

# An Investigation and Evaluation of Cross-Border Truck Transportation between Nongkhai, Thailand - Thanaleng to Vientiane, Lao PDR

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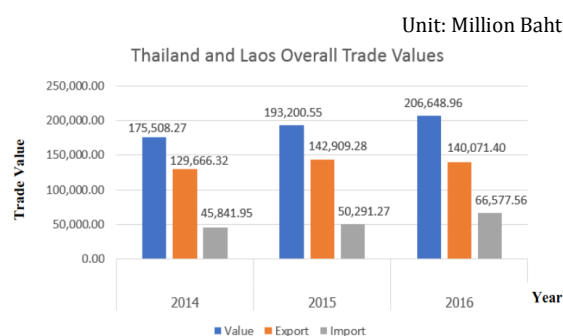
**Abstract**— Lao PDR has been a large constraint in the international market accessibility for its economic development for a long time. Moreover, Lao PDR depends on its neighbours as its key transit countries by using their sea ports. According to the 2016 UNDP Country Program for development projects, Laos has 3 potential economic vulnerabilities, one of which constraints [1]. Therefore, the cross-border truck transportation development becomes an essential for substantial economic development for Lao PDR. Therefore, the government of Lao PDR has its policy to transform its landlocked country to be as a 'land-linked' country by focusing on improving and developing the infrastructure to connect and integrate to sub-regional and regional. For example, the ASEAN Agreement Framework of 2013 of which articles 9 and 10 respectively, should be reassessed, monitored and implemented [15]. The purpose of this research is to identify and investigate the barriers and the impediments to seamless cross-border truck transportation between Thailand and Lao PDR and to use cross-border truck transportation from Nongkhai-Thanaleng to Vientiane, Lao PDR as an illustrative case study. The Analytic Hierarchy Process (AHP) to figure out the cost, time, and reliability as the key factors. From the outcome, it found that the cost of transportation service provider was the most important factor, which effected to cross-border truck transportation was the highest weight 0.5889. Nevertheless, the experts from both government and business sectors who had many working experiences on Nongkhai to Thanaleng route are considering about improving the transportation service to supply the higher demand in current situation. Lastly, policy recommendations and suggestions are given in order to improve the three identified obstacles by this research. The problems faced are trying to be address by international agencies, and by domestic efforts, also this research

specifies and critically analyzes the current issues despite the ongoing efforts.

**Keywords**— Cross-border, Truck Transportation, Seamless, Central Economic Corridor, Landlocked Country/Lao PDR

## 1. Introduction

Due to Lao PDR having limited domestic markets, most of trade development in Lao PDR depends on cross-border trade with its neighbors and with third countries. At present, Thailand is the main key partner as the highest trade values as shown in Figure 1, despite the steady increases in trade volume from Thailand to Laos, there are issues that need to be dealt with in order to facilitate ease of trade and the continuation of the trend of increased trade between Thailand and Lao PDR. The 1<sup>st</sup> Friendship Bridge between Lao PDR and Thailand has enabled an increase in trade between the two countries.

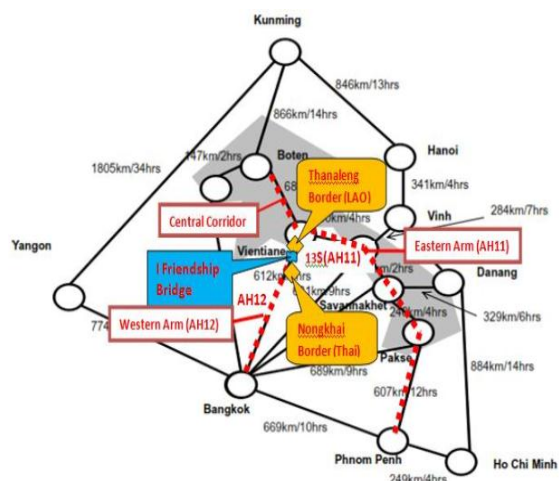


**Figure 1.** Thailand and Lao PDR overall trade values

In spite of this positive outcome, there are some issues that need to be faced in order for cross-

border transportation to operate smoothly. Also, the main challenges for the future perspective on logistics demand in GMS, the trade volume within GMS is projected to increase by 8.9% (2009-2015) and by 7.7% (2015- 2025) respectively. The export and import volume from/to Laos is projected slightly increase and is forecasted to triple by 2025 [13].

Thus, that will make the cross-border truck transportation increase in complexity Vientiane border crossing in the most active sections Central Economic Corridor (Figure 2), due to the dramatic increasing of the projected future trade value after the special economic zone in Vientiane has been fully in operation. The increasing of the future trade volume and the integration of multimodal transport, especially the combination of transport between road and rail in the Vientiane bonded logistics centre, as customs territory that generates more challenges for cross-border truck transportation between Nongkhai-Thanaleng Vientiane more complex.



**Figure 2.** Central Economic Corridor (CEC)

Therefore, the study on an Investigation and Evaluation of Cross-Border Truck Transportation to Lao PDR is essential to conduct, due to Laos being the sole landlocked economy of the ASEAN.

It is especially significant to study the route from getting transit goods from main seaports of Thailand to Vientiane, Lao PDR which pass through Nongkhai-Thanaleng border crossing points at the 1<sup>st</sup> Lao-Thai Friendship Bridge (1<sup>st</sup>FSB). This transportation route is considered to be the most complex cross-border checkpoint that impacts on the seamless flow for cargo movements.

The cost, time, and reliability will be the key factors identified and analyzed for this research. These key factors will be used to determine the performance of cross border truck transportation can reflex all the logistics services in Lao PDR, including customs procedures, time required for release, infrastructure facilities and tracking and tracing.

The road connecting between Nongkhai-Thanaleng to Vientiane as ASEAN High Way 12 (AH12) is acceptable, however the parallel rail connection is only used for passenger traffic. There appears to be a major problem with congestion on the Lao PDR side of the border resulting in significant congestion and the use of nonstandard border controls. This problem needs to be addressed [9].

In order to formulate adequate logistics development policies, a methodology needed to be developed to describe the current logistics situation in Lao PDR. A logistics system development based on the logistics development strategy was prepared [2]. This was used as a starting point for determining the data requirements for evaluation purposes. However, the framework may still be too broad. Therefore, in this regard to illustrate specific cost, time, and reliability in Vientiane Bonded Logistics Centre (VBLC), as a complex and critical section. To mitigate this concern, a logistics cost/time distance model has been determined, which includes a facility for measuring perception of reliability when assessing the various functions of the VBLC.

This model is constructed based on a detailed logistical activity map of specific products moving within the different customs bonded warehouses. This model will attempt to describe the cost and time components of movement through the 3 special customs supervision areas in Thanaleng Border Checkpoint, Vientiane, Laos, namely: Thanaleng warehouse, Lao-Thai 1<sup>st</sup> Friendship Bridge; and Container Yard (Thanaleng Railway Station, 2015), as well as to illustrate the delays at borders [11].

## 2. Literature Review

In 2015, the Government of Indonesia introduced its Regulatory Framework on Bonded Logistics Centres which amended the Government Regulation on Bonded Storage Places or Bonded

Warehouse/Zone to improve Indonesia's competitiveness.

Based on Press Release of Indonesia Investment Coordinating Board and found that the entire processes involved in export and import in Indonesia required 3.5 days in average, whereas Singapore required 2 days and even Vietnam requires only 1 day. In Indonesia, the whole processes cost around USD 573. In Singapore, by contrast, costs are only half. Furthermore, in Vietnam it costs only 45% of the cost Indonesia [8].

Based on the indicator of trade, performance of trading across borders is rather similar situation, which measures the overall procedures and performance of import and export, Indonesia was ranked 7<sup>th</sup> in ASEAN. The Bonded Logistics Centre does not only transfer the warehousing of import and export goods to the territory of Indonesia for domestic needs, but it is also expected to lower domestic logistics costs, thus improving the competitiveness of Indonesia products in global market, also propelling national export.

There have been dramatic developments in the private sector and the use of public/private partnership (PPP) zones, supported by the implementation of the World Trade Organization (WTO) and World Customs Organization (WCO) frameworks. Indonesia is focused on providing customs duties (and other related taxes) and relief and incentives. The UK Free Zones were located at certain ports of entry and controlled principally on the basis of the requirements of customs warehousing procedures. Since 2012, there has been growth in the development of bonded warehousing. The bonded warehousing is a customs procedure allowing the import of goods for storing in a secure area without payment of import taxes until the goods are removed for domestic consumption.

Generally, the duty liability is cancelled upon re-export of the goods outside the EU. A bonded warehouse can be both public or private and the authorization to have a bonded facility can be granted over the operators' existing premises or preferred location. The authorities govern the bonded warehouses via customs legislation and users can be granted an integrated authorization.

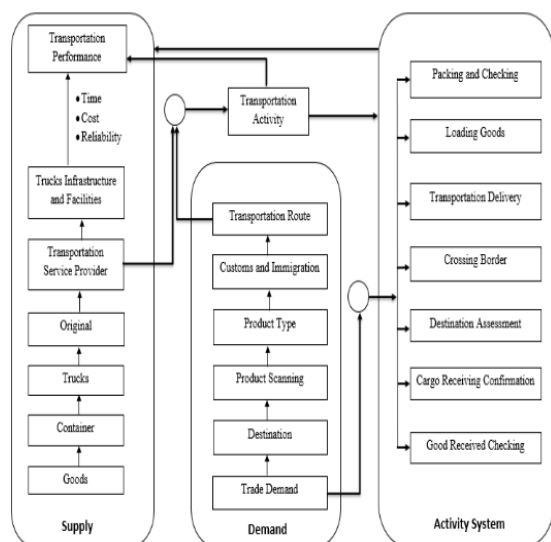
This allows importers to benefit from other customs processing reliefs. This makes bonded warehousing a relatively easy to use and attractive mechanism for importers, traders and manufacturers [6].

## 2.1 Transportation Management

Besides an excellent infrastructure an appropriate location also becomes a key success for setting up a logistics hub and developing multimodal transport networks and distribution facilities. Luxembourg, a landlocked country, is located in the heart of Europe, it provides global companies with many strategic advantages. Indeed, with its open and export-driven economy, Luxembourg is fully integrated into the EU common market. Luxembourg is the ideal gateway to the European market with over 500 million consumers. Over the last decade, Luxembourg has continuously improved its positioning as an intercontinental logistics hub in Europe for contract, air and rail freight-based logistic activities. Furthermore, Luxembourg has initiated a multi-product specialization strategy within its logistics sector by focusing on certain types of products requiring specific handling and/or storage solutions. The Government of Luxembourg sets up a single window for logistics in close collaboration with ministerial departments, administrations and the stakeholders concerned to facilitate import, export and transit procedures for goods and vehicles. Additionally, Luxembourg and to enable economic operators to use a single electronic platform for handling all regulatory information required for the efficient cross-border flow of goods.

A logistics system is composed of (1) shippers, and consignees; (2) public, private sector logistics and transport service providers; (3) provincial and national institutions, policies, and rules; and (4) transport and communication infrastructure [3]. There were many types of transportation systems and most of them consist of both hard and soft infrastructures.

In addition, transportation can be defined as a group of elements, and the interactions of demand trading side and the supply side as the preparation of transportation service provided as shown in Figure 3 Relationship between the transportation system and the activity system from origin (O) to destination (D).



**Figure 3.** Relationship between the transportation system and the activity system

## 2.2 Logistics Providers

Singapore provides clear guidelines for customs procedures regarding movement of goods within and out of bonded warehouses and free trade zones in particular. Customs Control in Singapore means the following: “When goods are under customs control, such goods may not be removed except with the permission of the proper Singapore Customs officer. Upon removal from customs control, import Goods and Services Tax (GST) is payable for the goods, unless they qualify under any import relief or import GST suspension or deferment scheme”. Furthermore, ‘Customs territory’ means Singapore and the territorial waters thereof but excluding of any Free Trade Zone. Goods are treated as import once they are brought into customs territory” [10].

The E-tax guide explains the GST treatment for movement of goods into, within and out of Free Trade Zones (FTZs), Licensed/Zero-GST/Bonded Warehouses and Excise Factories (EFs).

If the company is handling its own goods or handling goods on behalf of overseas principals, where these goods are: imported and exported via FTZs; stored inside FTZs, Bonded Warehouses and EFs; and traded within FTZs, Bonded Warehouses and EFs. The Vientiane Logistics Park (VLP) Project in Vientiane, Laos: Source: Preparatory Survey on Vientiane Logistics Park Project in Lao PDR.

The main objective of the VLP is to provide comprehensive and advanced logistics services that meet international standards and upgrading the current Thanaleng Warehouse as an international gateway to Vientiane. The results of this would be gained in the following ways:

Government can achieve correct duty/tax collection, cargo management and trade statistics;

The VLP can provide accurate, speedy and low cost logistics services by information linkage of cargo, vehicle and declaration; and

Users can satisfy quality services which have not been provided not only in Laos but also in neighbouring countries.

Consequently, the main benefits of the bonded logistics centre development are the following 4; (1) closing the gaps between factories and raw materials domestically (in other words, facilitating ease of processes between sellers and buyers), (2) attracting foreign and domestic investors, (3) reducing time delays and logistics costs at the port; and (4) increasing government tax revenue potential [5].

## 2.3 Measuring Transport and Logistics Performance

The score of Logistics Performance Index (LPI) refers to the ease of doing business. It also reflected as a key indicator for investors’ marketing decision. Taking into account the high increase in globalization, the past few decades’ expansion and intensity in trading activities have subsequently increased. Therefore, logistics activities have been becoming increasingly more important, which is considered of interest. It is also noticed that logistics is as a holistic approach and a process, thus there have been many researchers regularly continue conducting research or studying. The improvement and innovation in logistics and supply chain lead to reduce total producing cost and make more profits for the companies. The success of the companies and the keeping of their competitive advantages depend on the advance and development in logistics.

The Table 1 shows the comparison between Lao PDR and Thailand on the result of World Bank study on the logistics performance index (LPI) (2016), which measured by LPI score.

**Table 1.** LPI score of Lao PDR and Thailand

Performances	Lao PDR		Thailand	
	Rank	Score	Rank	Score
Customs	155	1.85	46	3.11
Infrastructure	155	1.76	46	3.12
International shipments	148	2.18	38	3.37
Logistics quality and competence	144	2.10	49	3.14
Tracking and tracing	156	1.76	50	3.20
Timeliness	133	2.68	52	3.56

Based on LPI score from the comparison table, it is shown that there has been a large gap in the logistics development of Lao PDR compare with Thailand. This means Lao PDR is far less developed than Thailand regarding logistics. In comparison to Thailand, Lao PDR has nearly two times less the key indicators of Customs, Infrastructure, and Tracking and Tracing. Furthermore, they are also failed to meet company quality criteria. The imbalance of transport and logistics between Laos and Thailand lead to many issues, as stated above of cross-border truck transportation, in particularly at Lao border checkpoint. Therefore, these issues need to be addressed. The findings again illustrate that in supply chain efficiency and reliability, the logistics gap is real and persistent.

### 3. Methodology

The main sources of data used in this research were from (1) related previous research and literature reviews, (2) secondary data from different relevant journals, reports, books, strategy and statistics, and (3) primary data from interview, field observation and questionnaire responses.

Furthermore, the Analytic Hierarchy Process (AHP) methodology was multi-criteria decision making where, on the basis of defines group of criteria and attribute values for every single alternative, the selection of the most acceptable solution is done. AHP method is an excellent method, which uses investigation and proof to create plausibility and deep understanding. AHP method creates plausibility and deep understanding by presenting data with presenting the consistency of decision-making process and through the comparison of components in hierarchy. The consideration of alternative correlation of components depends on a subjective estimation by the decision maker [6].

The AHP method guarantees that the assessment consistency is observed continuously in the alternative pair wise correlation procedure “Eq. (1)”. The consistency index:

$$C.I. = (\lambda_{max} - n) / (n - 1) \quad (1)$$

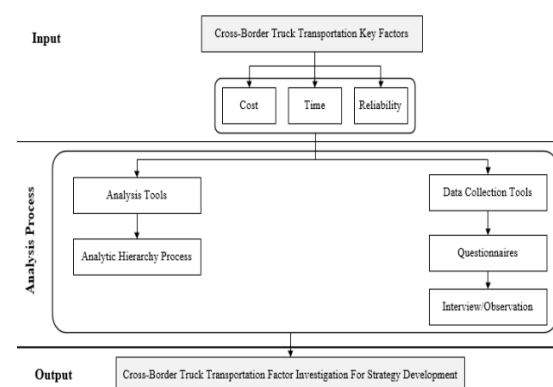
Calculates the consistency ratio  $C.R. = C.I./R.I.$ , where  $R.I.$  is the random consistency index  $n$  size matrix consistency index of randomly generated pair wise comparison, for which Table 2 is utilized (with calculated values) [16].

**Table 2.** Random consistency index values R.I.

n	1	2	3	4	5	6	7	8	9
R.I	0.00	0.00	0.52	0.89	1.11	1.25	1.35	1.40	1.45

$\lambda_{max}$  is the matrix Eigen value, while  $n$  is the matrix measure. Thereto, it is true that  $\lambda \geq n$ , and the distinction  $\lambda_{max} - n$  is utilized to measure the evaluation consistency. In case of inconsistency, if  $\lambda_{max}$  is closer to  $n$ , the evaluation is more consistent.

If  $C.R. \leq 0.10$ , the calculation of relative criteria significance (alternative priority) is considered acceptable. In the inverse case, the decision maker needs to examine the purposes behind unsuitably high evaluation inconsistency. AHP framework is used to analyze the data collected from the interviewees regarding cross-border truck transportation. Findings of the results are as shown in Figure 4.

**Figure 4.** Cross-border truck transportations analysis framework

### 4. Data Collection

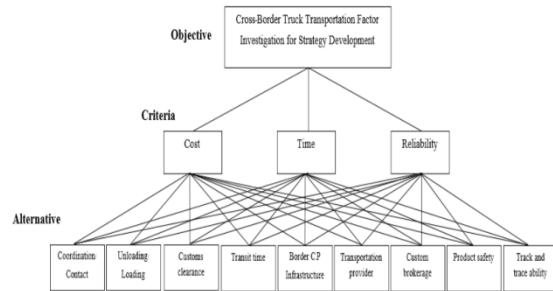
The research was design as an explanatory sequential mixed method. From the beginning, it was conducted quantitative research and explained the outcome in deeper detail by using qualitative

research though field survey, observation, face to face interviews. In term of data collection, the sampling was used non-probability and based on the purposive sampling.

The key sampling of cross-border truck transportation are the experts from both government and private sectors from Lao site included expert from Ministry of Industry and Commerce (MOIC), experts from Ministry of Public Works and Transport officers, experts from Customs Department, experts from Lao International Freight Forwarder Association (LIFFA), experts from Lao Logistics Group (LLG), experts from Lao Freight Forwarder Co., Ltd, experts from Societe Mixte De Transport Co., Ltd (SMT), experts from the 1st Lao-Thai Friendship Bridge (1FSB), experts from Thanaleng Warehouse (TLWH), and experts from Thanaleng Container Yard (TLCY).

**5. Results**

The AHP is integrated from direct factors of truck transportation, which are based on the hypothesis [16]. Following the progression guideline of running model that show the model fit. There are three principle factors utilized in the model including cost, time, reliability. Each contributing factor is comprised of many sub variances as alternatives. Moreover the related variances have distinctive levels of affecting truck transportation. Thus, research developed the model in order to determine the affect of each factor, and additionally to prioritize the factors and develop the appropriate strategies in order to enhance cross-border truck transportation performance. Therefore, applying AHP analysis facilitates the ease in studying the area of Nongkhai-Thanaleng transportation route and in understanding and extracting sufficient information on how time, cost and reliability come into play and ultimately how these three factors can be improved. From analyzing these three factors, the analysis provides the required information to implement an action plan of efficiency according to the problems extracted, and create an action plan accordingly. on how the expanding demand of transportation that increases yearly can be utilized in the most effective way Nongkhai-Thanaleng to Vientiane in the future (as shown in Figure 5).



**Figure 5.** Structuring the barriers of cross-border truck transportation factor investigation for strategy development

The second level attributes (criteria) are marked in the following way:

A<sub>1</sub> – Cost,            A<sub>2</sub> – Time,            A<sub>3</sub> – Reliability

Weight – in the following graphs ‘Weight’ relates to the total impact of A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>.

From the research findings, when comparing three main factors of cost, time and distance together, we can see the importance of these three attributes as presented and compared in the Table 3 below. From the data it can be extracted that the cost of transportation regarding the service provider was highest weight 0.5889 that affected to cross-border truck transportation from Nongkhai-Thanaleng to Vientiane.

**Table 3.** First level attributes comparison (decision criteria)

Criteria	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	Weight
A <sub>1</sub>	1	3.00	3.00	0.5889
A <sub>2</sub>	1/3	1	2.00	0.2519
A <sub>3</sub>	1/3	1/2	1	0.1593

Identically, the third level attributes (alternative) are marked in the following way:

- B<sub>1</sub> – Coordination/Contact,
- B<sub>2</sub> – Unloading/Loading,
- B<sub>3</sub> – Customs clearance,
- B<sub>4</sub> – Transit time,
- B<sub>5</sub> – Border check-point infrastructure,
- B<sub>6</sub> – Transportation provider,
- B<sub>7</sub> – Custom brokerage,
- B<sub>8</sub> – Product safety,
- B<sub>9</sub> – Track and trace ability

The coincident third level alternatives comparison matrices for each attribute and their respective priorities are present in the Table 3-5.

The research findings present four significant results, Firstly, the alternative relative importance regarding cost attributes, shows that the highest affected area is of cost of cross-border truck transportation is from Nongkhai-Thanaleng to Vientiane. The cost has the highest weight as the most significant factor is customs clearance totalling to an amount of 0.1842 as shown in Table 4. The customs clearance issues in this case are that there is a long lead-time to submit and process documents that are required. In order to facilitate the ease of exports and imports into Lao PDR, the lead time would need to be decreased. Furthermore, if there is any incorrect information regarding documents procedures from the customs broker, that may cause un-flow of information and becomes an obstacle to ship cargo from one country to another on time. The above stated reasons may increase costs if shipping if not executed in a timely and cost effective manner.

**Table 4.** Matrix of alternative relative importance comparing to A<sub>1</sub> attribute (Cost)

Alternative	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>5</sub>	B <sub>6</sub>	B <sub>7</sub>	B <sub>8</sub>	B <sub>9</sub>	Weight
B <sub>1</sub>	1	2	1/2	1/2	1/2	1/2	1	1	1	0.0869
B <sub>2</sub>	1/2	1	1	1	1	1	1/2	2	2	0.1076
B <sub>3</sub>	2	1	1	3	2	2	1	2	3	0.1842
B <sub>4</sub>	2	1	1/3	1	1	1	2	2	2	0.1275
B <sub>5</sub>	2	1	1/2	1	1	2	1	2	3	0.1355
B <sub>6</sub>	2	1	1/2	1	1/2	1	1	2	2	0.1106
B <sub>7</sub>	1	2	1	1/2	1	1	1	2	2	0.1235
B <sub>8</sub>	1	1/2	1/2	1/2	1/2	1/2	1/2	1	2	0.0699
B <sub>9</sub>	1	1/2	1/3	1/2	1/3	1/2	1/2	1	1	0.0543

Note.  $\lambda_{max} = 9.5007$ ; C.I. = 0.0626; C.R. = 0.0432 < 0,10

Secondly, this outcome found that the customs clearance is organized in a manner that is not efficient regarding transportation services along the cross-border checkpoint. The disorganization at customs clearance points causes unnecessary excess lead-time during customs examination, assessment, and payment of duties. Additionally, due to the customs clearance issues such as un-organized management in shipping containers to their destination becomes an obstacle and ultimately delays shipments arriving on time. Another negative consequence of customs clearance issues is that delay subsequently causes an increase in the cost of logistics services. Thus, the alternative relative importance in relation to time shows that the highest negative effects regarding the total time of cross-border truck transportation is from Nongkhai-Thanaleng to Vientiane. This route has the highest weight for customs clearance, which equals to 0.2025, as is illustrated in Table 5.

**Table 5.** Matrix of alternative relative importance compared to A<sub>2</sub> attribute (Time)

Alternative	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>5</sub>	B <sub>6</sub>	B <sub>7</sub>	B <sub>8</sub>	B <sub>9</sub>	Weight
B <sub>1</sub>	1	1	1/2	1	1	1	1	2	2	0.1064
B <sub>2</sub>	1	1	1	3	3	1	1	3	3	0.1658
B <sub>3</sub>	2	1	1	3	3	2	2	2	4	0.2025
B <sub>4</sub>	1	1/3	1/3	1	2	1	1	3	3	0.1099
B <sub>5</sub>	1	1/3	1/3	1/2	1	1	1	3	3	0.0961
B <sub>6</sub>	1	1	1/2	1	1	1	1	2	3	0.1110
B <sub>7</sub>	1	1	1/2	1	1	1	1	3	3	0.1167
B <sub>8</sub>	1/2	1/3	1/3	1/3	1/3	1/2	1/3	1	2	0.0516
B <sub>9</sub>	1/2	1/3	1/4	1/3	1/3	1/3	1/3	1/2	1	0.0401

Note.  $\lambda_{max} = 9.3225$ ; C.I. = 0.0403; C.R. = 0.0278 < 0,10

Thirdly, the reliability of coordination and contact in relation to information sharing is of prime importance. Coordination and contact of information sharing greatly impacts the operations of transportation system in the supply chain. Firstly, the sharing of information enables collaboration in identifying issues that may arise. Secondly, by coordinating activities such as sharing real time information, data containing evidence and performance can be viewed in real time. This is significant in that it allows stakeholders to view the transport process from start to end point. The results show, that Nongkhai-Thanaleng to Vientiane has the highest weight, or in other words, the highest negative impact in reference to cross-border truck transportation reliability. Therefore, reliability of these networks greatly impacts cross-border truck transport, efficient systems are required to be innovated or created in order to improve reliability, in terms of coordination, contact and collaboration.

**Table 6.** Matrix of alternative relative importance compared to A<sub>3</sub> attribute (Reliability)

Alternative	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	B <sub>4</sub>	B <sub>5</sub>	B <sub>6</sub>	B <sub>7</sub>	B <sub>8</sub>	B <sub>9</sub>	Weight
B <sub>1</sub>	1	2	2	2	3	3	3	1	1	0.1901
B <sub>2</sub>	1/2	1	1	2	2	1	1	1	1	0.1098
B <sub>3</sub>	1/2	1	1	3	3	3	2	1	1	0.1521
B <sub>4</sub>	1/2	1/2	1/3	1	3	2	1	1	1	0.0992
B <sub>5</sub>	1/3	1/2	1/3	1/3	1	1	1	1	1	0.0678
B <sub>6</sub>	1/3	1	1/3	1/2	1	1	1	1	1	0.0755
B <sub>7</sub>	1/3	1	1/2	1	1	1	1	2	2	0.1045
B <sub>8</sub>	1	1	1	1	1	1	1/2	1	2	0.1086
B <sub>9</sub>	1	1	1	1	1	1	1/2	1/2	1	0.0926

Note.  $\lambda_{max} = 9.6662$ ; C.I. = 0.0833; C.R. = 0.0574 < 0,10

At the end of the transportation procedure, it was shown a total issue analysis of the cross-border truck transportation from Nongkhai-Thanaleng to Vientiane, which has the highest factor customs clearance equal to 0.1837, which also responded to the mentioned cost model results of the products moving within the different locations of clearance in Thanaleng customs checkpoint before

proceeding to Vientiane. Following by unloading/loading 0.1226, custom brokerage 0.1188, transit time 0.1185, border check-point infrastructure 0.1148, coordination/contact 0.1083, transportation provider 0.1051, product safety 0.0715, and track and trace ability 0.0568, as summarized in Table 7.

**Table 7.** Synthesized table on the optimal alternative selection

Criteria	Criteria Weight		Sub-Criteria Weight		Sub-Criteria Weight		Sub-Criteria Weight		Sub-Criteria Weight		Sub-Criteria Weight		Sub-Criteria Weight						
	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	W <sub>5</sub>	W <sub>6</sub>	W <sub>7</sub>	W <sub>8</sub>	W <sub>9</sub>	W <sub>10</sub>	W <sub>11</sub>	W <sub>12</sub>	W <sub>13</sub>	W <sub>14</sub>					
A1	0.3889	0.6111	0.0512	0.1488	0.1842	0.1883	0.1275	0.0751	0.1333	0.0796	0.1106	0.0651	0.1235	0.0727	0.0699	0.0412	0.0543	0.0320	
A2	0.2519	0.7481	0.0268	0.1432	0.1418	0.2925	0.0510	0.1099	0.0277	0.0961	0.0242	0.1110	0.0200	0.1167	0.0274	0.0510	0.0130	0.0401	0.0191
A3	0.3701	0.6299	0.0303	0.1697	0.1571	0.0242	0.0992	0.0518	0.0678	0.0108	0.0755	0.0120	0.1047	0.0346	0.1086	0.0173	0.0926	0.0148	
	0.1883	0.1226	0.1837	0.1185	0.1148	0.1083	0.1051	0.1188	0.0715	0.0568									

**6. Discussion**

A number of strong and significant relationships were found in this research. From the research, the cost, time, and reliability, particularly on customs clearance was played a major role affected to cross-border truck transportation with the highest factor equal to 0.1837, following by unloading/loading 0.1226, custom brokerage 0.1188, transit time 0.1185, border check-point infrastructure 0.1148, coordination/contact 0.1083, transportation provider 0.1051, product safety 0.0715, and track and trace ability 0.0568 respectively.

Three research question factors that make cross-border trucking services not seamless between Thailand and Laos. The three factors are cost, time, and reliability. Cost and time are an issue at the border because of different international standards and the benchmark of goods. Customs clearance is affected by time because of mismanagement of professionals and unorganized. Next is reliability, which is affected by coordination and contact within Laos. In Laos, there is less real time online data about tracking products from origin to destination country; this is an obstacle to trust.

Moreover, in the field observation in Vientiane that can obviously see the lack of driver training for the trucks caused many issues occurs, the road infrastructure in Lao site (Figure 6), also the lack of labour skill who are well-known in the vehicle mechanics and maintenance. It should have the standard of Lao drivers by constructing the training driving centre for international driver the qualified by the international organizations cooperate with

Lao government to take the international driving licensed that can be able to reduce risk on the road of using vehicles and trucks in order to make more reliability for every sector, also it can reduce the time and gas which have a beneficial impact for the cost reduction as well.



**Figure 6.** Road Infrastructure in Thanaleng

**7. Conclusion**

According to the issues stated in discussion, some suggestions will be given. Consequently, the expanding cross-border trade demand for stimulate the economic growth of the countries, both Thai and Lao transport workers, governments, and policy makers should focus on empowering and supporting improvement of transport services. The following should be considered (i) improved productivity - government should consider on the support the business sectors to improve their product by considering the value added in the products that they already had, (ii) following international standards - the World Trade Organization (WTO) that include the tariffs, implement the ASEAN Economic Community (AEC) 2015, also policies should be implemented and monitored (iii) facilitation of cross-border truck transportation -the well-organized information flow in both customs clearance should be implement from the policy to the practical much more than the present to improve ease of cross border truck transportation and (iv) building trust to services-increasing reliability through tracking system and transparent. Also to increase reliability to add real time Internet access from origin to destination country. Over all, theory has to be practiced, not only written. To sum up, there are many action plans that can be done such as training skill for drivers to understand clearly on what they do among the route, however, for the long term, the policy makers should more consider on the international agreement before implementation due



to if there is some mistakes in the agreement can caused the huge impact to the country, thus, that will take time see the changing for the improving in the cross-border truck transportation not only between Thailand and Lao PDR, but also among the Greater Mekong Sub-region (GMS) and the Association of Southeast Asia Nations (ASEAN) [3]. Last but not least, the improvement in transportation and logistics would ultimately help to graduate Lao PDR from LDC status with prospects being to graduate by 2020. According to the UN Development Policy and Analysis Division 3 characteristics will lead to the graduation, of importance in this study is GNI which can be promoted through increased trade which supports GDP and GNI. However, this requires implementation not only theoretical framework. Economic Vulnerability Index is affected by (i) remoteness and (ii) Instability of export of goods and services [14].

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