

A GENERAL FRAMEWORK FOR SHORT SEA SHIPPING

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ABSTRACT

The movement of cargo and passengers needs balanced and integrated use of all modes of transport. The main and preferable feature is to be competed with other forms of transportation as road, rail and air. Maritime transport and other land bases cooperate to form truly mixed mode logistics chains. Short combined transportation is one of the modes that minimize the negations that road transport brings about such as high transportation costs, emission, noise pollution, traffic density, accident involving death or personal injury. Canalizing of the transport network to the sea at short distances has been aimed to be the alternative to road transport and improve the combined transport. Turkey where the road transport is frequently preferred has serious potential because of its position and natural structure about to create transportation network between different modes most particularly including reliable and cheaper marine shipping. The main purpose of this study is to provide a general description and assessment about short sea shipping, also to examine Turkey's combined transport operations by making the literature review.

Keywords: Short sea shipping, Coastal shipping, Multimodal transport, Intermodal transport, Combined transport.

1. Introduction

Future transport systems in terms of movement of cargo and passengers will be adopted by many publications involve several combined transport modes just as intermodal, multimodal and combined. The main focus of the present article is on short sea shipping which is defined as domestic and international maritime transport, including feeder services, along the coast and to and from the islands, rivers and lakes ("Definition on Shortsea Shipping", n.d.). It has been recognized as a sustainable and effective alternative to road and railway transportation. Also, overall charge and quality of all port services and hinterland connections are more influential for short distance ocean shipping than deep sea operations. Extensive research studies have been carried out to make explicit the subject of short sea shipping.

Studies in recent years include mostly explanation of short sea shipping associated with its strengths and weaknesses besides implementation of that transportation mode to some of countries thereby examining their suitability. Paxiao and Marlow (2002) stated the complexity of the SSS and need for more effort to consolidation of the system for the future transportation chains. Although the foreseen weaknesses of the system, the advantages can be achieved in areas such as geographical, financial, environmental, energy and human resources with appropriate feasibility studies. Medda and Trujillo (2010) presented SSS as one of the possible strategies by the aspect of its sustainability and economically competitiveness. Evolution of EU freight transport has been given in article to verify that combined transportation within rail and sea has been appeared to be attractive and applicable alternative to just road. However, essential capacity increase on maritime networks and logistic sector should be utilized by taking present legislation and management into consideration. To establish the competitiveness of the SSS, series of analysis about performance by mode have been given for freight transport. Moreover, researches show that CO₂ emission per trailer was 430 kg with Grimaldi SSS service in the course between Livorno – Barcelona while was 908 kg for road transport within the same route. CO₂ emission reduction for that case was appeared to be 53% (ECSA, 2016). According to the datas of freight transport by sea region and type of cargoes, the UK was the main country with respect to the largest SSS of Ro-Ro units with 83 million tonnes and Germany had 48 million tonnes SSS of containers, pursued by Spain (43 million tonnes) and Belgium (41 million tonnes). Additionally, service attributes of SSS in every aspect have been analyzed to demonstrate the competition capacity in multimodal logistics supply chains. Improvement of robust strategy has seemed to be depended to eight factors, see Figure 1, as carrier's logistic network design and speed, cost of service and

reliability/quality, carrier's representatives sales and after-sales behavior, investment policy, corporate image, commercial/operational and carrier-shippers' relationship policies, involvement in the forwarding industry, and service guarantee (Paixão and Marlow, 2005). An implementation on the Baltic Region has verified the competitive benchmarking in terms of economic territory between the unimodal transport model and the SSS of multimodal transportation chain. Multiple movement between coastal regions has been appeared to be the ideal transportation type (Ng, 2009). Another case study has been asserted by Beresford (1999) thereby suggesting a cost model about freight transport which has been tested on the route between UK and Greece; moreover, the factors affecting the choice of transport mode and combination have been documented as a consequence. Furthermore, SSS appears to be affected mode by geographic area at the most in despite of slow transition from land based transportation and inadequate infrastructural investments. Also, existing concept of "motorways of the seas" for the EU policy needs less administrative and legal conflicts (Douet and Cappuccilli, 2011). Perakis and Denisis (2008) demonstrated the SSS progress in USA; moreover, benchmarking with the EU improved performance by identifying and applying SWOT (strengths, weaknesses, opportunities and threats) analysis. On the other hand, Xie (2009) stated that elimination of weaknesses has been studied thereby implementing a new approach both in trestle bridges and in train ferries. Investments thrusts and improved engineering approaches have been suggested to achieve a systematic solution.

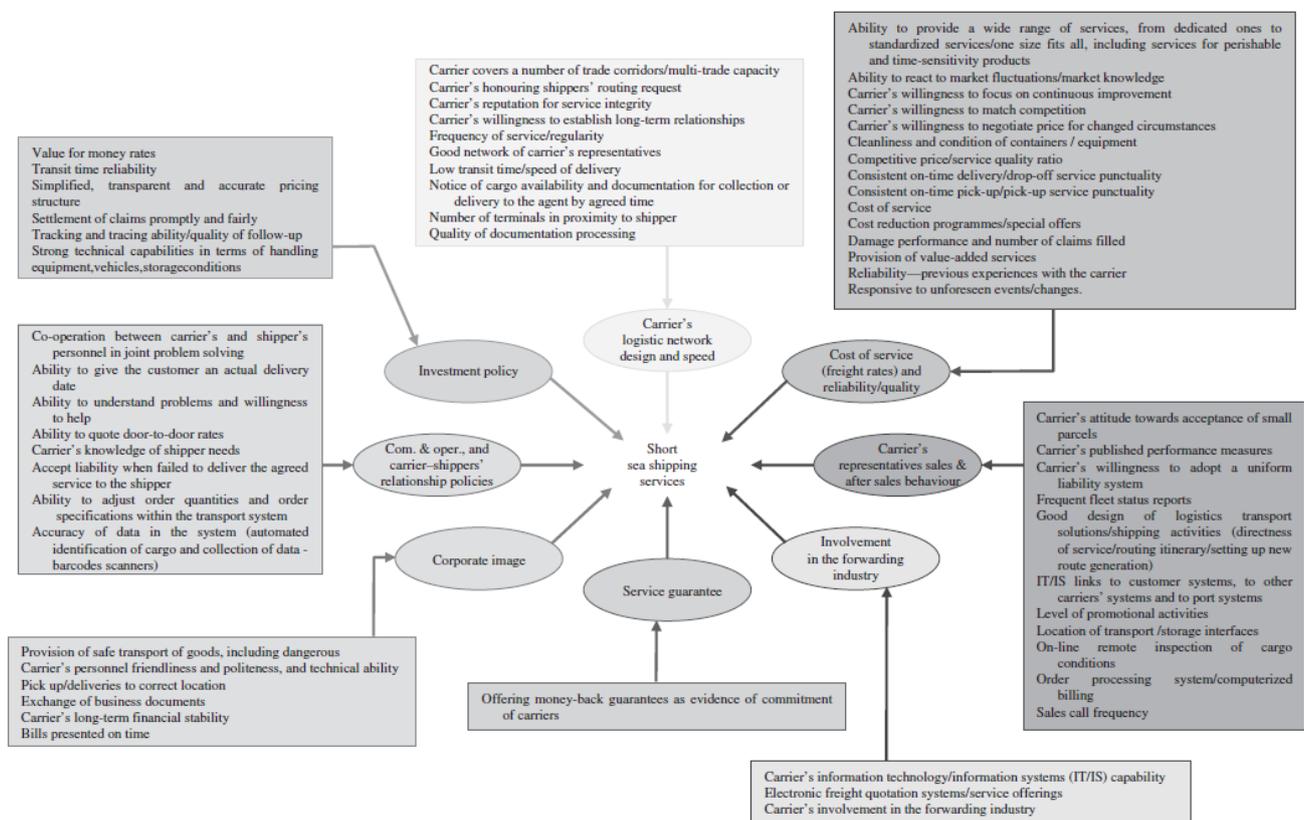


Figure 1. Relationship between SSS and service variables (Paixão and Marlow, 2005).

2. Mixed Mode Transportation

Under the present conditions, there is a possibility to reach cargo by using different ways of reaching the points of arrival at the exit points. For this reason, modalities for access are important in terms of safe and economic completion in election and access. Being more than one transport route for transport at the point of arrival to the load range points is inevitable for optimum transport. Rapid spreading modes of transport realized by international organizations are explained by multimodal transport, intermodal transport and combined transport concepts.

Multimodal transport, alias multiple transport units or multiple transport types with vehicles, is one of the mixed mode transport type. Multimodal transport is a load transmission between the seller and the buyer, which has at least two transport systems and overflows as a single cargo ship. The emergence of modern multi-carrier containers leads to forming different means of transport. With standard container sizes, freight transport has become a means of movement besides packaging (Çekerol, 2013). In addition, investing in terms of director is used for multi-stage carrier main material. The first applications of multi-point publication are container operators. It can apply multinational transport within the national borders of a country. Today, that is actively applicate in multinational international transport.

The share of developments in transport techniques also influenced the importance of multiple transport. In particular, growth and standardization play an active role in the "unit load" dimension. In this way, the stand of the ships at the two harbours is reduced, also improved the effectiveness of customs service at workplace.

Intermodal transport is the set of technologies that facilitates the transfer of loading units from one mode of transport to another. For the purpose of carrying larger volumes in one transport operation, intermodal transfer includes en route change from a given transport mode such as road transport to another such as train or ship (OECD, 2009). Intermodal freight forwarding is carried out by means of similar vehicles and loading units. Intermodal freight transport is intended to be transported by container, road or rail without any need to open the container or trailer. The goal is to open the transport unit with the loading points closed.

On the other hand, combined transportation means that the transportation process will involve transportation of at least two of the transportation modules such as motorway, railway, sea and aviation and is utilized by the European Commission. This mode of transportation has been developed in recent years with the combination of low cost rail and ocean freight for problematic transport in terms of distance and access. They all have the advantages of combined transport and at the same time keep professional services at the highest level. Summarized advantages of combined transportation can be written as follows:

- The load can be safely transported in large quantities.
- Flexible loading and distribution opportunities are provided by road.
- Different products can be combined and combined.
- Unified transport modules can be optimized.
- Transportation can be done as a whole even with different shipping modules.
- It creates economic advantages for heavy transportation.
- Transportation is secure by sea and railway.

3. Short Sea Shipping

Short sea shipping, which is the movement of cargo and passengers by sea over short distances, is identified by the European Commission as a transport mode including domestic and international maritime transport, feeder services, along the coast and to and from the islands, rivers and lakes ("Definition on Shortsea Shipping", n.d.). While domestic maritime transport contains a service regarding domestic market but does not interest foreign markets, international shipping contains the service which is carried out in accordance with international trade conditions regarding international market.

Short sea transport and other land-based modes are also cooperating to create truly intermodal logistics chains, see Figure 2. It can be said that short-haul sea-going transport will have more frequent port calls, which means that the price and quality of all port services and hinterland links have a relatively greater impact than deep-sea operations. Saldanha and Gray (2002) emphasized that short distance maritime transport is widely accepted as a sustainable and efficient alternative to road and rail transport in this context. It is more environmentally friendly in terms of gas emissions and noise pollution. It also offers substantial cost savings, can reduce traffic congestion.

The SSS, alias marine highway and motorways of the sea, are formerly named as coastal trade, coastal shipping, coasting trade or coastwise trade, which involves the transmission of cargo and passenger primary by sea along a coast, without crossing an ocean “deep-sea shipping”, “intercontinental shipping” or “ocean shipping” refers to maritime traffic that crosses oceans. Brooks (2009) stated that the term of marine highway is appeared to be used by United States meanwhile the term of short-sea shipping is used in Europe.

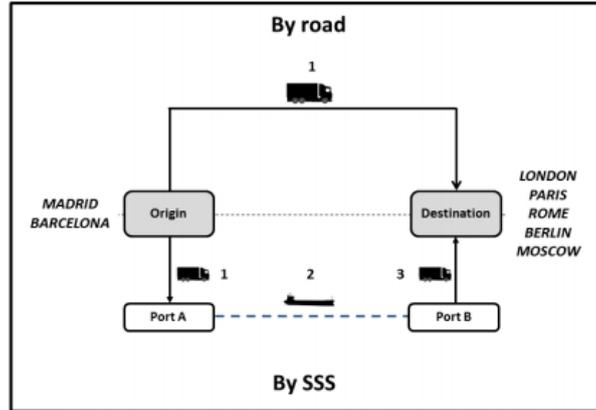


Figure 2. Definition of short sea shipping (Suarez-Aleman, Campos & Jimenez, 2013).

One thing is first that coastal shipping implicitly excludes freight movement at inland waterways, while short sea shipping has been evolved to include the use of inland waterways. For instance, in Europe fundamental amount of freight is moved along the Rhine River and is regarded as a short sea shipping. In addition, while short sea shipping is a door-to-door intermodal movement, coastal shipping is related to a single mode of waterborne transport. That's why coastal shipping does not include intermodal/multimodal components as short sea shipping does.

The intensification of the maritime border has been increased international transportation competitiveness and thus the basic elements of transportation have emerged. For cargo, the ships carrying the vessels have already been delivered to the country. The contribution of this situation to the economy of the country is quite high. The ability to transport loads that make up the raw material of the industry in large quantities at one time is a clear indication of the importance of ocean shipping as the transportation cost is 3.5 times lower than the railway, 7 times higher than the highway and 22 times lower than the airway (TÜİK, 2014). It is not only fast, safe, comfortable and economical way to transport freight and passengers, but also provides the lowest environmental pollution, minimum energy consumption per passenger-km and ton-km, ease of transport and low investment cost.

3.1 The strength of short sea shipping

Behind the growing interest for SSS in recent years, there are advantages to public interest over other modes of transport. In this section, the main benefits of the SSS are identified, as well as barriers that prevent it from expanding.

Improved energy efficiency: The transportation sector uses about 30% of the energy used in the United States and consumes about 43% of freight transport. The ships are the most energy efficient shipping mode although the trucks are the least efficient. The scale economies are favored by the SSS. A 1500-ton barge can carry 28, equivalent to 60 trucks or 15 rails. Based on the number of kilometers a gallon of fuel can carry per gallon, an inner barge can travel 576 miles, a train 413 miles, and a truck only 155 miles (MARAD, 1994). These data show that fuel cost saving is provided by choosing the right transportation mode substantially.



Figure 3. Energy consumption by transportation mode (EUROSTAT, 2016).

Road safety: The SSS can create modal transitions from truck mode to water mode. Thus, by removing the trucks from the roads, it can significantly increase the safety of the motorway. The trucks are responsible for many deadly road accidents. On the contrary, the SSS is one of the safest ways of transportation.

Infrastructure expenses: The capital costs required for a short marine terminal infrastructure are considerably lower than infrastructure spending for the expansion and maintenance of roads.

Transportation network capacity: The SSS can efficiently add more capacity to the stuck load transport network. Since the theory of sea lanes or 'sea highways' is unlimited, the SSS is the easiest way to expand the transportation system so far (Denisis, 2009).

Short distance transport will be supported by a cost-competitive, reliable and fast-breaking process. In Europe, there is a new trend for in-house short sea solutions to serve specific industries, companies, or product categories, such as forest products and automobiles. In the last decade short sea shipping in Europe has experienced significant growth and the EU wants to divert all new freight-up off-road modes over the next decade and plays a very important role in this diversion of short sea transport. Short sea shipping has a major role in the common transport policy because of its apparently have benefits mainly;

- Ensures and enhances the overall sustainability and safety of transportation by finding eco-friendly and safe alternatives, especially for congested road haulage,
- Provides collective harmony by establishing links with environmental regions and islands,
- Increase overall efficiency in the transportation system in a very large way by eliminating the confusion between highway, railway, sea and air transport and facilitating the transfer of goods and passengers.

3.2 The weaknesses of short sea shipping

There are a variety of administrative, legal, operational and financial barriers that delay the widespread deployment of short sea services, although the SSS is considered to be a major advantage as an important alternative between modes of transport. The identification and analysis of these barriers which has asserted below plays an important role in minimizing the disadvantages of the SSS.

Need additional ports: Ports and extra transit points are needed to provide maritime transport in combination with other modes of transport. The creation of these spots is costly and extra time consuming. Planning a proper facility in the right places requires a great deal of strategy.

Terminal handling costs: In multimodal transportation, the time spent in the terminal at the terminal is very well calculated and the time loss must be minimized. Pausing at crossing points causes both material and time loss. In the meantime, storage and operating costs are extra.

Low delivery speed and delays: Although the amount of cargo transported per vehicle by sea is higher than that of the highway, the freight transport by sea with respect to the highway is disadvantageous in terms of time. Delays and cancellations may arise in sea-going transport where the load carrying capacity is higher. These situations need to be well planned and predictable.

Affecting rapidly by external influences: Sea transport is more sensitive to external factors such as weather, as well as air transport, among other modes of transport. Time-outs due to the delays created by these conditions and the associated costs can be shown as disadvantages.

4. Short Sea Shipping Development in Turkey

As it is in the all over the world, a whale part of international trade in Turkey ton-km cost is the cheapest transportation type with sea route. Short sea/coastal shipping has just started to be noticed in Turkey as an influential alternative to other modes because of its cost effectiveness and being continuous way to alleviate the pressure by rail and road transport.

Geographic position of a country proves international and transit importance and significant potential for domestic and international transport. Therefore, maritime transport plays a major role at the along Turkish coast. Moreover, the Republic of Turkey has considerable potential in terms of intermodal transportation, owing to its preferential geographical position and natural transition point amid European, Asia and Middle East. Country is surrounded by the Black Sea, the Marmara Sea, the Aegean Sea and the Mediterranean Sea and the longest coastline is 8.333 km as well. So the country's land bridge position in North-South and East-West transportation ensures that ports play a major role in shipping operations and logistics. It has borders with Georgia, Armenia, Azerbaijan and Iran to the East, Bulgaria and Greece to the West, Syria and Iraq to the South and Russia, Ukraine and Romania to the North. The Gulf of Gibraltar with the Atlantic Ocean, the Suez Canal and the Arab Peninsula and Red Sea, the Black Sea-Mediterranean links of the Turkish Straits Eurasia and the Far East. Furthermore, intense population consumption affects directly the domestic trade volume and transportation density in the country.

The Turkish straits are 31.484 km in length and 68.524 km in length in the Çanakkale Bosphorus. The total length of the Turkish Straits of 203,720 km was 303,728 km for the ship circulation in the Sea of Marmara and it was opened to international sea transport with the control of the Turkish government. Long sea route Starting from the northern entrance of the Bosphorus and ending at the southern exit of the Dardanelles Strait is a critical region as geomorphological and hydrographical aspect. The Bosphorus having the only alternative between the Black Sea and the Mediterranean Sea is absolutely cramped with international maritime traffic because of its unique and strategic route also geopolitical and economic precaution (TCS, 2016; TURKLİM, 2016).

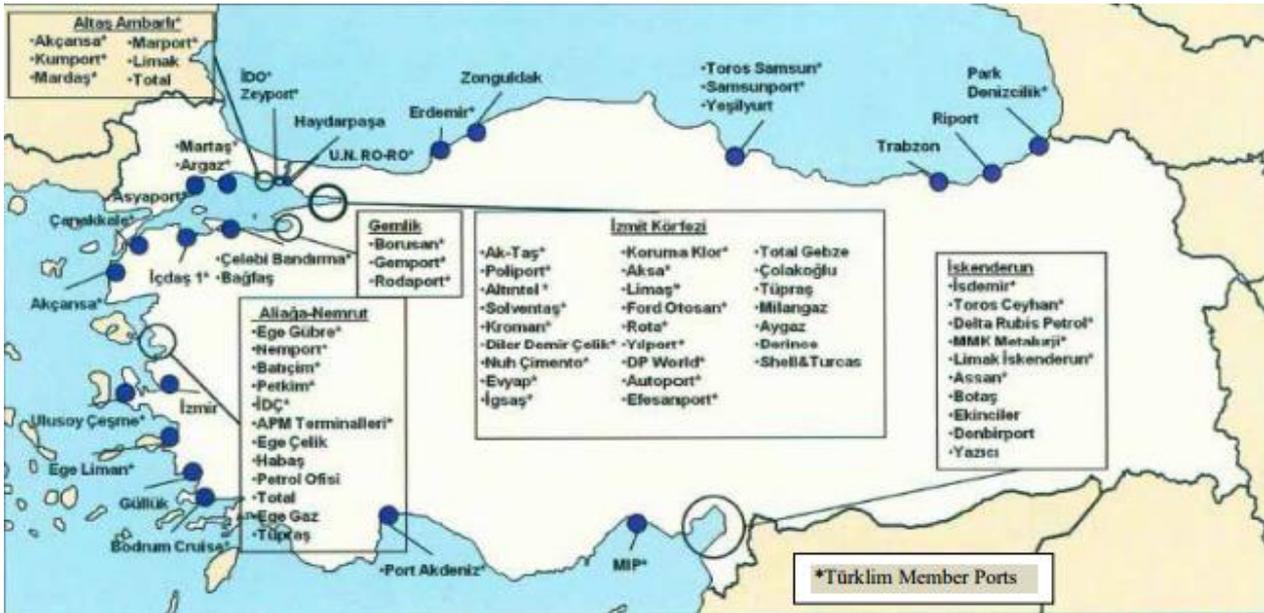


Figure 4. TURKLIM member ports (Turkish Chamber of Shipping, 2015).

In the year 2015, 43.544 ships in total have passed through the Istanbul Strait with a monthly average of 3628 ships and 43.230 ships in total have passed through the Çanakkale Strait with a monthly average of 3602 ships. In addition to given data, there are more than two million passengers passing by the small passenger ships every day from the Bosphorus which is four times more than the Suez Canal and three times more than the Panama Canal (TCS, 2016). Also, the average construction of 88.1% of the vessels in the last 10 years has increased the prevalence in the foreign trade (TCS, 2015). Moreover, Turkey has 179 ports in total along the coastline on Antalya, Çanakkale, İstanbul, İzmir, Mersin, Samsun and Trabzon regions, see Figure 4. Turkey has also major ports in the regions of East and West Black sea (15 ports), Marmara (56 ports), Aegean (21 ports), Mediterranean (23 ports). 135 of the total Turkish Ports are operated by the private industry, 21 are operated by the government and 23 are operated by the municipalities in Turkey (TCS, 2016; TURKLIM, 2016). In recent years, crucial developments have been recorded both inside and outside the port sector of Turkey. International and regional trade, privatization, new investments in ports, expansion and expansion of existing port capacities, increase in cargo traffic due to administrative changes and development of hinterland links of ports and logistics centers.

Table 1. SWOT matrix for Turkish combined transport (“Turkish Combined Transport Strategy Plan”, 2013).

Strengths	Geographical configuration of Turkey as a logistics platform between Europe and Asia
	Road transport sector with size and experience
	Turkish ro-ro shipping sector that is consolidated and well-positioned in its area of influence
	Active presence of multinational logistics companies
Weaknesses	Obsolescence of certain shipping and railway infrastructures
	Lack of a National Logistics Plan to define corridors and the locations of centers
	Presence of players that are not fully professionalized in road transport
	Competition based on negotiations with customers to agree low prices
Opportunities	Maintenance of expectations for growth of transport worldwide
	Growing, sustained economic development of Turkey up to 2020
	Growth of Turkish production sectors
	Programmes for the modernization of railway infrastructure already in progress
Threats	High volume of investment required
	Gradually radicalized international competition
	Disorganized emergence of new logistics centers
	Goods loading/unloading procedures far in excess of those desired by customers

Besides the abovementioned researches, SSS has been investigated by researchers from Turkey perspective in many aspects. Notwithstanding the fact that road-rail, Ro-La, RO-RO and rail ferry services plays an active role as intermodal transport forms in Turkey's logistic chains, 17 policy recommendations have been established to achieve prospering consolidation of the intermodal actions (OECD, 2009). An executive report including the SWOT matrix, see Table 1, has provided an evaluation and analysis of the current and prospective strategy. Adopted methodology for Turkish combined transport strategic plan was strategic, not operational.

5. Conclusion

Short sea shipping established the validity and efficiency by comparison with unimodal transport systems considering the outstanding issues about the sea route, starting from the principles and policies, the proposals and the reasons for physical infrastructure, transport, security, personnel and training, planned investments, adaptation to the EU and financing. A general framework in short sea shipping along with weaknesses and strengths also worldwide applications have been presented within the scope of study. Moreover, the purpose of the study was to figure out the difference between multimodal transport systems including the SSS and define the significance of the balance between sea, prevalent transportation modes and logistics services. Consequently, characteristic features with regard to intermodality in Turkey has been investigated. Intense carriage of freight and passengers between Asia, Europe and Africa increases the importance of geostrategic location of the Turkey as logistic chain. Future implementations for SSS require developed approaches and infrastructures which prevent outstanding obstacles about transit trade to combine rail, road and maritime operations.

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