Logistically, Thai railway has a large expansion opportunity. Also based on the future transport demands in the international economic corridor namely Greater Mekong Subregion (GMS), it could potentially become a powerful vehicle towards becoming the GMS freight distribution center under “the North-South and East-West Economic Corridor Development Plan.” A broadened freight service in Thai railway would support the trade in GMS, and this in fact becomes a highly prospective opportunity for the Thai government to consider granting investment. The objective of this present work is to suggest options to the improvement of medium to long distance freight transportation in Thailand, in such a way that would support it to become the GMS freight distribution center, as announced in the national policy. The focus of this paper is, however, given mostly onto opportunities of railway infrastructure redress as a main tool to achieve the goal.

**Keywords:** Railway, Freight Transportation; Freight Distribution Center, Railway Infrastructure.
1. INTRODUCTION

Medium to long distance freight transportation always plays crucial role in driving social and economics expansion by means of transporting and distributing goods to different regions in a country. In Thailand, the demand of road freight transportation has been continuously growing. Road traffic congestion can usually be observed both in in-urban and inter-urban areas. However, such congestion is associated with higher transportation cost, more fuel consumption and environmental impacts, which are direct/indirect costs to logistics transportation service provider resulting in an increase in total cost of production.

Meanwhile, the demand of railway mode in Thailand, though also growing, tends to be constrained by the declining investment. In fact, railway is more efficient at transporting bulk freight traffic over medium to long distances. It can also effectively handle large volume of transportation with time punctuality, speed safety and lower energy consumption, compared to their main rival, the truck industry (Cilliers and Nagel 1994, Crainic and Laporte 1997, Kasilingam 2003). However, generally in Thailand, agricultural products such as rice, coconut and sugar, and secondary merchandises such as machines and consumer products, depends largely on truck transportation. As a result, very few portions of these cargoes being transported by rail, despite of its several advantages of large-volume services offered for bulky cargoes.

To encourage the higher share of railway in the transportation sector is relatively straightforward. It is a clear choice for those logistics transportation service providers to save their cost by switching the mode of transportation from road to rail. Service expansion is one key answer in securing future demand and the improvement of the usage share. Besides, such expansion could also support the future trade in international economic corridor which is known as the Greater Mekong Subregion (GMS), comprising six countries along Mekong River. These countries include Laos, Cambodia, Myanmar, Vietnam, the Yunnan Province of the People’s Republic of China and Thailand. Accordingly, as the international opportunities are already established, it is of great importance for government to consider investment on service expansion in the country where feasible.

2. OVERVIEW AND OPPORTUNITIES OF THAILAND RAILWAY FREIGHT TRANSPORTATION

In the past, Thailand railway transportation was basically known as a passenger railway, as the marketing focus was weighted toward passenger traffic. Railway was most frequently used for inter-city transport of passenger especially amongst the poorer levels of society. With
the exception of the transport of some petroleum products, however, railway has captured only a minimal share of national total freight transport. This lack of emphasis on freight traffic, though, has begun to change over the past few decades. Nevertheless, the total revenues generated by the State Railway of Thailand (SRT) are relatively dwindling, caused primarily by artificially low fares for passenger traffic which had been imposed by the government. Therefore, it is most challenging for the Thai railway to capture more on revenues from freight traffic and increase its total usage share.

Opportunity of freight service expansion is actually relatively obvious in many areas of the country. In fact, the demand of service lines in Thailand has been increasing annually during the past ten years. Such demand has become apparent, for example, in the transport of containers. Container transportation line, which connects between Laem Chabang (LCB) port in the Eastern Seaboard (ESB) and Lat Krabang Inland Container Depot (ICD-Lad Krabang or known as “LICD”) that lies on the SRT Eastern Line, has continuously increased its transportation volume. This network offers highly promising opportunity for the service expansion from existing single and triple track as shown in the schematic diagram in Fig. 1. To respond to the further increase of container transportation, track doubling and expansion of the Inland Container Depot (ICD) can be taken to consideration.

![Fig. 1. Railway expansion opportunity in ESB line](image)

*Source: Office of Transport and Traffic Policy and Planning (2005)*

In political point of view, railway expansion project could provide a great support to the international transportation development policy. Logistically, with a well planned network, Thailand could play a key role in the GMS international economic corridor by becoming the “Center of Logistics & Goods Distribution” under “the North-South and East-West Economic Corridor Development Plan.” In fact, the ESB line above is expected to become future
distribution gateway from/to Southern part of China and eventually to Europe, as part of the integrated transportation corridors among the GMS as shown in Fig. 2 and Fig. 3. The broadened freight service would support the trade in GMS, and this is in fact become a highly prospective opportunity for the government to consider granting the investment (Krongkaew 2004).

To capture the potential opportunities, it is most important to improve current railway freight transportation system and their facilities. Also, by fully exploiting the advantages of railway transport, which will result in cost minimization especially over medium to long distance transportation, this will form a great contribution to the implementation of the national intermodal operation policy, which mainly support the role of being GMS center of distribution.
3. ISSUES ON RAIL FREIGHT TRANSPORTATION TOWARDS THE DEVELOPMENT

Railway freight transportation constitutes a vital link in mass movement of freight on land. However, the movement of freight in bulk and the inherent inflexibility to travel to many places have resulted railway in the loss of market share to the road sector. Like in other countries, the low movement of freight trains in Thailand is hampered by the lack of dedicated tracks around the country and by the lower preference compared to road movement as given by customers (Godwin et al., 2006). Several issues that are considered to cause the low movement of freight trains and lessen the potential of the railway transportation development involve problems with equipment, terminal/distribution center, railways track and railway vehicle (Godwin et al. 2006, Kuo and Nicholls 2007) and can be classified into three main categories as follows.

3.1 Inadequate utilisation of railway freight transportation potential

Railway freight transportation typically concentrates in specific locations. As for container transportation, for example, almost all service is dominated by the transportation between Bangkok and the ESB. Petroleum products are mainly transported between Northern region and the ESB, while cements are mainly transported between Saraburi province and the Northern region. The limitation of service area with specified commodities narrows down the freight transportation market. Railway transportation yet mostly intends to capture large-scale clients, for example, those require container service. This consequently results in losing future business opportunity of freight service expansion, and the freight facility is not fully utilised because there is not enough potential clients.

3.2 Quality of railway freight vehicles and infrastructure

SRT (State Railway of Thailand 2002) operates freight service with old locomotive and wagon. Shortage of rolling stock for freight service is usually experienced. The service age of locomotive and wagon of railway vehicle are shown in Table 1 and 2, respectively. An old module of locomotive is shown in Fig. 4. Moreover, many parts of railway track life are expired. Damaged rail, wood-sleeper and level crossing are often found as shown in Fig 5, 6 and 7, which seriously disturbed the railway operation.
Table 1. Service age of SRT Locomotives

<table>
<thead>
<tr>
<th>Service age</th>
<th>Diesel electric locomotive</th>
<th>Diesel hydraulic locomotive</th>
<th>Diesel hydraulic railcar</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–15 Years</td>
<td>31%</td>
<td>18%</td>
<td>52%</td>
</tr>
<tr>
<td>16-30 Years</td>
<td>36%</td>
<td>47%</td>
<td>31%</td>
</tr>
<tr>
<td>&gt; 30 years</td>
<td>33%</td>
<td>35%</td>
<td>7%</td>
</tr>
</tbody>
</table>

Source: SRT (2002)

Table 2. Service age of SRT Wagon

<table>
<thead>
<tr>
<th>Percentage of Vehicle</th>
<th>1–15 Years</th>
<th>16-30 Years</th>
<th>&gt; 30 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–15 Years</td>
<td>31%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-30 Years</td>
<td>36%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 30 years</td>
<td>33%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SRT (2002)

Fig. 4. Overaged vehicle of SRT.

Fig. 5. Damaged rail.

Fig. 6. Damaged Wood-Sleeper.

Fig. 7. Damaged Level Crossing.
3.3 Inadequate capacity of railway infrastructure and supporting facilities

Additional to the narrow market, limited potential clients, and expiring track and vehicles, low capacity and low efficiency of freight services themselves obstruct the expansion of the railway use. SRT (State Railway of Thailand 2002) operates train services over a network of 47 provinces with approximately 4,129 km. However, only 165 and 83 km are double and triple tracks, respectively, as shown in Fig. 8. Moreover, there are approximately 620 rail stations and stopping locations in Thailand, but only a minimal share is available for bulky freight transportation. In total, 292 of out 620 rail stations deal with freight services. However, only 55 stations involve large-volume transport with more than 10,000 tons of freight. Only those 10 largest rail freight stations that deal with more than 75% of the total freight volume in the country. This means that only these large stations are equipped with loading facility and are available for bulky cargo transportation (State Railway of Thailand 2002).

![Thailand railway network](image)

Fig. 8. Thailand railway network.
Source: SRT (2002)

The low capacity problem is clearly observed in the container transportation. For example, the demand container transportation has been continuously increased during past few years. However, the growing demand has been constrained by limited track capacity and rolling stock. Lad krabang Container Depot (LICD)’s capacity is almost fully utilized with current volume of containers. Rail stations in other regions are also facing problems with limited spaces and lack of supporting facilities, especially in rural area.
4. RECOMMENDATIONS FOR FUTURE ACTIONS

The recommendation is firstly given to identifying potential business opportunity for SRT to quickly improve its profitability. In the areas where the traffic volume is high, track doubling needs to be constructed. Also, the possibility to expand the freight business by integrating rail with other transportation modes should be considered.

In order to provide sufficient and efficient service, rail freight station should be restructured or reallocated to the areas with more freight volume and are in the strategic locations. The possibility to extent potential stations into regional distribution center and transport hub should also be considered (Hesse 2004). Overall, this will contribute to reduce operational cost, resulting in improving efficiency of rail transport service as a whole. To achieve this, it is important to formulate a better integration of freight transportation service between railway and other transportation modes such as integration between rail and truck and integration between waterway and rail. This swift mode transfers are the key to successful intermodal operation, which lead to the higher potential of becoming the center of GMS distribution center (Regan and Golob 2000).

Secondly, the focus should be given onto the improvement of the railway infrastructure that directly serves the railway development strategies. Overall, railway freight transportation network should be delineated. Based on it, necessary infrastructure development to form the network, in particular, Inland Container Depot (ICD) and/or Distribution Center (DC) and expansion of freight stations, should be taken into account at least at the center of each region.

Thirdly, service coverage for container transportation should be extended. During the past few years, demand for container transportation has increased continuously due to its safety and convenience of use, in particular, for materials, parts and machines. Since this tendency is highly expected to continue in near future, service areas for container transportation should be expanded, and integration of container transportation with road and marine transportsations should also be strengthened.

5. CONCLUDING REMARKS

Due to the prioritized government policy, investment has been given to road construction rather than to railway network. Thus, railway infrastructure is inevitably deteriorated by limited investment and maintenance. Railway transportation mode cannot increase freight services both because of the limitation of special wagons for bulky merchandises and the limitation of number of service stations and coverage. The expansion of rail freight services
thus are constrained and discouraged. Inadequate integration with off-rail transport service also disturbed the development of new freight services.

As a result, insufficient railway infrastructure, facilities and vehicles makes freight operation become less competitive to its rival, the truck, in terms of speed and frequency. However, the excessively growing demand of for railway utilization and the government intention to implement railway transportation policy have make possible to expand the railway services with success. To realise this policy, recommendations are proposed to the SRT. In the areas where the traffic volume is high, track doubling needs to be constructed. Also, the possibility to expand the freight business by integrating rail with other transportation modes should be considered. Apart from increasing track capacity and chain integration, the expansion of supporting facility and in-land/at-port infrastructure are also essential.

In this rapidly developing business environment, there will be the need for the major freight movement right into a center of region, where product is dispersed quickly. In this case railway transportation will become the most cost effective mode for moving large volumes of product over long distances. These products then are resized into smaller volume and deliveried by designated quantities to the customer requirements by road. It is vital that the right balance of speed, service and costs is achieved in order that the supply chain provides a competitive advantage internms of both service and cost. These factors, together with legistration and technological developments, will ensure that railway logistics solution will increase in popularity

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