 20 Euro per ton carbon and 40.2938 Baht per Euro at the 2010 currency rate were adopted for the analysis.

#### • Data Collection

Sets of data were collected from the related and participated 40 government and private organizations in 5 countries along the NSEC route. The values of both transportation costs was analyzed and modeled. The full and distortions of cost elements were then revealed and compared.

#### Results

The typical *Business Operating Cost* and hidden *Non-business Cost* values based upon the assumptions and analysis mentioned above are shown and compared in the following tables. It clearly shows that the most costly item is the truck's *Fuel* cost which costs the business more than 38%, while the *Street Lighting Electricity*, *Traffic Planning* and *Traffic Services* costs are accounted for less than 0.1% in each category. Note that although total *BOC* accounts for the majority of proportion of the full cost, with approximately 22.16 Baht per km., the *NBC*, however, is proportionally significant with approximately 3.72 Baht per km., or 14.36% of full cost.

Cost Item	Cost (Baht/km)	% of Full Cost
Vehicle Depreciation	2.84	10.98 %
Vehicle Insurance	0.64	2.47 %
Vehicle Registration Fee	0.13	0.50 %
Driver Salary	3.06	11.83 %
Supplies Expense	1.95	7.54 %
Undeclarable Expense	0.08	0.31 %
<b>sum of fixed BOC</b>	<b>7.94</b>	<b>30.68 %</b>
Vehicle Maintenance	1.39	5.37 %
Fuel	9.90	38.26 %
Tire	1.36	5.26 %

Grease & Lubricant	0.34	1.31 %
Goods Insurance	0.47	1.82 %
<b>sum of variable BOC</b>	<b>13.46</b>	<b>52.02 %</b>
<b>total BOC</b>	<b>22.16</b>	<b>85.64 %</b>

Cost Item	Cost (Baht/km)	% of Full Cost
Road Construction	1.11	4.30%
Street Lighting Electricity	0.02	0.07%
Traffic Planning	0.01	0.05%
Land Value	N.A.	N.A.
<b>sum of fixed NBC</b>	<b>1.14</b>	<b>4.41%</b>
Road Maintenance	1.74	6.70%
Traffic Services	0.08	0.03%
Accident Cost	0.25	0.91%
Environmental Cost	0.60	2.31%
<b>sum of variable NBC</b>	<b>2.57</b>	<b>9.95%</b>
<b>total NBC</b>	<b>3.72</b>	<b>14.36%</b>

## Conclusion

The total transportation cost was founded to be 25.88 Baht per km. The majority of cost, which is 85.64%, is the typical *Business Operating Cost*, which comprised of 6 fixed and 5 variable cost elements. The hidden *Non-business Cost*, comprised of 4 fixed and 4 variable cost elements were estimated to be 14.36%. These findings are valuable for the policy makers who are responsible for policy and strategic planning and therefore crucial for the country's productivity and competitiveness, especially in terms of logistic costs. The policies that are imposed to increase or reduce the proportion of the distorted costs will definitely affect the prices of both import and export products, hence, the competitiveness of the country. In addition, the details of cost structure also provide useful information for both public and private sectors in production and service industries for further logistics cost improvement, business planning and administrative purposes.

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