FACTORS IN SELECTING MODE CHOICE FOR RUBBER EXPORTING FROM TRANG TO PENANG PORT

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Abstract—This paper analyzed the transport alternative routes for delivering rubber from Trang province to Penang port. A Cost-Model is used to develop and justify the correspondence of cost and distance of intermodal transport in each choice; Kantang port, Sadao border, and Padang Besar border. Then, the Analytical Hierarchy Process (AHP) is applied for this analysis. Effectiveness mode is evaluated through three main factors; economics, port/customs and transportation factors. The results show that Kantang port is the primary choice for exporters focusing on cost, Sadao border is the most attractive when focusing on time. Lastly, Padang Besar border will be considered as first when the safety of the product movement becomes most important.

Keywords—Rubber exporting, Mode choice, Penang port, Analytical hierarchy process (AHP).

I. INTRODUCTION

Rubber is one of the Top 10 export products of Thailand. In 2015, the majority of rubber was exported to China. About 56.6 percent of the total export was Standard Thai Rubber (STR) for use in the tire industry, 11.5 percent was concentrated latex for the Malaysian glove industry and 7.7 percent was Ribbed Smoked Sheets (RSS) for the Japanese market [1]. Natural Rubber is one of the most important agriculture products of Thailand. So, it is crucial to plan and manage the natural rubber export well. In particular, careful consideration must be given to the development of the transportation infrastructure which can lead to support the country’s economics. At present, the natural rubber exported to areas such as South East Asia, Europe and others. These represent the most important customer groups and main trade partners. The majority of export is handled through the Bangkok port, Laem Chabang port and the ports in Malaysia. Of these, the Penang and Klang ports in Malaysia have been used most extensively for direct and transshipment vessel.

Malaysia is the country that is located the most close to the Southern part of Thailand. With its long coastline, the country has seen rapid infrastructure development in terms of Maritime Transport. The Malaysian Government has been a primary driver in this development, with as aim to become the center of collection and distribution of cargo through their Penang and Klang ports. This is also achieved by utilizing feeder vessels through or via the ports of TanjungPelapas or Singapore [2].

Basically, the main ports in Malaysia are Port Klang, the Port of TanjungPelapas, Johor port, Penang port and Kuantan port. Due to higher container volumes generated in Asia, Malaysian ports have extremely invested in the infrastructure and port capacity expansion in expectation of increasing the container volumes to their country. The main reason for shipper to load cargo via Penang port is the freight cost is quite cheap compared with load at Songkha, Laem Chabang or Bangkok ports. Moreover, the route of Trang province is close to Penang port than Laem Chabang or Bangkok ports.

Port Klang is the largest port in Malaysia. Many shipping lines have service via Port Klang, they providing cheap freight cost but the inland cost is quite high due to long distances. Thus, most of the rubber exporters in the southern part of Thailand decided to export the cargo via Penang port. Recently, the natural rubber exports have changed from bulk loaded to container loaded cargo. Last year an estimated 180,000 TEUs were exported. Thailand’s rubber is exported through the Bangkok, Laem Chabang and Songkha ports, some exported over Thailand border to the Penang port in Malaysia and the remaining containers volume was exported via some Thailand ports.

II. LITERATURE REVIEW

In the antecedent, the process facilitated for cargo movement can be either in break bulk or in container, and transport by road or rail [3]. The alternatives of transport mode or coalition of transport modes has a direct influence on the efficiency of logistic systems and channels. Beresford & Dubey have studied and adapted the cost model, which is represented in Figure1. This comprises many transport modes: road, rail, inland waterway, sea and intermodal transfer (ports, rail-freight a terminal, inland clearance depots) as a cost component.

There is the assumption that unit costs of transport alter between modes, with the steepness of the cost curves indicating the fact that, for volume movements, sea transport should be the route that represents the cheapest cost per ton-kilometer, road transport should generally be the most expensive, waterway and rail costs should be in the intermediate range. At inland terminals and ports of loading, a freight handling charge is imposed without any progresses being made.
together with the supply chain; a vertical “step” in the cost bend hence represents the costs encountered there [4].

To carry goods by using at least two different modes of transport is called multimodal transport [5]. There is study of Laothian garment exporters, which compares the cost in each kind of multimodal transport from Vientiane in Lao PDR to Singapore. 4 routes were analyzed; “Road-Sea” via Danang (Vietnam), “All-Road” via Bangkok (Thailand), “Road-Sea” via Bangkok Port and “Road-Rail-Road” via Lad Krabang (Thailand). The research result showed that the “Road-Sea” via Bangkok Port is the most competitive in terms of cost whereas the “All-Road” is the best option for the fastest transit time [6]. Obviously, each of the transport modes have different of strengths and weaknesses, at the mean time will effect with the effective of logistics channel directly [7]. 

The allotment of freight amongst transport modes, frequently called modal split, has been one of the most contentious topics in the field of transport logistics because the decision making cannot be made base on principles or the ideology only, but it depends on other factors that influence the trade [8].

The decision making in mode choice and transportation routes depend on many factors. Many researches revealed that logistics cost, operations, customer relationship, company image, transit times, reliability, flexibility, pilfered and damaged goods, shipper market consideration and carrier considerations are the factors that are commonly concerned by the exporters [9]-[11].

Apart from that, the topography, the density of transport network, the size of country, the community dispersion, the economic infrastructure, the investment, the tax and the environment safety were also considered as factors that influence the decision. In the meantime, the service level would be the main concern for choosing the truck carrier [12]. Despite those factors were considered but it cannot refer to the optimal route or best choice of the decision regarding of the selection may be changed upon the different circumstances [13].

Furthermore, next to the transportation route of cargo export, there is also the choice of port. The factors that influence the port choice from the Southeast Asian Freight Forwarder’s perspective are considered the following: frequency of ship visits, operational efficiency, adequacy of port infrastructure, location, competitive port charges, quick response to port users’ needs and port’s reputation for cargo damage [14].

The Analytic Hierarchy Process (AHP) is a multi-criteria decision making approach. The AHP has attracted the attention of many researchers mainly caused the good mathematical properties of the techniques and the fact that the required input data are not too hard to be gathered. AHP comprises a multi-level hierarchical structure of objectives, criteria, sub-criteria, and alternatives. The elementary principle of AHP is a simplification of a complicated issue that is not structured, dynamic and strategic to be parts and arranged in a hierarchy.

The relevant information is obtained by using a pairwise comparisons set. These comparisons are conducted by weighing of importance of the decision criteria, and the relative performance and structure measures of the alternatives in terms of each individual decision criterion. The weighing must obtained from a few expert respondents.

AHP can measure the consistency of judgement in case the deviation is too incomparably from the value of complete consistency, which shows the hierarchy of assessment needs to be repaired or must be re-structured [15].

III. METHODOLOGY

This research focuses on the decision making process for rubber exporting as container loaded from the Southern part of Thailand to Penang port by determining the factors that influence this process. Routes options considered were shown as Fig.1.

- Kantang Border, Thailand
- Sadao Border, Thailand
- Padang Besar Border, Malaysia

The problems encountered can be analyzed to provide a framework to improve and develop Thailand’s border exports. In determining these factors, the less weight factor should be concerned and improved the capability and performance in each mode.

Moreover, this research has also analyzed the Cost-Model in each three routes in Fig.2 to be the supporting evidences for the exporters. Distances, transit time, and cost were analyzed together.
IV. COST-MODEL ANALYSIS

A. Kantang port
This routing was held by intermodal transportation, its delivering began at the factories to the Kantang border by truck and trans loaded to barge vessel. The estimated total lead time to ship via Kantang border is about 8-14 days starting from pick up empty containers and return the laden containers to Penang port.

In Fig.3, there is a short distance between the factories in Trang and Kantang border. It takes around 2-4 hours for driving. Meanwhile, the routing between Kantang port and Penang port is taking long time due to the speed of the barge vessel.

B. Sadao border
As shown in Fig.4, this routing is held by truck only. The starting point is in the factories in Trang, directed to and dropped at Sadao customs house. They need to declare and submit customs documents, change the tractor trailer from Thailand registered number to be Malaysia registered number and then head to Penang port.

The estimate leading time for transport via this route take around 2-4 days for picking up empty containers from Sadao border and returning the laden containers to Penang port.

C. Padang Besar border
This routing is held by intermodal transportation, it began with truck and then trans loaded with rail at Padang Besar border in Fig.5. At the Padang Besar border, the cargoes were held by Malaysian Railway called Keretaapi Tanah Melayu (KTM) to the Penang port.

All the containers handling is managed by Malaysian side. The estimated leading time is about 5-7 days. The empty containers are picked up from a depot in Malaysia and the laden containers are returned to Penang port.

However, the decision making is not depending on distance or cost only. There are many other factors needed to be assessed for finding the optimal alternatives and control the restriction of this model to be less.

V. THE ANALYTICAL HIERARCHY PROCESS ANALYSIS

There are total 22 companies of rubber manufacturers in Trang province of which 7 have been selected as the sample because of two reasons: they have the highest production volumes per month and they have shipments loaded at Penang port. The criteria were identified and described as table I.
VI. RESULTS AND DISCUSSION

A. Kantang Port Choice
Kantang port is a primary mode for cargo export with regards to cost efficiency. It is the cheapest mode and the inland route is more close to the factories in Trang province than others. The exporters who focus on cost would consider this mode the best choice. In addition to the document process and procedures which is also performed well along with the service make this port being as the major mode for exporting the cargo from Trang to Penang port.

Only the transit time is around 14 days which need to be improved. This mode cannot support urgent shipments and there are also many shipping agents who provide free time detention and demurrage only for 5 or 7 days which cannot cover the lead time for export via this mode. Thus, they should increase the barge vessels and trips

B. Sadao Border Choice
Sadao border is a worthwhile choice for exporters concerned about short transit time. According to lead time for arranging the container regularly about 4-7 days, so there would be no problem about free time detention and demurrage allowed when transport occurs via this mode. Furthermore, this mode has been the entire transportation by truck that has a better punctual than other modes.

The study revealed this mode is the most expensive mode. It is also more risky than others. Normally, the truck must stop at the Sadao border to change the trucking plate from Thailand to Malaysia. Some trucks will park one night after entering to Malaysia and that has a high risk of robbery.

There are fewer possibilities to reduce the cost due to many factors such as fuels, operational and administrative cost. The improvement should focus to the security of transportation such as providing a rest area for drivers. It is possible to reduce the robbery problem and can make the exporter feel safe to export cargo via this mode.

C. Padang Besar Border Choice
Padang Besar border is determined as the safest mode for exporting cargo from Trang to Penang port. For rubber shipments, most of the cargoes packing with shrink wrapped pallet loaded in twenty and forty-foot equivalent unit but they also have some latex shipment in Flexi-bag packing which is very sensitive when delivering. It is too risky for exporting the Flexi-bag shipment via truck or barge vessel. It could cause the containers to swell up.

Service quality and punctuality are two main criteria that the exporter concerned when export via Padang Besar border. They work very slow compared to other modes. It is also very congesting when many exporters are queuing for returning the laden containers. Sometimes, they will suddenly close the gates for a few days to clear all laden containers. They also have problems about wagon shortage or rack maintenance. It affects the exporters directly because they cannot get the empty containers to load the cargo on time.

In general, most of the activities in this mode are mainly operated by Malaysian staff. They should improve the service by training the stuff especially for the operational working. Moreover, investing in equipment is important in order to support the high volumes of containers going in and out every day.

CONCLUSIONS

In this study, we proposed a mode choice selection using the AHP method. We considered three main criteria including Economic, Port/Customs, and Transportation factors. The finding of this study was shown in the table II. It reveals that the exporters are highly concerned about the cost of transportation, safety of products movement and the punctuality. The exporters decided to export via Kantang port when they consider the cost. Sadao border will be considered as first choice when they emphasized on time. Padang Besar border will be considered when they are focusing on safety of products movement.

According to the obtained results in Fig.6, Kantang port is the first mode choice to export the rubber from Trang to Penang port. Nevertheless, the study reveals that cost is not always important under many circumstances. Another mode choice can be chosen depending on the different factors. Despite the fact that survey has been limited to a...
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sample of rubber exporters in Trang, the results provide a useful empirical data in order to increase the border performances and the transport routes. Further research might also analyze the perspective of rubber exporters in Northeast of Thailand in order to export rubber to different mode choice.

Fig.6. The weights of all factors and the mode choice

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