
Analysis of Korea - Japan Freight rail transportation systems

Kwanghyun Kim*Jeonghun Han*Changmyeong Hyeon*Gyusung Cho

Tong Myoung University , Korea
e-mail : detn12@gmail.com

Contents

- I . Introduction
- II . Current status and Environment Analysis of Korea and Japan Freight Railway
 - 2.1 Current status of Korea freight railway
 - 2.2 Environment Analysis of Korea and Japan Freight Railway
- III . Conclusion
- IV . References

I . Introduction

As dependence on air route exceeds 94% in domestic logistics transport, intensified road congestion, emission of GHG, increase of logistics costs due to oil price increase incur high social costs. Due to low standard speed, track capacity restriction and impossible door-to-door transport, shortcomings of existing railway logistics systems, there are several special features that make it difficult to promote railway logistics.

Therefore, this research identifies problems of current domestic logistics transport and presents some relief and improvement measures against these problems of domestic freight railway by adopting Japan's logistics system for the purpose of introducing Japan's freight railway system to overcome

combined transport and delay phenomenon based on Japan's freight railway system and to relieve the occurrence of high social costs as logistics costs increase.

It is expected to change several special features that make it difficult to promote railway logistics due to low standard speed, track capacity restriction and impossible door-to-door transport, shortcomings of existing railway logistics systems and accordingly, Japan's freight transportation system is examined and lack in flexibility of route selection due to the limit of the current domestic railway network is improved to present the development possibility of domestic railway transportation.



Picture 1. South Korea and Japan's rail transportation path

II. Current status and Environment Analysis of Korea and Japan Freight Railway

2.1 Current status of Korea freight railway

It is decided that the reason why railway is somewhat used despite of shortcomings of the domestic railway transportation such as multi-level transportation, complexity of railway transportation processes and inflexible freight charge is that railway transportation has strong points such a securing of stable transport capability, container device storage function at ICD or railway CY, combined function of automobile transportation and railway transportation, transporting heavy materials, dangerous materials and other freight improper for road transportation, alternative transportation means in case of strike of the Solidarity of Freight Transportation Workers. For most of shippers, a significant difference in the quantity of goods transported between weekdays and weekends and between the beginning of a month and the end of a month because of seasonal factor or temporal factor and as an alternative to get over this difference in transportation demands, railway transportation is used in many cases.

However, as seen in the current status of year-to-year railway container transported volume (2003-2014), 1,069 thousand TEU in 2006, 1,126 thousand TEU in 2007 and 1,185 thousand TEU in 2008 when the highest score was recorded, after that, in 2009, the volume sharply decreased to 799 thousand TEU due to the influence of the Global Financial Crisis and it recorded 933 thousand

TEU in 2010, 1,099 thousand TEU in 2011, 1,138 thousand TEU in 2012 so that it looked to recover the highest performance in 2008 but, it turned to a decreasing trend showing 1,097 thousand TEU in 2013 and 944 thousand TEU in 2014, continuing its decreasing trend while marine transport and road transport increased by about 40% during the same period. Consequently, the rail container transportation had increased to the peak in 2008 after it reached 1 million TEU in 2006 for the first time and then, due to 2008 the Global Financial Crisis, the international freight transported volume sharply drop by 33% from the previous year and in 2012, transported volume in 2008 was almost recovered but, due to railway strike and a trend of avoiding the railway transportation as the carrier's risk increases due to extension of train unit sales, the railway transported volume decreased.

Also, because private companies decide the charge of container yard (CY) equipment and loading and unloading for the freight commissioned by the shipper in the logistics market, except road carriers who can perform a continuous transportation service, that is, Door to Door service, railway operators who can provide station to station transportation only have to attract the volume of shippers or carriers only for fare of the railway section so that it is difficult to meet the shipper's needs for Door to Door service and furthermore, if private companies fix a high price for equipment for railway transportation or loading and unloading fee at railway CY or ICD, that may restrict the railway operators' active attraction.

구분	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
계	825	835	956	1,069	1,126	1,185	799	934	1,099	1,138	1,097	944
전년대비	108	101	114	111	105	105	67.5	116	117	103	96	86

단위: 천TEU, %

2014년 철도 컨테이너 수송실적														
연도	1월	2월	3월	4월	5월	6월	7월	8월	9월	10월	11월	12월	합계	전년 대비
2011	82,704	76,352	95,461	95,853	96,233	96,261	97,534	95,001	92,883	91,082	87,356	92,236	1,099,956	117.8%
2012	82,334	92,431	96,602	92,826	96,206	100,828	106,003	92,142	96,827	100,508	90,475	90,247	1,138,929	103.5%
2013	95,103	86,476	99,527	96,262	101,992	90,768	88,333	92,780	89,668	98,296	89,501	61,113	1,097,492	96.4%
2014	66,944	70,184	82,419	82,779	79,965	76,821	89,217	79,958	74,160	84,616	76,059	81,571	944,693	86.1%

단위: TEU

Picture 2. Rail container transport result in 2014

2.2 Environment Analysis of Korea and Japan Freight Railway

In Japan, transported volume share rate is relatively even among transportation means, JR Freight was established to separate passenger and freight and to devote itself to freight transport and new systems such as E & S (Effective & Speedy Container Handling System) are introduced and researches on high-speed freight transport are continuously carried out.

Also, various efforts have been made such as development of vehicles and equipment and materials suitable for local conditions, reinforcement of competitive edge through building manufacturing and repairing bases, establishment of a cooperative system between private and public, reinforcement of support through summit diplomacy (Top sales) and the results of those efforts have been visualized through organic connection with relevant organizations.

Japan has enhanced transport efficiency by developing various load transshipment technologies such as piggyback system and DST system.

In case of Korea, trading domestic freight volume steadily increases but, railway's freight sharing rate is decreasing while road transportation takes charge more than 70%. The portion of import and export freight is constantly growing mainly in the Incheon International Airport and the portion of national logistics rate against GDP is high and the reason of this is judged that most people depend on the road transport, a centralized transport system.

Japan's freight railway has following special features:

- Accurate time management and possession of a lot of trains

Operation on schedule is essential because most cities are densely populated and compared to other nations, even a little time gap has effects on the operation of other trains. For this, factors that may delay train operation are pre-estimated and preventive measures are designed and constructed, regulations are established to reduce failures and operators' mistakes through strict

inspections and repairs and education and training are conducted to eliminate mistakes. In addition, even a train is delayed, other alternative transportation means such as transfer to connected trains or bus are provided and information on delay is quickly transmitted to recover the situation.

- Railway speed

Except Shinkansen specially designed and built to allow high-speed operation, the driving speed of most trains is 120~130km/hour, a normal or relatively a slow speed while a little number of trains drive at a speed of max.160km. First, various routes exist in Japan and the width of a route is relatively narrow and the size of a vehicle is small so that it is hard to carry a high-output motor to allow the train to drive at a high speed. Also, many mountain or hill sections exist so that it is difficult to drive at a high-speed and according to safety rules, the driver shall stop the train within 600m after pressing an emergency brake because population is concentrated and there are many crossings on a railroad.

- The world-first hybrid railway vehicle

On July 31, 2007, JR East Railway began to run a commercial vehicle (Kiha E200) that loaded the hybrid system in Koumi Line, Nagano for the first time in the world and this vehicle combined the latest diesel engine, power plant and battery-powered motor and reduced harmful substances such as nitrogen oxide (NOX) and particulate (PM) to be evaluated as environment friendly vehicle with fuel economy and low noise.

III. Conclusion

As this research suggested, if Japan's high-speed freight train is introduced and the environment friendly vehicle with fuel economy and low noise is operated, the domestic railway freight system might enjoy many benefits the Japan's system brings about.

Korea would have Japan's experiences accumulated during the rapid growth period

and safe and accurate operation know-hows on highly overcrowding transport and could establish a clear approach to proceeding the domestic railway's freight system. However, when introducing, it cannot be clear because sentimental factors and geographical factors are different between Japan and Korea. However, benefits that could be obtained by introducing Japan's system are clear if each part is well identified and examined. For development of Korea's railway industry, it could be necessary to introduce the freight transportation system that uses Shinkansen railway train among Japan's freight transportation systems. The freight transportation of Japan's Shinkansen train has one base in each section and it is possible to reach to customers faster through transporting base to base like air route transportation.

By promoting benchmark based on Japan's railway system and proceeding the railway infra project that will introduce new fuel-efficient logistics systems, as seen in Japan's case, professional human resources are utilized through organizations equipped with professionalism in each field and integral HR structures and systems. And globalization of Korean-style standardization on railway technology in the movement of rapidly changing overseas railway market and the government's support are judged to play a critical role in advance into the overseas of Korea's railway in the future.

Currently, it is found that the portion of Korea's freight railway transportation and bases between travel interval are weak and it is considered to be better to change and correct Korea's facility and political problems first rather than to introduce Japan's railway system right away.

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