

INTERMODAL FREIGHT TRANSPORT OPERATION USING TOWED TRAILER BETWEEN KOREA AND CHINA AND RESULTING ECONOMIC EFFECTS

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ABSTRACT

An intermodal freight transport scheme was newly introduced since December 2010 by allowing sea-land intermodal transport operation of towed trailers by using car ferry between Korea and China to cope with increasing bilateral trade and to complement the existing transport systems. This study provides the bilateral efforts to introduce a sustainable intermodal transport system through specific negotiations on technology standards and amendment of related regulations. Further, we introduce several methods to make this intermodal transport system sustainable. Specifically, this study reports several economic effects, for example, reduction in time spent loading and unloading as well as a cut in expenses at ports of newly introduced operation, compared to the existing RoRo system.

The intermodal freight transport using towed trailers between Korea and China is a sea-land transport system that provides services of transporting container-loaded towed trailers by using car ferry routes. To identify benefits of the newly introduced intermodal freight transport system compared to the existing conventional container shipping and RoRo system, we surveyed time and cost requirement for the maritime transport and loading and unloading time and cost at Incheon Port in Korea and Qingdao Port in China, and analyzed the scenario-based results collected from car ferry companies.

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The newly introduced sea-land intermodal transport operation is expected to cut time spent on freight handling (loading and unloading) at ports by about 3.5 hours and expenses by US\$49.5 per TEU. Furthermore, there is potential occurrence of costs such as the expenses for retrieving trailers and opportunity costs. However, benefits such as reduction in time spent loading and unloading as well as a cut in expenses are expected to be greater than the costs.

Keywords: sea-land intermodal transport, towed trailer, car ferry, RoRo

INTRODUCTION

A towed trailer is a tractor-towed non-motorized freight loading vehicle that meets technical and road transport requirements. The major sea-land intermodal freight transportation method between Korea and China is a RoRo (Roll-on, Roll-off) system. RoRo ships are vessels designed to carry wheeled cargo such as cars, trucks, or trailers that are driven on and off the ship on their own wheels. RoRo ships have built-in ramps which allow the goods (e.g. 20ft or 40ft containers) to be efficiently rolled on and rolled off the ship when the ship is anchored at the dock. In particular, the towed trailers that are used in the RoRo ship are not used on a general roadway, but exclusively used as equipment for delivering goods in RoRo ships in the port yard. Since roadway towed trailer cannot be entered in the RoRo ship, goods like containers should be unloaded from the roadway towed trailer, and be loaded to the RoRo towed trailer. These unloading and loading processes generate time and cost both in the departing and arriving port yards.

To reduce the time and costs which are generated from the unloading and loading processes, a new type of sea-land multimodal transport scheme designed to reinforce physical connection between Korean and Chinese distribution markets and expand bilateral trade activities. This system allows the operation of towed trailers of the exporting country not only in bonded areas but in inland areas of the importing nation.

This study provides the bilateral efforts to introduce a sustainable intermodal transport system through specific negotiations on technology standards and amendment of related regulations. Further, we introduce several methods to make this intermodal transport system sustainable. Specifically, this study reports several economic effects, for example, reduction in time spent loading and unloading as well as a cut in expenses at ports of newly introduced operation, compared to the existing RoRo system. To identify benefits of the newly introduced intermodal freight transport system compared to the existing conventional container shipping and RoRo system, we surveyed time and cost requirement for the maritime transport and loading and unloading time and cost at Incheon Port in Korea and Qingdao Port in China, and analyzed the scenario-based results collected from car ferry companies.

OVERVIEW OF RORO SYSTEM BETWEEN KOREA AND CHINA

Under the current sea-land intermodal freight car transportation system (RoRo) between Korea and China, freight containers are loaded on trailers and carried by car ferries. When shipment arrives at the entry port of the importing country, the freight is further transported to the final destination after undergoing customs procedures. Or it may be carried to an airport through bonded transportation, and sent to a third country via airplanes.

Multimodal car ferry transportation between Korea and China registered steady growth in the amount of freight at an average annual rate of 13.1 percent between 2001 and 2008 (Incheon Main Customs, 2009). Despite its temporary setback following the 2008 global financial crisis, the sea-land multimodal transport market between the two countries is considered to have great potential for growth.

As of 2009, there were 15 car ferry companies operating 17 routes between Korea and China; the ferries ran two to three times a week depending on the line. The passenger capacity ranged from 300 to 1,000 persons, while the freight capacity was between 150 to 300 TEUs. Freight transportation was mostly through the RoRo method using trailers, while the LoLo (Lift-on Lift-off) method was in use for four routes (KCCFA, 2010).

Regarding car ferry transportation of freight containers, no records have been reported from the Incheon-Shanghai, Gunsan-Yantai, Pyeongtaek-Weihai, Mokpo-Shanghai, and Busan-Yantai routes. About 75 percent of freight transport using car ferries is being conducted through the RoRo method, while the remaining 25 percent is using the LoLo scheme. The port of Incheon is serving as the base for most of the car ferry operations.

CHARACTERISTICS OF THE TOWED TRAILER OPERATION SYSTEM BETWEEN KOREA AND CHINA

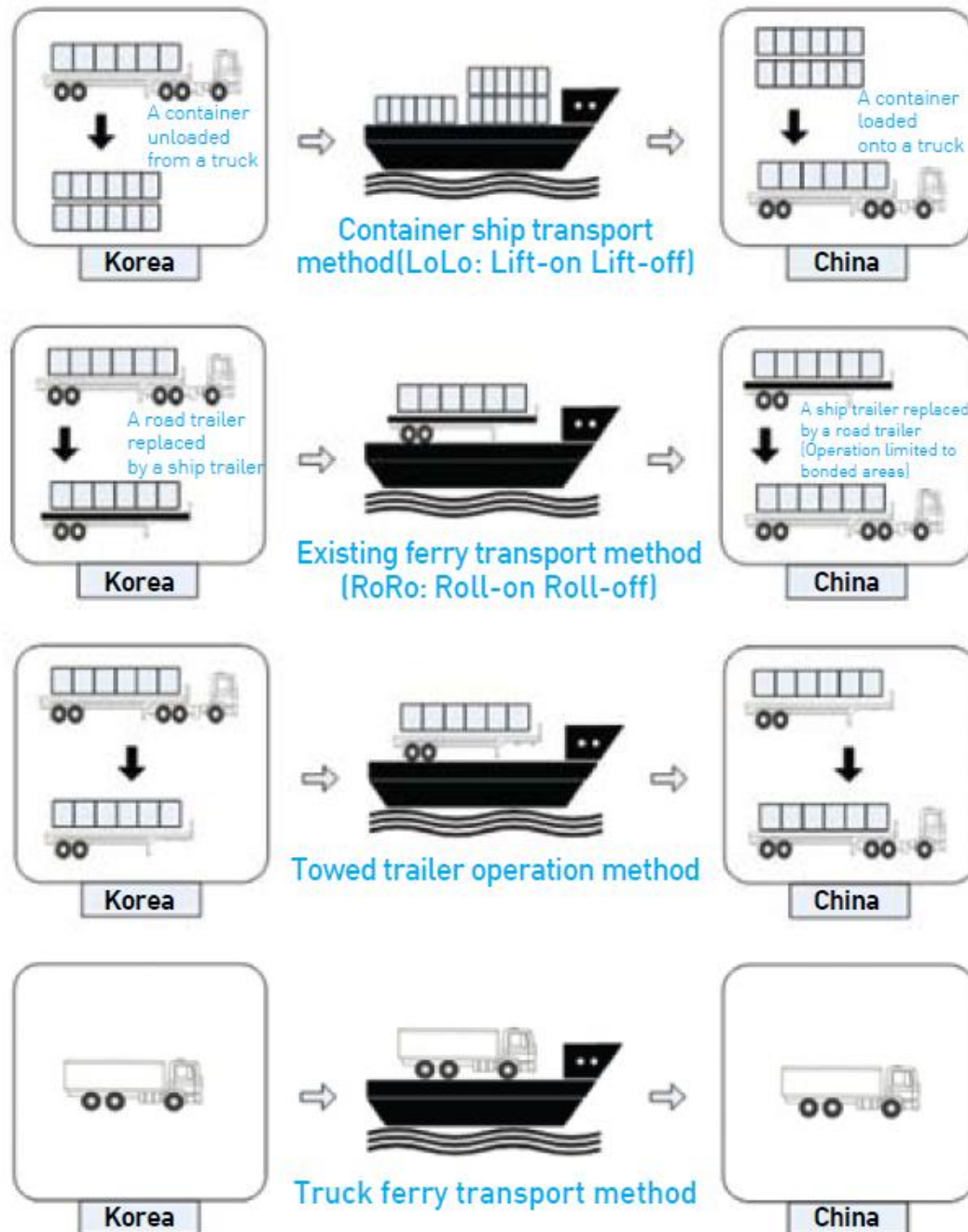
The strength of the system lies in the fact that it can ensure speedy and punctual transport through car ferry services, and maximizing freight stability. First, it should be noted that car ferries are normally used for near-distance marine transportation based on passenger-oriented operation schedules. Thus, speediness and punctuality are essential preconditions for remaining competitive in the car ferry transport business. The freight transport system using towed trailers exploits this aspect of car ferry services. If further combined with inland transport in Korea and China, it would generate positive effects in the supply chain, especially by simplifying stage-by-stage procedures in the maritime logistics and transport mechanism. Naturally, this development would be accompanied by reduced lead time.

Second, the towed trailer operation would cut the number of stages in the loading and unloading processes for freight and containers. This would help ensure safe handling of freight, making it easier to gain the trust of consignors who expect inexpensive, fast and stable transportation services. Car ferries are a mode of passenger-oriented transport. In this

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regard, the towed trailer operation system using car ferries could appeal to shippers who want to send damage-sensitive precision products as well as those who have an urgent need to dispatch cargo in a faster mode than traditional container ships (Park et. al., 2010). Figure 1 shows the concept of the sea-land multimodal transport system between Korea and China.



Source: The Korea Transport Institute (2007). Building a Truck Road Feeder System among Korea, China, and Japan.

Figure 1. A conceptual drawing of Korea-China sea-land multimodal transportation

ECONOMIC EFFECTS OF TOWED TRAILER OPERATION METHOD

The towed trailer operation method, if implemented with the preparation of dedicated inspection passages within terminals, could lead to the omission of procedures for entering container yards depending on the characteristics of freight or at the request of shippers. In other words, the current customs procedures could be replaced with direct customs clearance at terminals. Under this situation, freight could be transported to inland areas immediately after being unloaded from car ferries. We surveyed five car ferry companies to collect the unloading and loading time and their costs in Incheon port in Korea and Qingdao port in China in 2009. Further, we also surveyed the detailed processes of RoRo transport method to figure out the reducing time and costs in the exporting and importing ports. This would make it possible to cut the time spent at the port by about 3.5 hours, and lower the expense by \$49.5 per TEU compared to the existing RoRo system (KOTI, 2009). Table 1 compares time and costs of LoLo, RoRo, and Towed Trailer System generated from Incheon port in Korea and Qingdao port in China.

Table I – Comparison of Time and Costs by Modes (Incheon and Qingdao ports)

		LoLo ①	RoRo ②	Towed Trailer ③	Comparisons	
					①-②	②-③
Hours	Required time in Incheon Port	12	10.5 (1.75)	8.75	1.5	1.75
	Shipping	22	15	15	7	0
	Required time in Qingdao Port	24	12 (1.75)	10.25	12	1.75
	Sub-total	58	37.5	34	20.5	3.5
Cost (\$/TEU)	Required cost in Incheon Port	210 (33)	221 (44)	199	-11	22
	Shipping	350	600	600	-250	0
	Required cost in Qingdao Port	116 (75)	114 (55)	86.5	2	27.5
	Sub-total	676	935	885.5	-259	49.5

This method is expected to involve hard-to-measure potential expenses such as opportunity cost, trailer retrieving cost, and management cost. However, what is more important than the economic feasibility is the prospect of creating synergistic effects in efforts to promote bilateral exchanges and cooperation as well as ensure a favourable logistics environment in trade with China. In addition, it would help secure a beachhead from which Korean logistics and transport companies can make inroads into Chinese markets. Overall, benefits from this

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new multimodal transportation are expected to exceed the costs, especially in terms of expanding trade with China.

Developing a new model for sea-land multimodal transport between Korea and China should merit attention with regard to the prospect of overcoming the limitations in the bilateral cargo transshipment sector, which has totally relied on sea-air multimodal transportation. Eventually, it would also provide impetus for specialization and segmentation of the Korea-China multimodal transportation market. Figure 2 shows a comparison of processes of the RoRo system and the towed trailer operation system.

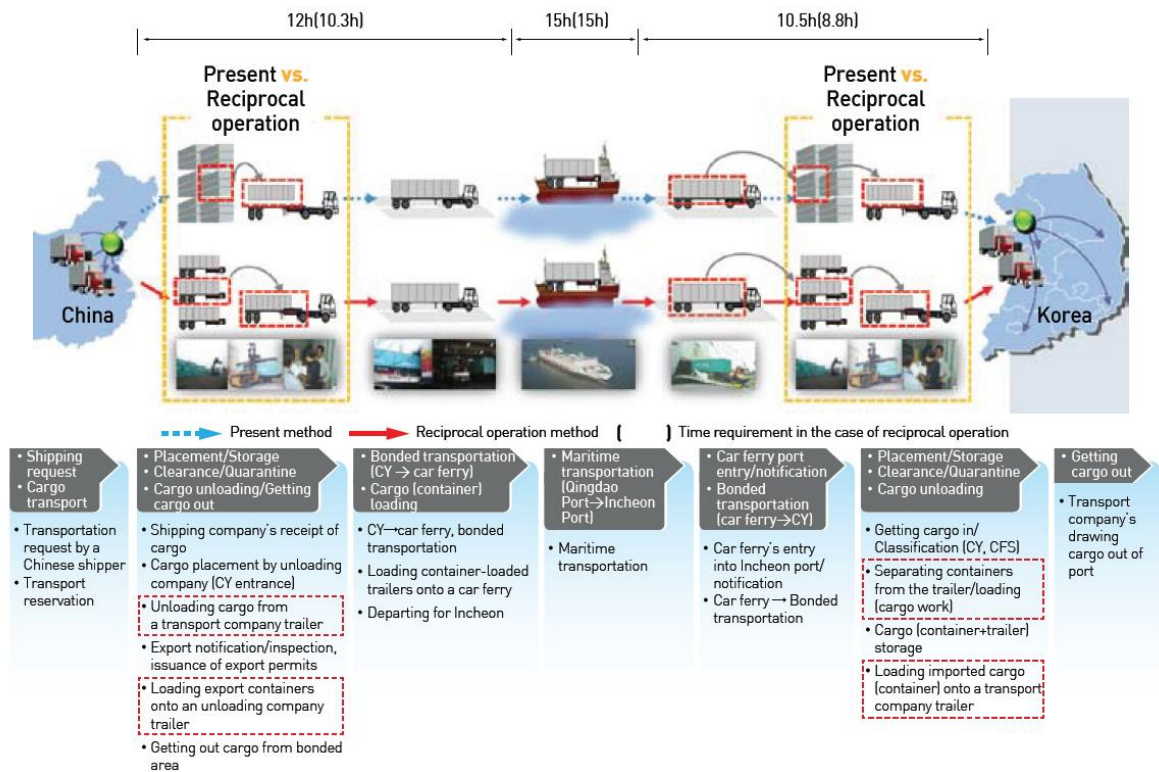


Figure 2. A comparison of processes of the present car ferry RoRo method and the towed trailer operation system

NECESSITY FOR INTRODUCING A SUSTAINABLE MULTIMODAL TRANSPORT SYSTEM

First, for implementation of the operation of towed trailers between Korea and China, there is a need to reorganize legal and other related systems in terms of the operation of temporarily exported or imported cars. Specifically, in order to ensure operation of towed trailers, revisions should be made to relevant legal stipulations on the definition of the temporarily exported and imported cars as well as such matters as their operation permits and duration. Related laws should also be revised to include new clauses on such matters as establishment of agencies and related facilities, safety standards, and environmental

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standards on gas emissions. Pertinent government officials of the two countries should conduct negotiations to reach agreement necessary for starting the process of settling these legal matters.

Second, it is necessary for a bilateral consultative body to have discussions on terms related to transport permits. Korea is currently using the term "International Transport Permit" only for nations that joined the Vienna Convention on Road Traffic. Not a signatory to the convention, China uses the term for its 11 neighbouring countries with which it has concluded a car transport treaty.

Third, there is a need for detailed discussions on a multimodal transport waybill through a bilateral cooperation committee. The Chinese side has already proposed that the waybill for multimodal transport should be dealt with differently from the transport permit. It made the proposal, noting that unlike the bill of lading used for marine transportation, the waybill for multimodal transport encompasses all the bills that occur from the freight's place of origin to the destination. Now, it is Korea's turn to clarify its position on this subject.

Finally, matters related to ISO technical standards concerning towed trailers need to be settled. During the first Korea-China Experts' Meeting held in Qingdao, China, the Chinese side presented five ISO technical standards concerning towed trailers. The standards were those related to the definition of the connector linking a towed trailer and a tractor, its requirements and the connecting equipment. There are no problems regarding these standards, because Korea also follows the ISO standards concerning the connector. However, the bilateral cooperation committee needs to discuss the scope of application of additional technical standards regarding towed trailers.

CONCLUSIONS AND IMPLICATIONS FOR RESEARCH AND POLICY

This paper discusses on the benefits and economic effects of newly introduced intermodal freight transport operation using towed trailers between Korea and China. The results indicate that developing a new model for sea-land intermodal transport between Korea and China should merit attention with regard to the prospect of overcoming the limitations in the bilateral cargo transshipment sector, which has totally relied on sea-air multimodal transportation. The findings from this study suggest benefits of newly introduced sea-land intermodal freight transport operation in investigating implications of intermodal freight transport policy decisions with adjacent countries, offering insights into which freight transport policies can potentially have advantages compared to the existing intermodal freight transport systems.

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