The Energy and Resources Institute
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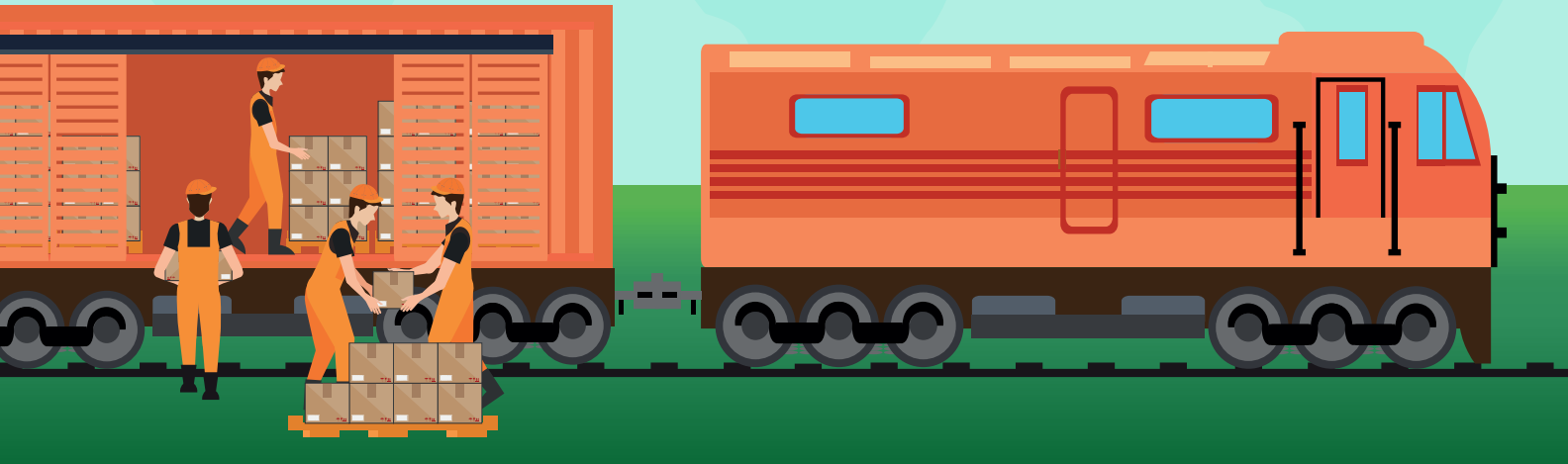
SHAKTI
SUSTAINABLE ENERGY FOUNDATION

MOVING TOWARDS A LOW-CARBON TRANSPORT FUTURE

Increasing **Rail Share** in Freight Transport in India

Working Paper – Container



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About Shakti: Shakti Sustainable Energy Foundation works to strengthen the energy security of India by aiding the design and implementation of policies that support energy efficiency, renewable energy and sustainable mobility.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES

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CONTAINERS

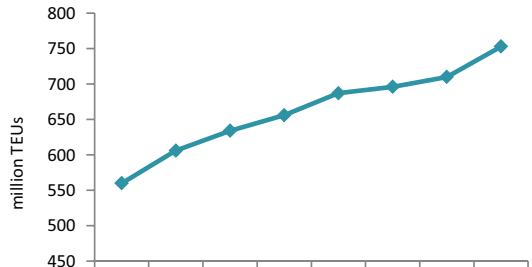
Global Container Market

As a conveyance foundation for sea freight, containers entered the international market nearly six decades ago and have since gained acceptance throughout the world as a concept of unit load. Containers are uniform metal boxes whose contents need not be unpacked at each point of transfer. They have been designed for convenient and fast handling of freight. Besides the enhanced convenience in discharge and loading processes, containers also simplify scheduling and controlling and improved cargo protection against the weather.

The movement of cargo in containers has proven to be cost effective and more efficient by facilitating faster movement of cargo. By 2009, almost 90% of the world's non-bulk cargo was moved by containers stacked in transport ships (Ebeling, 2009). Overall, the volume of goods carried through containers has increased significantly from 102 million tonnes (mt) in 1980 to about 1,830 million tonnes in 2017[1]. In terms of twentyfoot equivalent units (TEUs), the world container port throughput has increased at a compound annual growth rate (CAGR) of 4% between 2010 and 2017[2]. According to Lloyd's list of top container handling ports[3] , India's JNPT and Mundra ports are ranked 28th and 35th while China's Shanghai port tops the chart. Notably, seven Chinese ports are placed in the top 10 container handling ports in the world.

In 2016, 34.3% of the total cargo tonnes handled by 28 European Union countries in deep sea shipping were containerised (European Commission, 2018). Figure 1 shows the trend in containerisation levels in Road, Rail, Maritime, and Inland waterways movement of all cargo in Europe.

Assessing the containerisation trends in Europe shows that corresponding to increasing containerisation levels



	2010	2011	2012	2013	2014	2015	2016	2017
World container port throughput (million TEUs)	560	606	634	656	687	696	710	753

Figure 1: World container port throughput (million TEUs)
Source: UNCTAD

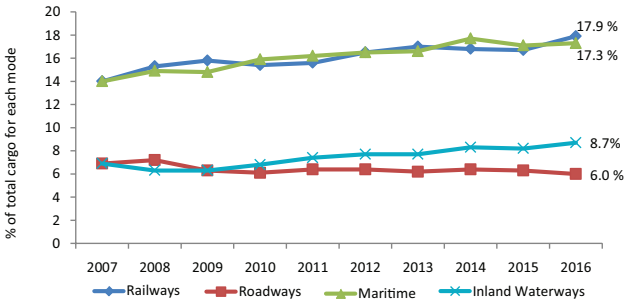


Figure 2: Containerisation Levels in EU
Source: European Commission, 2018

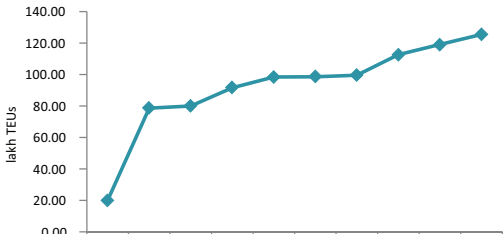
in maritime freight movement, there is an increase in containerisation levels in rail cargo. However, the containerisation levels in road bound cargo declined in the same period. This triggers the question if containerised cargo is friendlier to rail than road and highlights the scope of investigation regarding the linkages between containerisation levels in shipping, rail, and road.

Container Market in India

India's (export-import) EXIM trade has grown faster than the gross domestic product (GDP) in the past two decades. This has boosted the growth in container traffic as shippers are increasingly shifting from bulk shipping

[1] *https://www.statista.com/topics/1367/container-shipping/*
[2] *http://stats.unctad.org/handbook/MaritimeTransport/Indicators.html*
[3] *https://lloydslist.maritimeintelligence.informa.com/one-hundred-container-ports-2018*

or general cargo to container transport. The share of containerised cargo in major Indian ports went up from 8% in 1995-96 to 18% in 2008 (Planning Commission, 2008). From 2000 to 2011, the container traffic in Indian ports grew at a CAGR of 13% and between 2011 and 2018 it grew at a CAGR of approximately 6%, which is attributed mostly to the global recession from 2008 onwards[4] .



	2000-01	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Total container traffic at Indian Ports	20.01	78.61	80.01	91.56	98.46	98.55	99.57	112.57	119.05	125.47

Figure 3: Container traffic at Indian Ports
Source: Indian Container Market Report, Drewry & Gateway Research

The road freight is usually carried by trucks equipped with internal combustion engines (ICE) which are mostly propelled by diesel. Achieving a higher share of railways in the inland container movement will mitigate tonnes of vehicular emissions and move India closer to its climate change mitigation targets. This report attempts to assess the challenges in such a modal shift of containers in India and undertakes an analysis of CRIS data from Indian Railways (IR) and recommends steps to be taken by the Indian Railways to improve its share in inland container movement in India.

Container Movement in India

Largely driven by services sector growth, India has been witnessing rapid growth in the white goods, engineering goods, and fast moving consumer goods markets. Given the convenience of moving these goods in containers, containerized traffic has seen rapid growth over the last decade. In India, the container traffic has seen a CAGR of over 10% over the last ten years with most of the export-import containers (EXIM) being traditionally carried out by the major ports. However, over the last few years, this ratio has become skewed with non-major ports competing heavily with the major ports for the container traffic.

As with the global context, most of the container business is being handled by trucks as compared to the Indian Railways (IR), despite the fact that Indian Railways has undertaken measures such as "opening up" the rail-based container traffic movement to private operators almost a decade ago in 2006.

Container Movement by Rail

Container is one of the nine major bulk commodities that account for a substantial share in total traffic as well as earnings of Indian Railways. Container traffic accounts for about 5% in total freight traffic (2017-18) of Indian Railways and about 4.9% in the total freight earnings. Majority (80% in terms of tonnage and 70% in terms of net tonne km (NTKM)) of the total container traffic during 2017-18 is accounted by the EXIM traffic, that is, going to the ports or coming from the ports.

Figure 4: Chain of export/import-oriented goods moved through container

[4]*Indian Container Market Report, Drewry & Gateway Research (2018)*
http://containersindia.in/pdf/INDIAN%20CONTAINER%20MARKET%20REPORT-2018.pdf

Table 1: Total IR traffic and earnings vis-à-vis container traffic and earnings

	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Total IR traffic and earnings						
Traffic (million tonnes)	1,014	1,054	1,098	1,104	1,109	1,162
Earnings (in Rs. crore)	85,262	93,472	1,05,313	1,09,287	1,04,475	1,13,024
NTKM (in billions)	691	652	686	656	620	658
Container traffic and earnings						
Traffic (million tonnes)	41.1	43.54	48.3	45.84	47.6	54.31
Earnings (in Rs. crore)	3,432	3,767	4,333	4,843.5	5,212	5,510
NTKM (in billions)	49.97	52.10	47.88	45.43	45.88	49.73
% share of container traffic in total IR traffic	4.05%	4.13%	4.40%	4.15%	4.29%	4.67%
% share of earnings from container in total IR earnings	4.02%	4.03%	4.11%	4.43%	4.99%	4.88%

Source: Railway Board

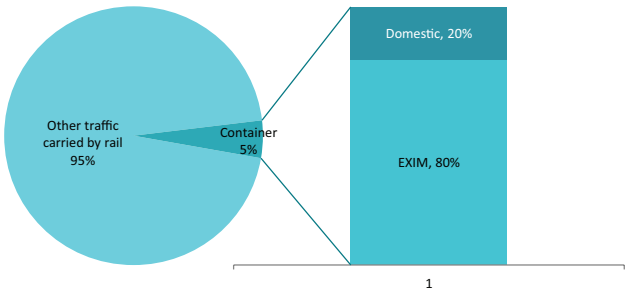


Figure 5: Share of container traffic in total traffic (in terms of tonnage) carried by Indian Railways (2017-18);
Source: Indian Railways

- Over the last five years (2013-18), container traffic volume has increased at a CAGR of 6%. On the other hand, earnings from container traffic increased at a CAGR of 10% during the same period.
- The domestic container traffic volume has increased at a CAGR of 0.1% in 5 years whereas EXIM container traffic volume increased at a CAGR of by 7.4% from FY 2013-14 to FY 2017-18.
- During the same period, earnings from domestic containers increased at a CAGR of 5.3% and from earnings EXIM containers increased at a CAGR of 11.9%.

Table 2: Domestic and EXIM container traffic carried by Indian Railways

Year		TEU-KM (in million)	NTKM (in million)	Earnings (Rs crore)	Earnings/ NTKM	Average lead (in km)
2013-14	Domestic	23.25%	30.59%	30.90%	73.03	1,459
	EXIM	76.95%	69.41%	69.10%	71.98	1,109
	Total	**2,579**	**52,101**	**3,767.0**	**72.3**	**1,284**
2014-15	Domestic	28.05%	31.26%	26.87%	77.78	1,426
	EXIM	71.95%	68.74%	73.13%	96.3	869
	Total	**2,159 ↓**	**47,876 ↓**	**4,333.1 ↑**	**90.51 ↑**	**1,147.5 ↓**
2015-16	Domestic	25.47%	27.28%	24.40%	95.34	1,371
	EXIM	74.53%	72.72%	75.60%	110.85	898
	Total	**1,591 ↓**	**45,429 ↓**	**4,843.5 ↑**	**106.62 ↑**	**1,134.5 ↓**

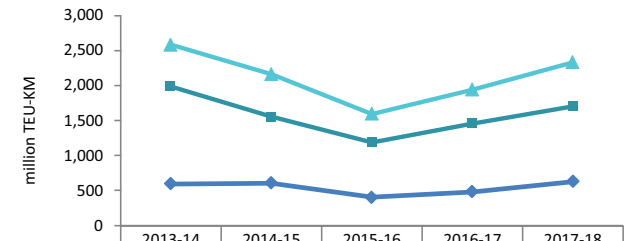
Table 2: Domestic and EXIM container traffic carried by Indian Railways

Year		TEU-KM (in million)	NTKM (in million)	Earnings (Rs crore)	Earnings/ NTKM	Average lead (in km)
2016-17	Domestic	24.84%	29.36%	26.06%	100.82	1,376
	EXIM	75.16%	70.64%	73.94%	118.92	857
	Total	**1,938 ↑**	**45,878 ↑**	**5,212.0 ↑**	**113.61 ↑**	**1,116.5 ↓**
2017-18	Domestic	26.90%	29.42%	25.93%	97.67	1,334
	EXIM	73.10%	70.58%	74.07%	116.27	810
	Total	**2,328 ↑**	**49,731 ↑**	**5,510.0 ↑**	**110.8 ↓**	**1,072 ↓**

Note: The arrows indicate increase (↑) or decrease (↓) from the preceding year
Source: CRIS & TERI Analysis

Of the 54 million tonnes carried through containers in Indian Railways, 20% are domestic services (Railway Board, 2018). The Container Corporation of India (CONCOR) initiated domestic container movement in 1991. The tonnage of domestic container increased at a CAGR of 0.1% in the last 5 years (Railway Board, 2018). However, this does not paint a true picture because 22% of total truck movement in the country is accounted by closed body trucks (CBTs), which highlight the huge potential for containerisation of domestic freight in India.

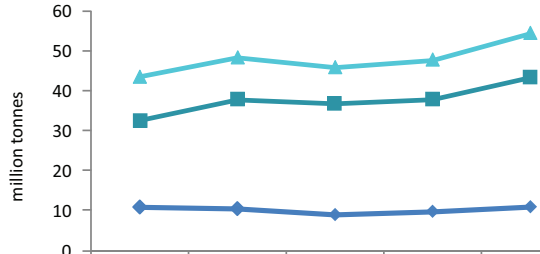
TEU-KM is a better indicator of NTKM for analysing container traffic through railways. For example, same number of containers moving a light commodity and a heavy commodity will have same TEU-KM but different NTKM. The heavier commodity traffic will show a higher NTKM. However as the freight rates and the traffic congestion depends on the container units and not on the weight of the commodity, it is rational to consider TEU-KM instead on NTKM for analysing container flow. Figure 3 illustrates the flow of overall container traffic in India.



	2013-14	2014-15	2015-16	2016-17	2017-18
Domestic	595	606	405	481	626
EXIM	1,985	1,554	1,186	1,457	1,702
Total	2,579	2,159	1,591	1,938	2,328

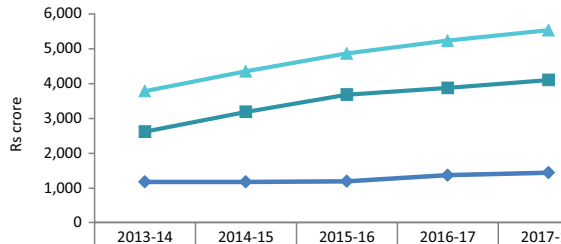
Figure 6: Growth of Container Traffic (in million TEU-KM)
Source: CRIS

Even though the EXIM container rail traffic seems to increase if measured in terms Tonnage or Earnings, when measured in terms of TEU-KM, it is clear that the container traffic has in fact, decreased in the period considered in this report (2013-14 to 2017-18). However, the domestic container traffic has increased in the period from 595 TEU-KM in 2013-14 to 626 TEU-KM in 2017-18.



	2013-14	2014-15	2015-16	2016-17	2017-18
Domestic	10.93	10.5	9.04	9.79	10.97
EXIM	32.61	37.8	36.8	37.81	43.34
Total	43.54	48.3	45.84	47.6	54.31

Figure 7: Total container traffic (EXIM and domestic) carried by IR (2013-14 to 2017-18) tonnage (million tonnes);
Source: Indian Railways



	2013-14	2014-15	2015-16	2016-17	2017-18
Domestic	1,164	1,164	1,182	1,358	1,429
EXIM	2,603	3,169	3,662	3,854	4,081
Total	3,767	4,333	4,844	5,212	5,510

Figure 8: Total earnings from IR's container service during the last five years – Earnings (Rs crore);
Source: Indian Railways

It must be noted that EXIM container traffic is the driver of total container traffic in India. Therefore, the analysis and recommendations of this report focus more on EXIM container flows.

Classification of Commodities in FOIS data of EXIM and Domestic Containers (in numbers)

A vast variety of commodities move in EXIM containers as compared to domestic containers. The containerisation of commodities in international trade continues to rise, the evidence of which is clearly visible as due to the rise in diversity of commodities in EXIM containers carried by railways in India.

Table 3: Number of types of commodities moved in containers

Financial Year	EXIM	Domestic
2013-14	9,745	818
2014-15	11,776	841
2015-16	12,739	716
2016-17	18,652	730
2017-18	20,605	741

Source: CRIS

The actual diversity of commodities may be lesser than the numbers above as the commodity data from CRIS has multiple names for the same commodity or commodity type. For example, paper is spelt as papr or papar or white paper for different observations in the data set.

However, the commodities have been categorised based on their density as light, intermediate or heavy cargo (Ravibabu, 2013). The observations were also classified based on their distance as long, medium, and short leads.

EXIM Traffic

The diversity of commodities of all the three categories in EXIM traffic has increased more than two-fold from 9,745 commodities to 20,605 commodities between 2013-14 and 2017-18. This could be accounted due to increasing containerisation of international trade. Due to higher containerisation levels in shipping freight, import traffic has higher containerisation levels. The choice of 'when to containerise an export cargo' influences whether the cargo will be moved through rail or road. Factors determining the choice include cost of transportation, ease of transportation/hassle-free movement, documentation required, safety of consignment, scheduled time for export, etc. An export-oriented manufacturer may have three choices of containerising his cargo enumerated as follows:

1. Containerise at the factory
2. Containerise at the nearest freight station
3. Containerise at the port

Table 4: Classification of commodities based on Density and Distance

Type of Cargo based on Density	Tonnage per TEU	Type of movement based on distance	Tonnage per TEU
Heavy Cargo	More than 16 tonnes per TEU	**Long Lead**	More than 750 km
Intermediate Cargo	Between 4 and 16 tonnes per TEU	**Medium Lead**	Between 250 km and 750 km
Light Cargo	Less than 4 tonnes per TEU	**Short Lead**	Less than 250 km

Source: Ravibabu, Research in Transportation Economics

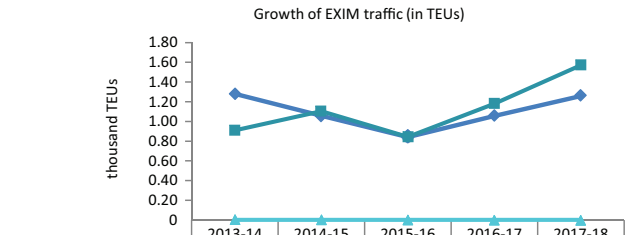
Table 5: Diversity of commodities carried by EXIM containers – by Density (No. of different types of commodities)

	2013-14	2014-15	2015-16	2016-17	2017-18
Heavy cargo	5,141	6,158	6,590	9,707	10,832 (46.3%)
Intermediate cargo	4,347	5,335	5,759	8,531	9,324 (53.4%)
Light cargo	257	283	390	414	449 (0.3%)
Total	**9,745**	**11,776**	**12,739**	**18,652**	**20,605 (100%)**

Source: CRIS & TERI Analysis

The highest number of diverse commodities carried in EXIM containers are heavy cargo i.e. with an average weight of more than 16 tonnes per TEU. Least diversity is observed in the light cargo category, which accounted for 0.3% share in EXIM traffic. This sprouts the question of whether light cargo has low containerisation levels in international freight movement. If not, then are there cheaper options available for inland transport of light containerised cargo arriving at Indian ports.

When measured in terms of TEUs, the container traffic for intermediate and light cargo increased from 2013-14 to 2017-18; while, TEUs of heavy cargo carried by IR decreased in the period under consideration. It is observed that there was a considerable fall in traffic for heavy and intermediate cargo categories during 2013-14 to 2015-16.



	2013-14	2014-15	2015-16	2016-17	2017-18
Heavy Cargo	1,280.07	1,057.73	841.99	1,056.46	1,257.60
Intermediate Cargo	910.54	1,103.43	843.42	1,180.09	1,571.69
Light Cargo	1.54	2.40	2.45	2.88	2.58

Figure 9: Growth of EXIM container traffic by cargo type (in TEUs)
Source: CRIS

In terms of distance moved or lead, about 50% of the EXIM container traffic accounted for longer lead (>750 km), followed by medium lead and short lead. This supports the argument that IR is preferred for medium to longer leads while short lead is dominated by road.

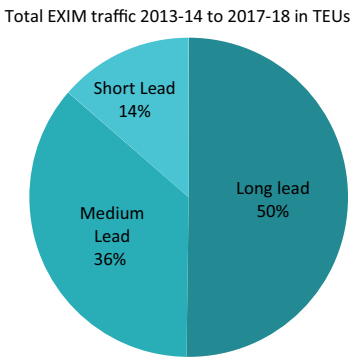
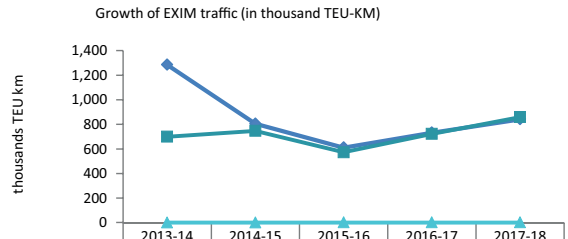


Figure 10: Total EXIM traffic (2013-14 to 2017-18) based on Lead categories
Source: CRIS

When measured in terms of TEU-KM, CRIS data indicates a fall in container traffic for heavy, intermediate, and light cargo moved through rail. For clearer understanding of data, the EXIM traffic was split into nine categories through combinations of distance and density.



	2013-14	2014-15	2015-16	2016-17	2017-18
Heavy Cargo	1,284	805	611	732	841
Intermediate Cargo	700	747	573	723	859
Light Cargo	1	1	2	2	2

Figure 11: Growth of EXIM container traffic by cargo type
Source: CRIS

The highest amount of TEUs carried in the last 5 years was of intermediate cargo over long distances followed by heavy cargo for long distances; the least traffic was in light cargo. This raises a question whether this corresponds to similar lower levels of containerisation

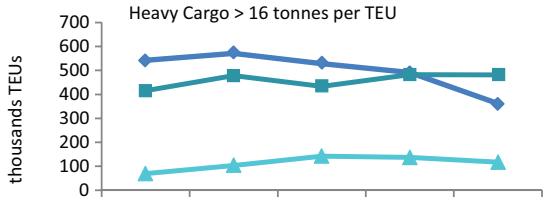
of light cargo in international trade. Light cargo over long distances moved the least amount of traffic in TEUs among the nine categories considered here.

Table 6: Percentage of Total TEUs of EXIM container traffic in railways (2013-14 to 2017-18)

Distance → Weight ↓	Long Lead	Medium Lead	Short Lead	Total
Heavy Cargo	24.21%	22.21%	5.49%	51.92%
Intermediate Cargo	26.02%	13.93%	8.12%	48.08%
Light Cargo	0.00%	0.00%	0.00%	0.00%
Total	50.23%	36.15%	13.62%	100.00%

Source: CRIS & TERI Analysis

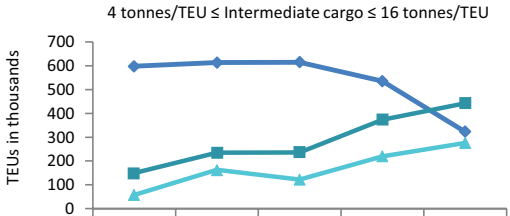
TEUs of heavy cargo carried over long distances (more than 750 km) has declined by almost 55% from 2013-14 to 2017-18. The overall TEUs of EXIM heavy cargo carried in the same period have declined by 1.8%.



	2013-14	2014-15	2015-16	2016-17	2017-18
Long Lead	542	572	528	492	362
Medium Lead	415	478	433	482	481
Short Lead	69	103	142	137	116

Figure 12: Growth of Heavy Cargo moved in EXIM containers over short, medium and long distances (2013-14 to 2017-18);
Source: CRIS

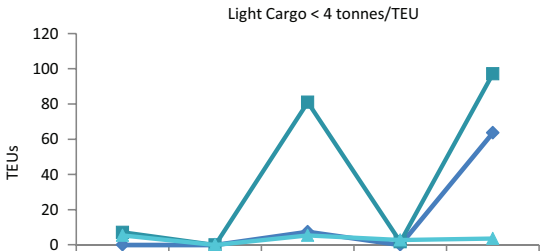
Overall TEUs of intermediate cargo carried in EXIM containers increased by 30%. This is primarily because of a 290% increase in TEUs carried for medium distances and 480% increase in TEUs carried for short distances.



	2013-14	2014-15	2015-16	2016-17	2017-18
Long Lead	598	613	614	535	322
Medium Lead	149	235	236	373	443
Short Lead	58	163	122	220	275

Figure 13: Growth of Intermediate Cargo moved in EXIM containers over short, medium and long distances (2013-14 to 2017-18)

The proportion of light cargo on IR EXIM traffic is negligible. Amongst the little light cargo that was moved from 2013-14 to 2017-18, the majority was over long and medium distances. This also raises the question on whether 4 tonnes per TEU is an appropriate classification of light cargo like electronics. However, it must be noted that, even though insignificant, light cargo traffic has increased by more than 13 times from just 13 TEUs in 2013-14 to 164 TEUs in 2017-18.



	2013-14	2014-15	2015-16	2016-17	2017-18
Long Lead	0	0	7.4	0	63.6
Medium Lead	7.2	0	81	1.8	97.2
Short Lead	5.4	0	5.4	2.8	3.6

Figure 14: Growth of Light Cargo moved in EXIM containers over short, medium and long distances (2013-14 to 2017-18)

Zonal-Pair wise Distribution of EXIM Traffic

There 16 Railway Zones considered here and hence 256 Origin-Destination (OD) pairs of Zones possible. However, 179 (70%) of such possible Zonal OD pairs have a negligible (close to zero) percentage of total EXIM container traffic flowing through them. More than 50% of the EXIM container traffic is moved in the western corridor between Western Railway, North Western Railway, and Northern Railway. The Western DFC is expected to decongest these routes.

Table 7: Distribution of Traffic (FOIS data, 2017-18)

DESTINATIONS→ ORIGINS ↓	CR	EC	ECO	ER	NC	NE	NF	NR	NW	SC	SE	SEC	SR	SW	WC	WR	Grand Total
CR	5%	0%	0%	0%	2%	0%	0%	3%	0%	2%	0%	0%	0%	0%	1%	4%	17%
EC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ECO	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
ER	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
NC	3%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	2%	6%
NE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
NF	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
NR	3%	0%	0%	0%	0%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%	8%	16%
NW	0%	0%	0%	0%	2%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	5%	12%
SC	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
SE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SEC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%
SW	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	2%
WC	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
WR	3%	0%	0%	0%	2%	0%	0%	13%	11%	0%	0%	0%	0%	0%	0%	7%	37%
Grand Total	17%	2%	2%	0%	6%	0%	0%	23%	16%	3%	0%	0%	2%	3%	1%	25%	100%

Source: CRIS & TERI Analysis

EXIM Traffic in Southern States

For the purpose of this study, TERI classified five states of India as 'southern states'—Andhra Pradesh, Telangana, Karnataka, Kerala, and Tamil Nadu. This section has been added in the analysis to gain clarity in EXIM container movement in southern India as the container throughput of ports in the above states is increasing rapidly every year. For instance, the Kochi Port saw an increase of container traffic of more than 16% from 2016-17 to 2017-18. Hence, it will be interesting to assess the corresponding container flows by rail in the southern region. For the same purpose, the EXIM FOIS data for the years 2013-14 to 2017-18 were segregated in 4 categories, enumerated as follows:

- Traffic originating from the 5 southern states and ending in any of the other states (South-Others).
- Traffic originating in any of the other states and ending in one of 5 southern states (Others-South).
- Traffic both originating and ending in the 5 southern states (South-South).
- Traffic neither originating nor ending in the 5 southern states (Non-South).

Table 9 indicates the share of movement of EXIM containers from the southern region.

It can be observed that the container traffic in TEU-KM from other states to the southern states and from southern states to the other states has reduced significantly from 2013-14 to 2017-18. However, the container traffic within southern states has increased from 0.99% of total EXIM TEU-KM in 2013-14 to 2.26% of the same in 2017-18.

OD Analysis of EXIM container movement

The origin and destination stations of container cargo

through railways indicated in the CRIS data were paired together and converted into one variable to simplify the analysis. Table 10 summarises the station pairs hence formed.

It is clear that the number of OD pairs for domestic container cargo is more than EXIM. Further, it is also clear that the absolute number of OD pairs for both domestic and EXIM are increasing. The pairs identified above for each year were ranked based on their NTKM.

To further filter these pairs, all the OD pairs with their NTKMs ranked 20 or better than 20 in at least one of the years (2013-14 to 2017-18) were selected. This led to the selection of 36 EXIM OD station pairs, paired between 18 stations and 41 domestic OD station pairs between 44 stations. These OD pairs were then ranked based on the standard deviation of their ranks based on NTKM across the 5 years[5]. The standard deviation of pairs which started their operations late (after 2013-14) or ended their operations early (before 2017-18) was calculated from the variation only amongst their years of operation.

The above OD pairs must be studied in depth to understand the reasons for the rise or fall in the EXIM traffic on their respective routes. It has been attempted to analyse some of them in the next section.

MDCC to PLPC

The EXIM OD pair with the highest variation in its rank based on NTKM is Mundra (MDCC) to Pristine Mega

Table 8: EXIM traffic by movement in Southern states (TEU-KM in millions)

	2013-14	2014-15	2015-16	2016-17	2017-18
Non South	1,652.43	1,485.59	1,131.70	1,374.42	1,580.45
Others-South	177.62	20.35	18.10	35.62	51.75
South-Others	135.05	23.88	16.72	19.16	31.00
South-South	19.73	23.99	19.47	27.60	38.40
Grand Total	1,984.82	1,553.81	1,185.99	1,456.80	1,701.60

Source: CRIS

Table 9: EXIM Traffic by southern movement (% of TEU-KM)

	2013-14	2014-15	2015-16	2016-17	2017-18
Non South	83.25%	95.61%	95.42%	94.35%	92.88%
Others-South	8.95%	1.31%	1.53%	2.44%	3.04%
South-Others	6.80%	1.54%	1.41%	1.32%	1.82%
South-South	0.99%	1.54%	1.64%	1.89%	2.26%
Grand Total	100.00%	100.00%	100.00%	100.00%	100.00%

Source: CRIS

Table 10: Number of OD pairs involved in EXIM container movement

Financial Year	EXIM Pairs	Total Pairs
2013-14	278	696
2014-15	288	758
2015-16	337	803
2016-17	371	785
2017-18	426	885

Source: CRIS

Table 11: OD Ranks based on NTKM (EXIM)

	OD Stations	OD Ranks based on NTKM (EXIM)					
		2013-14	2014-15	2015-16	2016-17	2017-18	Standard Deviation of OD ranks across years
1	MDCC-PLPC	-	-	137	38	14	65.20
2	MDCC-CMLK	139	90	81	22	1	55.43
3	TICD-MDCC	9	14	10	17	127	51.31
4	DICD-PPSP	27	18	39	94	125	46.57
5	IBBM-MDCC	-	108	18	4	30	46.56
6	MDCC-PDLL	84	82	41	34	11	31.77
7	MDCC-PGFS	4	2	11	23	77	31.07
8	PGFS-MDCC	7	12	25	35	67	23.82
9	PPSP-CMLK	61	8	24	9	3	23.70
10	DICD-MDCC	6	9	7	20	57	21.53
11	ISNL-MDCC	-	-	20	11	50	20.42
12	JNPT-MKPP	60	47	35	24	8	20.12
13	ICDD-MDCC	8	10	8	7	53	20.04
14	JNPT-CWCN	19	23	33	37	69	19.73
15	PPSP-TICD	3	4	3	13	46	18.49
16	GDGH-MDCC	17	21	19	12	56	17.65
17	PPSP-GDGH	43	19	13	6	5	15.50
18	PPSP-DICD	20	31	21	45	51	13.99
19	ICDD-JNPT	16	17	38	44	20	13.04
20	CWCN-MDCC	5	6	12	15	37	12.98

Source: CRIS

Logistics Park (PLPC) in Ludhiana. The NTKM rank of this OD pair went form 137 in 2015-16 to 14 in 2017-18. Standard deviation of the rank of NTKM across 3 years for this pair is 65.2. It should be noted that PLPC, Ludhiana, was operationalized in February 2016.

The share of traffic and earnings between MDCC and PLPC (Ludhiana) has been increasing over the years. Between 2016-17 and 2017-18, the share of MDCC-PLPC (Ludhiana) almost doubled in terms of all the parameters discussed in Table 13.

This station pair went from contributing 0.8% of total EXIM NTKM in 2016-17 to 1.44% of total EXIM NTKM in 2017-18. This pair has an average lead of about 1,300 km. For the purpose of this report, such ODs have been classified as long leads.

[5] This was done in order to identify OD pairs with high NTKM variation across the years and also with a considerable absolute share of the total NTKM in at least one of the years.

The diversity in commodities carried in EXIM containers from MDCC to PLPC (Ludhiana) expanded from just 84 commodity types in 2016-17 to 544 different commodities in 2017-18. One of the key factors explaining this trend could be shift in traffic one terminal to this particular terminal. This is a phenomenal increase and factors leading to such an increase should be studied further.

MDCC to CMLK

The NTKM for EXIM containers in this route increased from 0.03% of total EXIM NTKM in 2013-14 to 2.97% of the total in 2017-18. For the entire traffic on this route, CONCOR is both the consignor and consignee.

The traffic (in TEUs) from MDCC to CMLK grew at a CAGR of 133% in the period 2013-14 to 2017-18. The container traffic from MDCC to CMLK grew from just 1,043 TEUs in 2013-14 to 72,199 TEUs in 2017-18 which constituted 4% of IR's total container traffic in terms of TEUs. The reason for such a high rate of growth could be the emergence of CMLK as a transhipment hub as well as movement of double stack container trains to the terminal. Although Kathuwas MMLP was officially inaugurated in March 2016, the formal operation began in 2013-14[6].

Other opportunities for improving rail share of container traffic

TERI assessed to the origin and destination stations to identify the top origin and destination points in terms of container traffic measured in terms of TEUs. From the

Table 12: Details of MDCC (Mundra) to PLPC (Ludhiana) OD

Station code	From MDCC	To PLPC
Station name	Mundra Port Cargo Complex	Pristine Mega Logistics Park Private Limited
Division	Ahmedabad	Ambala
State	Gujarat	Punjab
Zone	Western Railway	Northern Railway
Distance	Approx. 1,350 km	

Source: CRIS

Table 13: Percentage share of MDCC (Mundra) to PLPC (Ludhiana) traffic in total EXIM traffic

	2015-16	2016-17	2017-18
(%) Share of NTKM	0.08%	0.83%	1.44%
(%) Share of TEU	0.03%	0.27%	0.49%
(%) Share of Freight/earnings	0.05%	0.52%	0.99%
(%) Share of Tonnage	0.04%	0.41%	0.70%

Source: CRIS

Table 14: Details of container traffic between MDCC (Mundra) and PLPC (Ludhiana)

	Sum of NTKM		Sum of FRGT		Sum of TEU	
Year	in million tonnes km	(%) increase	in Rs crore	(%) increase	In TEUs	(%) increase
2015-16	17.73	-	1.60	-	557.8	-
2016-17	172.95	875.3%	16.86	951.2%	6132	999.3%
2017-18	245.45	41.9%	26.38	56.5%	9,788.4	59.6%
Total	436.13	-	44.84	-	16,478.2	-

Source: CRIS

Table 15: Variety of commodities carries between MDCC (Mundra) and PLPC (Ludhiana)

	2015-16	2016-17	2017-18
Variety of commodities carried in containers	13	84	544
Total TEUs	**557.8**	**6,132**	**13,297.6**

Source: CRIS

Table 16: Details of MDCC (Mundra) to CMLK (Kathuwas) OD

	From	To
Station Code	MDCC	CMLK
Station Name	Mundra Port Cargo Complex	Greenfield PFT of CONCOR Neemrana served by Kathuwas
Division	Ahmedabad	Jaipur
State	Gujarat	Rajasthan
Zone	Western Railway	North Western Railway
Distance	Approx. 1,000 km	

Source: TERI Analysis

Table 17: Details of traffic between from MDCC to CMLK

Year	Sum of NTKM in million tonne km	(%) increase	Sum of FRGT in Rs crore	(%) increase	Sum of TEU in TEUs	(%) increase
2013-14	6.34	-	1.01	-	1,044	
2014-15	46.92	640%	6.76	570%	6,487	521%
2015-16	68.88	47%	13.13	94%	10,556	63%
2016-17	271.04	293%	49.05	274%	37,973	260%
2017-18	507.03	87%	93.04	90%	72,199	90%
Grand Total	900.21		162.99		128,259	

Source: CRIS and TERI Analysis

two OD lists, the stations which were both origins and destinations in the data were segregated for the year 2017-18. The difference between the incoming and outgoing container traffic at the nodes, identified in the previous step, was evaluated.

From the above analysis JNPT (Jawaharlal Nehru Port Trust) and MDCC (Mundra Port Cargo Complex) were identified as the major distribution nodes with handling 28% and 29%, respectively, of the total EXIM container traffic in India. Both of these nodes have high outgoing traffic over incoming traffic.

It is well established that containerised import cargo traffic is more likely to be moved by rail as the cargo might already be arriving at the port in ISO containers. However, regarding export traffic, as it might be cheaper to containerise the cargo at the port, the cargo might be arriving by trucks (not in ISO containers) till the port for export.

There is a huge deficit in rail-based export container flow compared to the rail-based import container flow at the Mundra port. The Mundra port is a commercial port and is the second largest port in India in handling container

[6] *http://www.aceanalyser.com/Conference%20Call/131344_20140203.pdf*

Table 18: Cargo movement analysis of JNPT-MDCC container traffic (2017-18)

Distribution Nodes	% total EXIM containers in India (in TEUs)	Incoming Traffic (Export Traffic)	Outgoing Traffic (Import Traffic)	Difference
	(1)	(2)	(3)	(4) = (3-2)
JNPT	28%	397,029	409,409	12,382
MDCC	29%	297,809	515,080	217,277

Source: CRIS

Table 19: Cargo movement analysis of CMLK & TICD container terminals of CONCOR

Station		Incoming traffic (TEUs)	Outgoing traffic (TEUs)	Incoming over Outgoing
	(1)	(2)	(3)	(4)=(2-3)
Greenfield PFT of CONCOR Neemrana served by Kathuwas	CMLK	342,781	221,670	121,111
Tughlakabad Inland Container Depot (CONCOR)	TICD	201,968	121,517	80,450

Source: CRIS

traffic. In 2016-17, the Mudra port handled a total of 4.2 million TEUs of container cargo. The total rail incoming and outgoing container traffic at Mundra for the same year was just 0.78 million TEUs which is just 18% of the total TEUs handled at the port. TERI recommends further analysis for understanding of container traffic at Mundra Port and also discussions for making railways, 'container friendly' at the port. Similarly, of the 4.83 million TEUs handled by JNPT in 2017-18, only 0.8 million TEUs (17%) reached or left the port by rail.

The terminals of CONCOR in Kathuwas and Tughlakabad (TICD) were identified as major consumption centres in the FOIS data for 2017-18. Both of these terminals have a huge deficit between incoming and outgoing traffic. Only 65% of the TEUs arriving at CONCOR terminal in Kathuwas by rail also leave the terminal by rail. Even if there is no actual trade flow, the empty containers have to find their way back to the ports or wherever it is in demand. It is clear that even such flows are not happening through rail. Similarly, only 60% of incoming rail containers in Tughlakabad, left the private freight terminal (PFT) by rail.

The above opportunities clearly indicate a preference of railways in import traffic than in export traffic. Facilitating easier containerisation at the terminals may help capture this opportunity.

Domestic traffic

In contrast to the EXIM container traffic, the diversity of the commodities being carried has decreased for all the three cargo types. However, similar to the EXIM traffic, the highest and lowest degree of diversity is amongst the heavy cargo and light cargo categories, respectively.

Table 20: Cargo type wise diversity in commodities carried in domestic containers (No.)

	2013-14	2014-15	2015-16	2016-17	2017-18
Heavy Cargo	667	667	627	608	621
Intermediate Cargo	145	166	108	117	116
Light Cargo	6	8	3	5	4
Total	818	841	738	730	741

Source: CRIS

There is a negligible amount of diversity in light cargo carried in domestic containers. As per CRIS data, these are mainly consumer goods, such as shoes, candles,

packaged soaps, and also cars and various other auto industry products. The heavy cargo in containers include a large diversity of products, such as food grains like rice, scrap metals, cement, tiles, etc. The intermediate cargo also has a wide variety of consumer products, such as blankets and plastics to goods like plywood and glassware.

Table 21: Domestic Traffic by Cargo type (TEUs in thousands)

	2013-14	2014-15	2015-16	2016-17	2017-18
Heavy Cargo	389.6	393.3	325.4	331.5	436.7
Intermediate Cargo	24.2	37.1	36.4	30	31.1
Light Cargo	0.02	0.1	12.8	0.2	0.04
Total	413.9	430.5	374.5	361.6	467.8

Source: CRIS

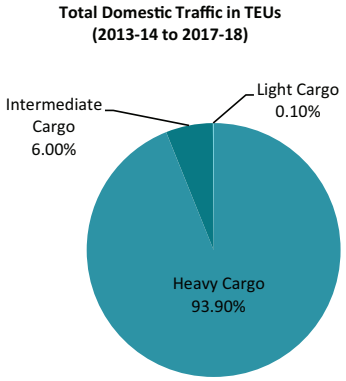


Figure 15: Total Domestic Container Traffic by cargo type (2013-14 to 2017-18);
Source: CRIS

It is pertinent to mention here that domestic traffic is predominantly heavy cargo and around 94% of the total container traffic carried by the IR in the period 2013-14 to 2017-18 has been goods with density more than 16 tonnes per TEU.

Most domestic traffic handled by IR is heavy cargo and TEUs of light cargo moved by IR is miniscule.

Unlike the EXIM traffic, there is no noticeable difference in domestic traffic trends in Freight Operation Information System (FOIS) data, when measured in terms of TEU-KM instead of TEUs.

The domestic container traffic is mainly heavy cargo (93.9%). Similar to EXIM container traffic, light cargo

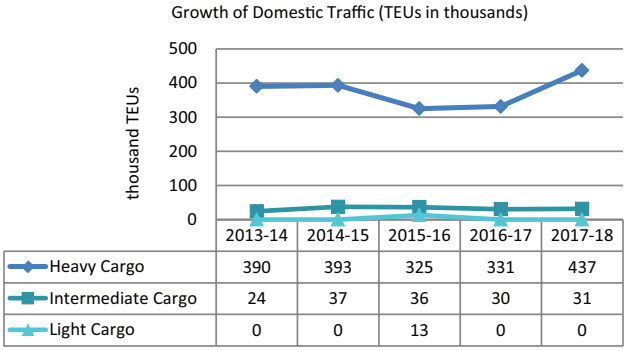


Figure 16: Growth of Domestic Container Traffic by Cargo type (2013-14 to 2017-18) (in '000 TEUs)
Source: CRIS

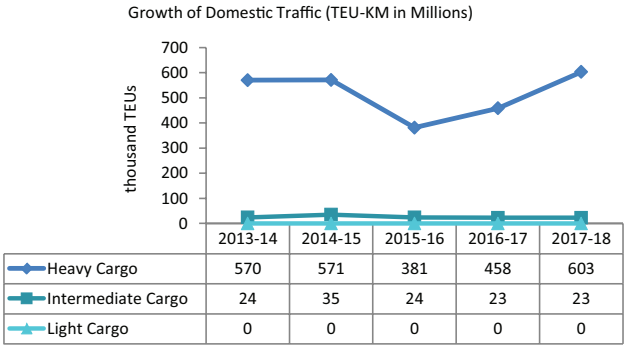


Figure 17: Growth of Domestic Container Traffic by Cargo type (2013-14 to 2017-18);
Source: CRIS

accounts for the least traffic. The light cargo carried over long, medium, and short distances in domestic containers in India is negligible. This shows a vast potential for railways to capture domestic freight of light goods over long distances. Most electronic goods fall in the light cargo categories.

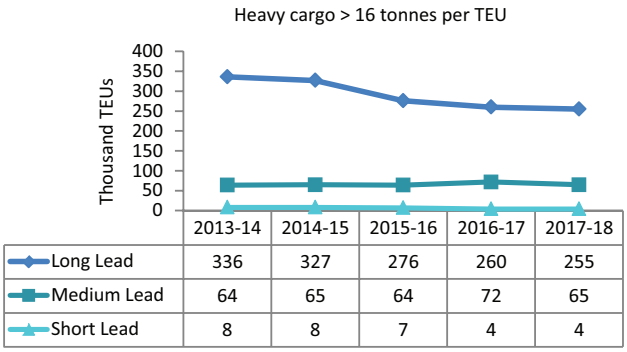
The traffic of intermediate cargo over medium distances has increased mainly due to fall in average lead from 2013-14 to 2017-18. While the intermediate cargo carried over long distance declined from 6,000 TEUs to 5,000 TEUs, the intermediate cargo carried over medium distances increases from 8,000 TEUs to 10,000 TEUs.

Domestic light cargo through containers in rail is an absent market. There is no stable demand for this service. The TEU level of light cargo over long distances is negligible. There was no container of any light cargo moved for a distance more than 750 km in the entire period of 2013-14 to 2017-18.

Table 22: Percentage of total TEUs of domestic container traffic in railways by distance and density (2013-14 to 2017-18)

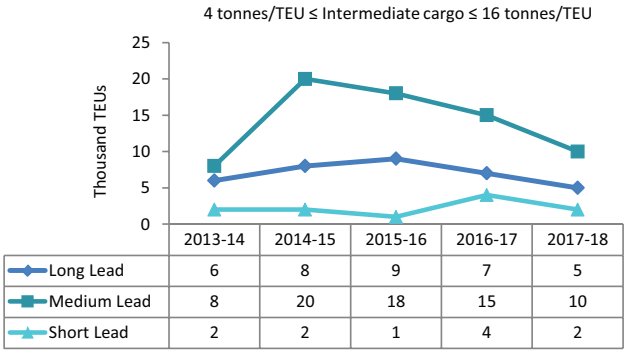
Distance → / Weight ↓	Long Lead	Medium Lead	Short Lead	Total
Heavy Cargo	75.2%	17.1%	1.6%	93.9%
Intermediate Cargo	1.8%	3.6%	0.6%	6.0%
Light Cargo	0.0%	0.0%	0.10%	0.10%
Total	77.0%	20.7%	2.3%	100.0%

Source: CRIS



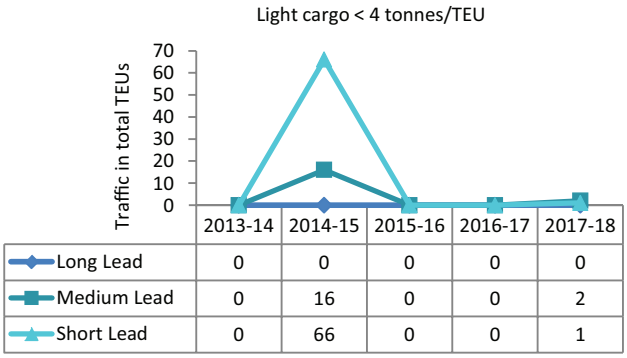
	2013-14	2014-15	2015-16	2016-17	2017-18
Long Lead	336	327	276	260	255
Medium Lead	64	65	64	72	65
Short Lead	8	8	7	4	4

Figure18: Growth of Heavy Cargo moved in Domestic containers over short, medium and long distances (2013-14 to 2017-18);
Source: CRIS



	2013-14	2014-15	2015-16	2016-17	2017-18
Long Lead	6	8	9	7	5
Medium Lead	8	20	18	15	10
Short Lead	2	2	1	4	2

Figure 19: Growth of Intermediate Cargo moved in Domestic containers over short, medium and long distances (2013-14 to 2017-18)
Source: CRIS



	2013-14	2014-15	2015-16	2016-17	2017-18
Long Lead	0	0	0	0	0
Medium Lead	0	16	0	0	2
Short Lead	0	66	0	0	1

Figure 20: Growth of Light Cargo moved in Domestic containers over short, medium and long distances (2013-14 to 2017-18);
Source: CRIS

Zonal-Pair wise Distribution of Domestic Traffic

There 16 Railway Zones considered here and hence 256 OD pairs of Zones possible. However, 85 (33%) of such possible Zonal OD pairs have no domestic container traffic flowing through them. More than 17% of the Domestic container traffic is moved in the western corridor, between Western Railway, North Western Railway and Northern Railway. This relative volume is lower compared to EXIM traffic which has over 50% traffic concentrated between these three zones. The domestic traffic is relatively more distributed across the zones as compared to EXIM traffic. Further, even though the overall domestic volumes are little, there is some traffic between 67% of the zonal pairs while the same for EXIM traffic is just 30%.

OD Analysis of Domestic Container Movement

The origin and destination stations of container cargo through railways indicated in the CRIS data were paired together and converted into one variable to simplify the analysis. Table 23 summarises the station pairs hence formed.

It is clear that the number of OD pairs for domestic container cargo is more than EXIM. Further, it is also clear that the absolute number of OD pairs for both domestic and EXIM are increasing. The pairs identified above for each year were ranked based on their NTKM.

To further filter these pairs, all the OD pairs with their NTKMs ranked 20 or better than 20 in at least one of the years (2013-14 to 2017-18) were selected. This led to the selection of 36 EXIM OD station pairs, paired between 18 stations and 41 domestic OD station pairs between 44

stations. These OD pairs were then ranked based on the standard deviation of their ranks based on NTKM across the 5 years[7]. The standard deviation of pairs which started their operations late (after 2013-14) or ended their operations early (before 2017-18) was calculated from the variation only amongst their years of operation.

Table 23: Distribution of Domestic Container Traffic (2017-18)

Destinations→ Origins ↓	CPT	CR	EC	ECO	ER	NC	NE	NF	NR	NW	SC	SE	SEC	SR	SW	WC	WR	Grand Total
CPT	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
CR	0.7%	1.2%	0.3%	0.0%	0.0%	0.2%	0.0%	0.0%	3.5%	0.0%	0.0%	0.3%	0.2%	0.0%	0.1%	0.0%	0.0%	6.6%
EC	0.2%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%
ECO	0.0%	0.1%	0.0%	2.3%	0.1%	0.2%	0.1%	0.1%	2.9%	0.0%	0.0%	0.3%	0.3%	0.4%	0.0%	0.0%	0.3%	7.1%
ER	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	0.9%	1.6%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	3.0%
KR	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
NC	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.4%
NE	0.1%	0.9%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.2%	1.7%
NF	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%
NR	0.0%	0.7%	0.0%	0.0%	1.9%	0.0%	0.0%	0.5%	2.4%	0.1%	1.3%	0.2%	0.0%	3.6%	1.7%	0.0%	2.7%	15.2%
NW	0.1%	0.3%	0.7%	0.2%	5.0%	1.2%	0.1%	0.3%	1.7%	0.2%	1.4%	0.3%	0.3%	2.0%	0.5%	0.0%	1.2%	15.5%
SC	0.0%	0.1%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	1.8%	0.0%	0.0%	0.6%	0.0%	0.1%	0.0%	0.0%	0.0%	2.9%
SE	0.0%	1.0%	0.0%	0.0%	0.0%	0.7%	0.3%	1.8%	3.6%	0.2%	0.1%	0.1%	0.2%	0.5%	0.0%	0.2%	1.0%	9.7%
SEC	0.0%	0.1%	0.2%	0.2%	0.1%	0.0%	0.3%	0.1%	1.0%	0.0%	0.2%	0.1%	0.0%	0.2%	0.2%	0.0%	0.1%	2.8%
SR	0.0%	0.1%	0.0%	0.1%	0.0%	0.2%	0.0%	0.0%	4.7%	0.0%	0.0%	0.9%	0.0%	0.5%	0.1%	0.0%	0.0%	6.6%
SW	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	1.3%	0.0%	0.0%	0.7%	0.0%	0.2%	0.0%	0.0%	0.1%	2.4%
WC	0.0%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%	0.2%	0.0%	0.1%	0.7%
WR	0.2%	0.5%	0.0%	0.2%	0.9%	1.3%	4.9%	0.6%	8.0%	0.9%	0.5%	1.9%	0.2%	1.2%	0.9%	0.0%	0.4%	22.6%
Grand Total	1.4%	5.9%	1.3%	3.2%	8.5%	3.9%	5.8%	4.3%	33.5%	1.8%	3.8%	5.8%	1.3%	8.9%	3.8%	0.3%	6.4%	100.0%

Source: CRIS & TERI Analysis

Table 24: Number of OD pairs for domestic container movement

Financial Year	Domestic Pairs	Total Pairs
2013-14	454	696
2014-15	520	758
2015-16	528	803
2016-17	486	785
2017-18	541	885

Source: CRIS

[7] *This was done in order to identify OD pairs with high NTKM variation across the years and also with a considerable absolute share of the total NTKM in at least one of the years.*

Table 25: OD Ranks based on NTKM (Domestic)

OD Stations		OD Ranks based on NTKM (Domestic)					
		2013-14	2014-15	2015-16	2016-17	2017-18	Standard Deviation of OD ranks across years
1	MILK-C	63	461	35	-	-	238.28
2	CWCJ-CTCS	-	-	-	206	15	135.06
3	NAC-CP	13	32	299	181	-	134.72
4	HZL-BLQR	6	33	198	-	-	103.94
5	MVI-MLPM	9	10	20	45	164	65.58
6	CSRP-ICDP	93	15	73	27	155	56.13
7	HACG-JNPT	108	18	18	123	26	52.31
8	ICDS-ICDA	128	109	30	61	11	50.06
9	ICDS-ICDT	19	27	107	-	-	48.66
10	CGDM-ICDT	16	66	-	-	-	35.36
11	CTCS-ICDA	101	42	19	20	20	35.23
12	MLPM-PDLL	12	11	14	21	92	34.88
13	MVI-HDCG	10	19	-	-	70	32.36
14	SCIC-DRTA			68	18	13	30.41
15	CFCV-JSLS	-	-	70	15	25	29.30
16	NINS-ICPH	-	-	60	13	21	25.15
17	KLH-CTKR	26	15	44	-	-	14.64
18	CTKR-ICDA	20	26	42	57	36	14.43
19	HDCG-KTIG	-	-	-	38	18	14.14
20	MVI-CEDC	-	35	10	7	10	13.08

Source: CRIS & TERI Analysis [8]

[8] *Full out of station codes has been given in Appendix 1*

REVIEW OF CONTAINER POLICY IN INDIA

In 1988, the Container Corporation in India (CONCOR) was established as a subsidiary to Indian Railways as a container train operator (CTO). A policy to allow container operators other than CONCOR was announced in 1994. However, the policy did not trigger any private participation in container operations. The guidelines were found to be restrictive for new entrants and there was lack of clarity on the role of CONCOR vis-à-vis new operators (Gangwar, 2012). Even though the Central Warehousing Corporation (CWC) obtained the clearance to run container trains, they did not immediately take up operations. Other than this, IR also gave permission to Pipavav Rail Corporation Ltd (PRCL) in 2004 to operate container train between Pipavav port and 15 inland container depots (ICDs) of CONCOR.

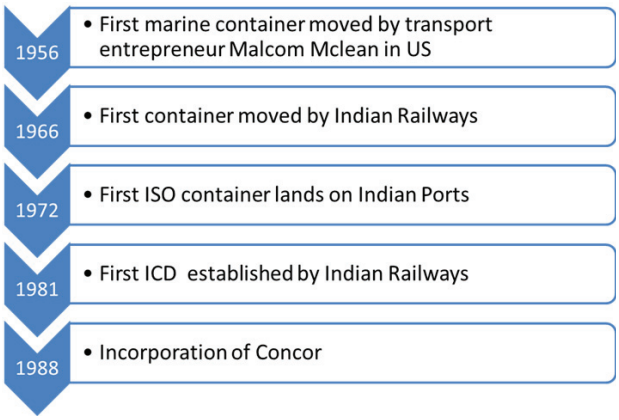


Figure 21: Events leading to the setting up of CONCOR

In January 2006, at a point when the rail share of the containerized cargo was not above 30%, the Ministry of Railways (MoR), Government of India, took a step further by allowing entry of private and public train operators to obtain licenses for running container trains in India. The guidelines to the policy were based on the study sanctioned by Ministry of Railways and conducted by RITES, a multi-disciplinary consultancy under the MoR. The policy opened up to all Indian companies, including subsidiaries of foreign companies registered in India with a minimum annual turnover of Rs 1,000 crore (Gangwar, 2012).

Historically, in freight movement, organisational reforms in Indian Railways have been routed towards creation of subsidiaries like CONCOR (for specific operations) or the reforms have been towards establishment of partnerships with the state governments and/or private players for infrastructure creation projects, such as wagon manufacturing schemes. These projects did not involve direct interface with the customers. The opening up of container sector to private players (since 2006) is a new era for Indian Railways with respect to having direct interface with customers.

The entire IR network was classified and grouped into four categories on the basis of existing and anticipated traffic volumes of ports. A one-time registration fee of Rs 50 crore (for Category I licence) or Rs 10 crore (for Categories II, III, and IV license) was payable to the Ministry of Railways[9].

Fourteen operators (including CONCOR) signed an agreement with Indian Railways in the first round of registration (January–February 2006) and10 operators registered for Category I routes, 2 for Category II, and 2 for Category IV. The Ministry of Railways collected Rs 540 crore as registration fee from these operators. This was a success considering that the drafting of The Model Concession Agreement (MCA) (which is framework legalising the agreement between the operator and the MoR) was still underway. Eight of the 13 CTOs had to also sign MoUs with CONCOR to access its terminals. However, CONCOR put a restriction on them that they should not use these terminals to take away existing business/customers of CONCOR.

Although 60 companies applied in the second round of registration (Dec'06 to Jan'07), only KRIBHCO and

[9]*http://planningcommission.gov.in/sectors/ppp_report/4.Case%20Studies/5.Introducing%20Competition%20in%20Container%20Movement%20by%20Rail.pdf*

Table 26: Categories of CTO Licenses

Classification	Areas of Operation	
	EXIM	Domestic
Category I	Entire rail network of Indian Railways	
Category II	Rail network connecting JNPT, Mumbai Port to any location excluding any location in or reached via NCR	Entire rail network excluding any traffic from/to any location in or reached via National Capital Region (NCR) route
Category III	Rail network connecting ports of Pipavav, Mundra, Chennai, Ennore, Vizag, Kochi to any location	
Category IV	Rail Network connecting ports of Kandla, New Mangalore, Tuticorin, Halda, Kolkatta, Pradip and Mormugao to any location	

Source: Planning Commission (2006)

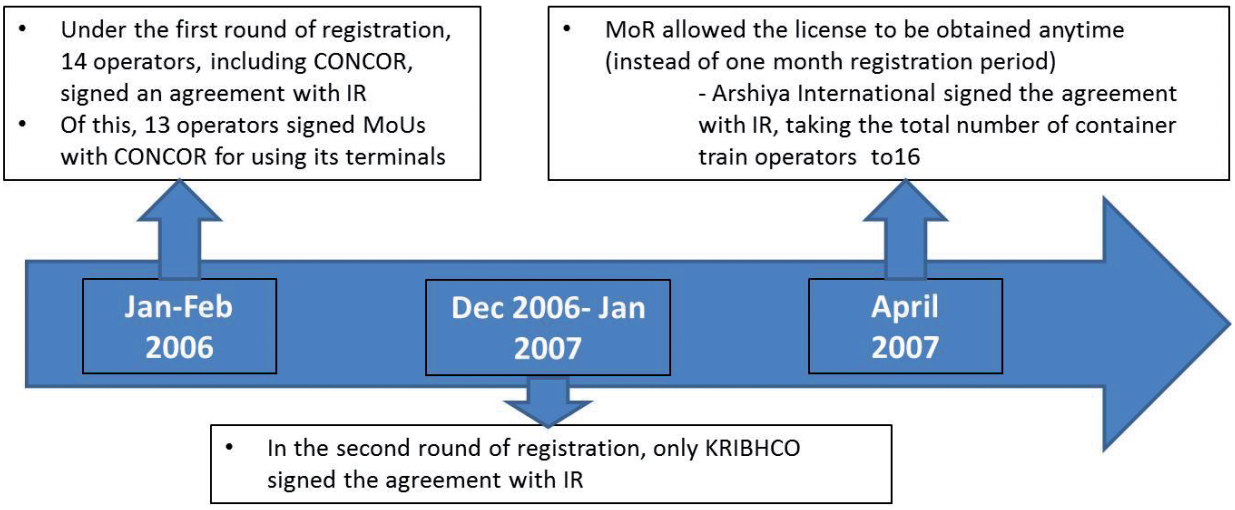


Figure 22: Liberalization of container operation by Indian Railways

Gammon displayed consistent interest. Finally, only KRIBHCO signed the MCA with IR for Category I routes. It appeared that the one year period had given the private operators an opportunity to realistically assess operational viability and gain deeper insights into container train operations.

The finalised MCA specified certain commodities as restricted/notified commodities which cannot be moved in containers. These were iron ore, coke, coal, and minerals (which accounted for 66% of IR's traffic by originating tonnes and 63% by freight revenue)

Table 27: Key interventions made by IR related to container movement

Month and Year	Policy Intervention
July, 2008	IR declared uniform haulage charges for EXIM and domestic containers regardless of the commodities carried in them. The rates varied for empty flat wagons, loaded and empty containers dependent on the weight (in TEU) and distance. The policy also presented the guidelines for usage of Hub and its Spokes by private operators. Except for a few notified commodities under the group of iron and steel, POL, cement, alumina and stones, all container traffic was to be charged at Freight Any Kind (FAK) tariff. The notified commodities were to be charged at an intermediate tariff rate called as Container Class Rate (CCR). This was done to restrict the shift of these notified commodities which were moved in significant volumes by IR General Wagons in significant volumes.
September, 2008	IR amended the uniform haulage charges to give 10% rebate to all domestic container traffic with weight more than 20 Metric Tonnes.
December 2009	IR introduced Assured Transit Time (ATT) service for time sensitive containers. This premium service was provided by the IR to Container Terminal Operators for a 10% premium on standard haulage charges.
December 2010	In order to attract the piecemeal traffic not carried by railways, IR decided to permit CTOs to use private sidings for handling and transportation of different commodities. The permissions were given for a period of 6 months and were to be annually reviewed on the basis of impact on rail traffic and rail coefficient.
March 2012	IR added to Hub and Spoke policy by defining the basis for approval of the Hub and its Spokes by the Traffic Transportation Directorate of Railway Board. The policy also mandated that an undertaking be taken from CTO desiring to move their container through a Hub stating that no handling (cargo loading/unloading) will be done from the container going through the Hub.
May 2012	On the basis of a multi-disciplinary committee report, IR approved the guidelines for grievance redressal mechanism for CTOs. The policy also contained instructions for conducting periodical meetings and the assigned nodal officers from Railways to ensure effective implementation of MCA and holdings of the meetings.
June 2012	To attract the piecemeal traffic not carried by Railways from Industrial Units connected with private rail sidings, Railway Board issued guidelines for considering access to trains operated by CTOs to such private sidings for handling and transportation of commodities in container trains.
March 2013	Railway Board approved the movement of Felspar (or Feldspar) in containers considering the movement of the same by IR General Service Wagons to be of miniscule proportion. Also, IR announced concession of 25% for movement of fruits and vegetables in containers.
June 2013	IR exempted mandatory 100% weighment of import containers
September 2013	Railway Board partially relaxed the restriction on commodities by allowing all forms of Ores, Minerals, Coal and Coke in import containers only which are transported purely under customs bond and seal. This permission was initiated on an experimental basis for 6 months and then extended for 6 more months in February 2014.
	IR revised the list of notified commodities to add Fly Ash. The existing and the revised list of notified commodities at this point were as follows

May 2014	Existing list of Notified commodities	Revised list of Notified commodities
	Cement other than white cement and Fly Ash; Slag; Iron and Steel; Bricks and Stones other than Marble and Ceramic tiles; Alumina; and Petroleum products & Gases	Cement other than white cement; Slag; Iron and Steel; Bricks and Stones other than Marble and Ceramic tiles; Alumina; and Petroleum products & Gases
July 2014	Railway Board approved movement of the restricted commodity, "Hydrated Lime" in containers citing its movement to be miniscule by IR General Service Wagons.	
August 2014	The permission for all forms of Ores, Mineral, Coal and Coke in import containers only was extended for a period of 1 year.	
February 2016	Railway Board decided to permit outward booking of import cargo after de-stuffing from containers custom cleared at CTO's ICDs, in IR General Service Wagons.	
February 2017	Railway Board approved movement of the restricted commodity, "Quick Lime" in containers citing its movement to be miniscule by IR General Service Wagons.	
March 2017	Permission for all forms of Ores, Mineral, Coal and Coke in import containers only was extended for a period of 6 months.	
April 2017	Railway board approved movement of import containerised traffic of restricted commodities (ores, minerals, coal and coke) at FAK rates, in seal cut containers.	
August 2017	Permission for all forms of Ores, Mineral, Coal and Coke in import containers only was extended for a period of 1 year.	
December 2018	Review of haulage charges: • 25% discount on per TEU haulage charges for movement of empty containers • 25% discount on per TEU haulage charges for movement of empty flat wagons	

Source: Policy Circulars, Railway Board; Compiled by TERI

ISSUES AND RECOMMENDATIONS

Based on analysis of CRIS data (2013-14 to 2017-18) and discussions with stakeholders, TERI has broadly classified the recommendations based on whether they address the issues pertaining to IR operations, IR infrastructure or IR policy. The recommendations to address the issues identified have been included along with each highlighted issue. Other independent recommendations have been included at the end of this section.

Policy-related Issues

The policy issues have been broadly classified as issues in competition in container freight operation and issues in marketing or commercial services by IR.

Regulation of Competition

As was indicated in the policy review, CONCOR is an incumbent in the market of Container Train Operators (CTOs). Most of the currently built ICDs are owned and managed by CONCOR. The stakeholders interviewed expressed that CONCOR can undercut prices owing to the wider operation levels and compensate the losses in non-competitive routes. Although it is true that CONCOR moved 62% of the total TEU-KM carried by railways (2017-18), this study did not find any evidence of such predatory pricing by CONCOR. The problems identified with respect to maintaining a 'level playing field' are not new to an infrastructure-intensive field which has just opened for private participation (NITI Aayog, 2018). However, new entrants in such a capital-intensive transportation segment need access to key infrastructure which is owned by the incumbent. The market share of the new CTOs has consistently increased in the period under this study. The CTOs, other than CONCOR, moved 31% of the total traffic in 2013-14 which became 38% in 2017-18. Even though the traffic carried by CONCOR, in terms of TEU-KM, increased from 2015-16 to 2017-18 and the market share of CONCOR declined from 68% to 62% in the same period. This is a promising trend for ensuring competitiveness in the container rail movement in India.

To assess the level of competitiveness on IR, the traffic volumes were compared in OD Zones with the number of CTOs operating in the same OD. Table 28 has been colour scaled from high to low as green-yellow-red. The variation in the scales of volume and number of CTOs may be considered as a faint indicator of competition. Similar to the traffic volumes, the CTOs are also concentrated mainly on the western corridor (WR-NWR-NR). However, there are OD zonal pairs, such as SR-SW and NW-NC where considerable amount of traffic is being moved but CONCOR is the only CTO operating on the respective routes.

It is observed from the CRIS data that CONCOR's market share in terms of TEU-KM has declined in the period considered in this study from 69% in 2013-14 to 62% in 2017-18. It is to be noted that the share is measured in terms of TEU-km, while share based on tonnage could

Table 28: Zonal OD wise traffic and CTO operations

OD ZONES ↓	Sum of TEU	Percentage of Total TEUs	Number of CTOs operating in 2017-18
Grand Total	**28,31,874**	**100%**	**15**
WR-NR	3,61,276	13%	11
NR-WR	2,16,024	8%	12
CR-CR	1,53,270	5%	8
NW-NR	1,47,107	5%	8
NW-WR	1,33,697	5%	7
CR-WR	1,05,519	4%	5

Table 28: Zonal OD wise traffic and CTO operations

OD ZONES ↓	Sum of TEU	Percentage of Total TEUs	Number of CTOs operating in 2017-18
Grand Total	**28,31,874**	**100%**	**15**
CR-NR	90,491	3%	9
SR-SW	67,878	2%	1
CR-NC	61,646	2%	5
NR-NR	61,350	2%	8
WR-NC	56,572	2%	2
NW-NC	48,811	2%	1
ER-EC	42,138	1%	1
SW-SR	38,926	1%	1
ECO-ECO	38,154	1%	2
WC-CR	26,448	1%	3
CR-WC	15,840	1%	1
SR-SR	11,388	0%	1
SW-SC	10,679	0%	1
NC-NC	8,591	0%	1
WC-WR	8,175	0%	1
SEC-ECO	7,355	0%	1
ECO-KPT	6,729	0%	2
CR-NW	5,099	0%	1
SC-SC	4,872	0%	1
ECO-EC	4,658	0%	1
ECO-SE	3,884	0%	2
SEC-KPT	2,240	0%	1
NW-NE	2,208	0%	1
NF-ER	2,029	0%	1
EC-ER	2,027	0%	1
SE-EC	1,463	0%	1
NE-NW	1,241	0%	2
WC-KPT	1,160	0%	1
ECO-SEC	880	0%	1
NR-NE	718	0%	2
CR-SEC	584	0%	1
NC-WC	551	0%	1
NR-SE	528	0%	1
NC-NE	449	0%	1
NE-NR	227	0%	1
NR-SC	192	0%	1
NR-SW	160	0%	1

Table 28: Zonal OD wise traffic and CTO operations

OD ZONES ↓	Sum of TEU	Percentage of Total TEUs	Number of CTOs operating in 2017-18
Grand Total	**28,31,874**	**100%**	**15**
WR-SW	140	0%	1
ER-ER	118	0%	1
NE-CR	90	0%	1
ER-KPT	88	0%	1
CR-NE	75	0%	1
NR-ER	70	0%	1
NC-NR	48	0%	1
SR-CR	36	0%	1
SE-NF	30	0%	1
ER-NR	4	0%	1
CR-NF	2	0%	1

KPT: Calcutta Port Trust; Source: TERI Analysis

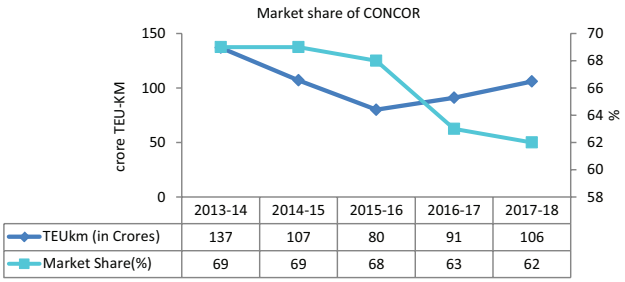


Figure 23: CONCOR Market Share and Performance (2013-14 to 2017-18)
Source: CRIS

indicate a higher share of CONCOR in total container moved by rail. There is a need to assess the competition levels in the container freight movement through IR.

Table 28 shows that market shares of the top 13 CTOs from 2013-14 to 2017-18. It is observed that a few big players in the market like Gujarat Pipavav Port Ltd (GRPL), Hind Terminals Private Ltd (HTPL), and Adani Logistics Ltd (ADIL) have increased their market share while the others are losing their market share.

The Losers

- The Central Warehousing Corporation (CWC) lost a considerable share of traffic from 2013-14 to 2017-18. Its traffic volume measured in terms of TEU-KM declined by 87% from 2013-14 to 2017-18.
- SICAL Multi-Modal and Rail Transport Ltd (SICAL) lost almost all of the traffic handled by it from 2013-14 to 2017-18, that is, approximately 100% decline in container operations.
- Fourcee Infrastructure Equipment Pvt. Ltd (FIEP) lost 97% of the traffic in the same period.
- KRIBHCO Infrastructure Ltd lost 77% of its traffic in terms of TEU-KM from 2013-14 to 2017-18.
- Arshiya Rail Infrastructure Ltd (ARIL) lost 50% of its traffic in the period.
- Container Rail Road Services Pvt. Ltd (CRRS) lost 30% of the EXIM container traffic handled by them in 2013-14.
- India Infrastructure Logistics Pvt. Ltd lost 15% of its traffic in the 5 years considered here.
- Finally, CONCOR also lost 22% of it EXIM container traffic measured in terms of TEU-KM in the period 2013-14 to 2017-18.

The Gainers

There are five CTOs who have gained traffic volumes and market share in the period considered in this study.

- Boxtrans Logistics (BXTS) is the biggest gainer by increasing its traffic handling from 2013-14 to 2017-18 by 579% when measured in terms of TEU-KM.

Table 29: Change in Market Share of CTOs between 2013-14 and 2017-18 (in TEU-km)

Operator	Code	2013-14	2014-15	2015-16	2016-17	2017-18
CONCOR	CONR	69%	69%	68%	63%	62%
Gujarat Pipavav Port Ltd.	GRPL	7%	10%	11%	13%	12%
Hind Terminals Private Ltd.	HTPL	5%	7%	7%	8%	9%
Adani Logistics Ltd.	ADIL	2%	2%	2%	5%	5%
India Infrastructure Logistics Pvt. Ltd.	IIPL	4%	6%	5%	4%	4%
Boxtrans Logistics	BXTS	0%	0%	1%	3%	3%
Container Rail Road Services Pvt. Ltd.	CRRS	2%	3%	3%	2%	1%
Arshiya Rail Infrastructure Ltd.	ARIL	2%	0%	0%	1%	1%
Distribution Logistics Infrastructure Pvt. Ltd.	DLI	0%	0%	1%	1%	1%
KRIBHCO Infrastructure Ltd.	KRIL	1%	0%	0%	0%	0%
Central Warehousing Corporation	CWC	1%	1%	1%	0%	0%
Fourcee Infrastructure Equipment Pvt. Ltd.	FIEP	1%	0%	0%	0%	0%
Sical Multi-Modal and Rail Transport Ltd.	SCAL	2%	0%	0%	0%	0%

Note: CTOs highlighted in green are gainers while those highlighted in orange are losers;
Source: CRIS & TERI Analysis

- Adani Logistics Ltd (ADIL) increased its EXIM container traffic by 65% in the period 2013-14 to 2017-18.
- Hind Terminal Pvt. Ltd (HTPL) and Gujarat Pipavav Port Ltd gained 52% and 43%, respectively, of the traffic handled by them in 2013-14 (measured in terms of TEU-KM)
- Distribution Logistics Pvt. Ltd (DLI) started operations in EXIM container traffic only in 2014-15, but the traffic handled by them has been consistently increasing.

The basic analysis conducted using the FOIS data reveals that a few large players are emerging in the competitive market for container train operations. However, the fairness of the competition is undetermined in this study. To regulate the competitiveness so as to maximise to potential of rail operations and the share of railways in inland container movement in India, TERI recommends the establishment of an independent regulatory authority to monitor the same. It is also recommended that IR simplifies the stringent concession agreement provisions which restrict the sharing or pooling of rakes and terminals amongst the CTOs.

Operational Issues

The operational issues in container traffic identified through this study include issues related to tariff charged by IR and issues related to transit time.

Tariff

Haulage charges constitute about 75% of the operating cost for CTOs. The same haulage charges have been increased over 10 times since the competition policy was finalised in 2006 in order to allow private CTOs.

In November 2014, an additional port congestion surcharge of 10% was levied on all import-laden containers from all ports. The same charge was discontinued by IR in April 2016 as it was restricting the rail movement of import traffic. Figure 24 maps the impact of the introduction and subsequent scrapping of port congestion charge by IR.

The increase in haulage charges is driving shipping lines to move away from the hinterland towards 'port-to-port'

Issues and recommendations highlighted by ACTO

During the course of the study, TERI sought inputs from the private container train operators. The recommendations from the CTOs have been listed below.

Suggestions related to domestic business

Restriction on commodities: It is suggested that Indian Railways restrict only coal and raw iron ore and allow all other commodities to be carried in containers.

Haulage charges: The container class rate (CCR) charged for heavy commodities like iron and steel, alumina, cement, stones, slag and petroleum products is almost double of normal haulage rate despite the fact that CTO's pay for empty haulage. It is also suggested that weight of the container be charged at freight all kind (FAK) haulage rate so that CTO's can carry some notified commodities.

Transit time: Light goods are generally more time sensitive and the chances of diversion of the same to road are higher. Till the time Indian Railways resolve this issue, it will be very difficult to capture light good/valuable consignments through rail containerization. The problem related to long time taken by container trains could be resolved through time-tabled operation of container trains simultaneously augmenting capacity of existing and developing new lines on congested route. DFC is expected to ease the issue of capacity constraint.

Access to terminals: Due to lack of terminals of private CTO's shipping lines and other customers have to depend on CONCOR for terminals.

- Allow access to CONCOR terminals built on Railway land to all CTO's
- Charge CONCOR land licensing as per railway policy (6% of market rate) to ensure level playing field
- Bring policy for development of good sheds on PPP model

Other recommendations: Some of the other key recommendations by the CTOs are as follows.

- Allow examination of trains after 7,500 km as compared to the present practice of 6,000 km
- Allow all CTO's to carry traffic for Bangladesh and Nepal, which is currently restricted to CONCOR

Suggestions related to EXIM business

Transit time: Movement from Ports (Mundra/Pipavav) to NCR and back takes 8-10 days thereby restricting number of trips in a month to 3 which has led to poor turnaround and affected the commercials of CTO's. It has also increased dwell time at ports. As discussed earlier, DFC is expected to resolve the issue of high transit time compared to road transport.

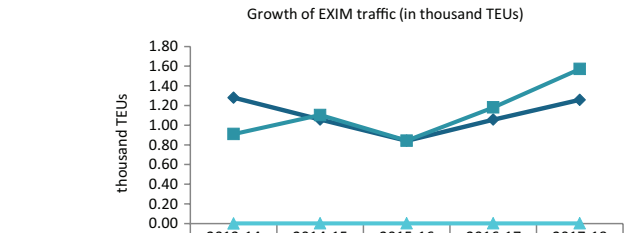
Imbalance in Exports and Imports at Ports: There is a huge imbalance in the export and import oriented container traffic at ports. For instance, imports in containers are more than twice of exports in containers at Mundra Port.

- *Export movement to Mundra in Trucks:*
    a) Over 500 truck-loads of rice in TEU's (on an average) per day go from Punjab, Haryana, etc. to Mundra port for export in containers
    b) Further, around 150-200 trucks of yarn go by road per day, again from the same region to Mundra for export
- *Import Containers Detained at Mundra:*

Average pendency of import containers awaiting clearance to the hinterland by rail ranges from 10,000 to 20,000 TEUs per day.

There is a need to balance traffic to the extent possible to reduce delay in clearance of imports. Increased rail movement of exports in containers will lead to greater availability of rakes of wagons to clear import containers. Efforts to balance traffic (Imports with Exports) by reduction in rail freight on rice exports (FAK rate reduction on heavy weight slabs to capture rice export traffic movement by rail in containers). Also, FAK reduction for export-oriented yarn movement to encourage its movement by rail.

Digital sharing of data between IT systems of service providers (Ice Gate & FOIS): Indian Railways have been insisting on the weighment of Import containers destined to hinterland by rail from the ports. This is difficult to achieve unless weighment details are digitally transfered from the Customs IT system (Ice Gate) to the Railways IT system (FOIS). The same information is shared between customs and CONCOR, the same is not shared with the CTOs. Hence the Imports, to be transported from the Ports onward to the hinterland, are subjected to 100% weighment at Pipavav Port (except for CONCOR containers), which takes significant time. Arrangement should be made to improve communication between customs and CTOs and Indian Railways could take a lead.



	2013-14	2014-15	2015-16	2016-17	2017-18
Heavy Cargo	1,280.07	1,057.73	841.99	1,056.46	1,257.60
Intermediate Cargo	910.54	1,103.43	843.42	1,180.09	1,571.69
Light Cargo	1.54	2.4	2.45	2.88	2.58

Figure 24: Possible effects of port congestion charges (from figure 9)

movement. In October 2018, IR further increased the haulage charges for containers by 5%[11]. While it may make economic sense to hike prices to improve services for the rising traffic in the Western corridor, it may not be rational to have uniform pricing on a non-uniform traffic distribution.

Further, 55% of the EXIM traffic in terms of TEUs either originates from or is destined to the Western Railway (WR) Zone. Similarly, Northern Railways is the origin or destination of 37% of the EXIM container traffic. Table 29 attempts to present the proportional inflow and outflow of EXIM containers of all the zones of Indian Railways.

It is clear that most of the traffic is concentrated in the WR and NR zones of IR. Table 30 shows the EXIM container traffic in 2017-18 amongst 16 Zones of Indian Railways.

- There 16 Railway Zones considered here and hence 256 ODs of Zones are possible.
- However, 179 (70%) of such possible Zonal OD pairs have a negligible (close to zero) percentage of total EXIM container traffic flowing through them.
- Even though the haulage charged by IR is uniform for its entire rail network. It is economically irrational to have uniform pricing for uneven traffic levels.

Additionally, it is witnessed that container traffic by rail over long distances is challenged by road transport. For instance, even though the distance between Mumbai area ports and Dadri is over 1,500 km, CONCOR is faces tough competition from road transport in moving lighter commodities like readymade garments[12].

Recommendations: IR could plan for designing of a dynamic pricing system to attract traffic on decongested rail lines; the potential for the same in highlighted in Table 31.

[11] *Haulage charges for empty containers and flats have been reduced by 25% in December 2018. However, the impact of the same is expected to be seen in the coming months.*

[12] *https://www.unescap.org/sites/default/files/Study%20on%20Planning%2C%20Development%20and%20Operation%20of%20Dry%20Ports%20of%20International%20Importance_26-02-2016.pdf*

Table 30: IR Zone wise proportional EXIM traffic in TEUs originating and ending (2017-18)

Zonal Railway		Originating	Ending	Both Originating and Ending	Either Originating or Ending
		(1)	(2)	(3)	(4=1+2-3)
WR	Western Railway	37%	25%	7%	55%
NR	Northern Railway	16%	23%	2%	37%
CR	Central Railway	17%	17%	5%	29%
NWR	North Western Railway	12%	16%	0%	28%
NCR	North Central Railway	6%	6%	0%	12%
SCR	South Central Railway	2%	3%	0%	4%
SWR	South Western Railway	2%	3%	0%	4%
SR	Southern Railway	3%	2%	0%	4%
ECOR	East Coast Railway	2%	2%	1%	2%
WCR	West Central Railway	1%	1%	0%	2%
ECR	East Central Railway	0%	2%	0%	2%
ER	Eastern Railway	2%	0%	0%	2%
NER	North Eastern Railway	0%	0%	0%	1%
SECR	South East Central Railway	0%	0%	0%	0%
SER	South Eastern Railway	0%	0%	0%	0%
NFR	North Frontier Railway	0%	0%	0%	0%

Source: CRIS

- More than 50% of the EXIM container traffic is moved in the western corridor, between Western Railway, North Western Railway, and Northern Railway. The Western DFC will decongest these routes.
- As there is negligible traffic on other routes, it is not rational to have uniform haulage charges throughout the IR network.
- Similar to different category licences issued to CTOs, the haulage charges must also vary to maximize the potential of railways in moving containers.

Recent reduction in haulage charges (December 2018) would benefit third party operators as CONCOR has already shared the price reduction benefit to its aggregators/clients. Going forward, IR should also look at a long-term plan to determine tariff rates taking into consideration the price charged by the road transporters, especially for intermediate and light goods.

Transit time

Indian Railways does not follow any fixed time table or schedule for most freight trains. Amongst the freight trains, container trains are not prioritised in any way with respect to transit time. The average speed of a container

Table 31: Percentage of Total EXIM Traffic in TEUs (2017-18)

DESTINATIONS→ ORIGINS ↓	CR	EC	ECO	ER	NC	NE	NF	NR	NW	SC	SE	SEC	SR	SW	WC	WR	Grand Total
CR	5%	0%	0%	0%	2%	0%	0%	3%	0%	2%	0%	0%	0%	0%	1%	4%	17%
EC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
ECO	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
ER	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
NC	3%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	2%	6%
NE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
NF	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
NR	3%	0%	0%	0%	0%	0%	0%	2%	3%	0%	0%	0%	0%	0%	0%	8%	16%
NW	0%	0%	0%	0%	2%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	5%	12%
SC	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
SE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SEC	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
SR	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%
SW	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	2%
WC	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%
WR	3%	0%	0%	0%	2%	0%	0%	13%	11%	0%	0%	0%	0%	0%	0%	7%	37%
Grand Total	17%	2%	2%	0%	6%	0%	0%	23%	16%	3%	0%	0%	2%	3%	1%	25%	100%

Source: CRIS

Table 32: Cost incurred in transporting containers through rail vis-a-vis road transport

Stream	Exports and Imports Cost (in Rs per TEU)			% variation (rail over road)
	Size	Rail	Road	
Ludhiana-Mundra	20′	30,791	22,500	37%
	40′	46,186	45,000	3%
Palwal-Mundra	20′	27,569	19,000	45%
	40′	41,435	38,000	9%
Sonepat-Mundra	20′	27,569	20,000	38%
	40′	41,435	40,000	4%
Sonepat-Pipavav	20′	29,647	22,000	35%
	40′	44,462	44,000	1%
Patli-Mundra	20′	25,421	18,000	41%
	40′	38,268	36,000	6%

Note: The costs related to road transport are average and subject to variation on account of various factors, including diesel prices, availability of trucks, etc.

Source: Industry sources

Table 33: Transit time comparison between road and rail on key ODs (in days)

Stream	Exports		Stream	Imports	
	Rail	Road		Rail	Road
Ludhiana-Mundra	3.2	2.8	Mundra-Ludhiana	3.2	2.8
Palwal-Mundra	2.9	2.3	Mundra-Palwal	2.8	2.3
Sonepat-Mundra	2.8	2.6	Mundra-Sonepat	3.1	2.6
Sonepat-Pipavav	3.2	2.8	Pipavav-Sonepat	3.3	2.8
Patli-Mundra	2.1	2	Mundra-Patli	4.7	2

Source: Industry sources

train is as lower than 25 km per hour. High turnaround time and longer lead time emerge to be major issues. With the coming of the Goods and Services Tax (GST) regime, the transit time by trucks has significantly improved. As IR does not ensure transit time, the transit time assurances made by the CTOs to their clients are often not met. Even though IR introduced Assured Transit Time (ATT) scheme in December 2009, the execution of the same was questioned by most stakeholders. However, with coming of the Eastern and Western Dedicated Freight Corridors (DFC), transit time is expected to improve significantly.

Recommendations: TERI recommends IR to introduce scheduled freight trains on key routes and undertake rational prioritisation of the containers and other commodities identified as containerised freight by IR. Benchmarking of its activities should be done with the road transportation as well so as to overcome the challenge of higher transit time and competition faced by IR.

Infrastructural Issues

Several infrastructural issues came up during TERI's discussions with stakeholders and railway professionals. A broad classification of these issues has been conducted for the purpose of this report—access to terminals, management of empty containers, and issues concerning last mile connectivity. Other than these, certain irrational restrictions on containerised commodities and terminals were also expressed as significant issues by many stakeholders.

Access to Terminals

CONCOR is the market leader with 81 ICDs/CFSs spread throughout the country . Other CTOs are charged by CONCOR for usage of the infrastructure. Private CTOs indicate that the incumbent has an undue advantage in the absence of independent regulator.

Empty Container Flows

Eight zonal railways of IR have higher incoming traffic of containers than outgoing traffic. Except South Eastern Railway, none of these eight zones have port connectivity. The highest deficit is in the Northern Railway with 209,070 TEUs of EXIM containers which enter the zone through rail but exit the zone through other modes. As indicated from the analysis in this study, Northern Railway is a major consumption zone and the traffic is mainly import traffic from the western coast. Even if there is no corresponding traffic of goods moving out of the zone, the empty containers have to be moved to locations where the demand exists. As has been observed from the literature review and interaction with stakeholders, export traffic moving towards the ports by road are usually containerised only at the ports due to lower loading costs at the port. This may mean that the cargo and the empty containers might be moving towards the ports separately by road. There is a huge potential that such empty container flows could be captured by IR so as to reduce the corresponding carbon emissions on road.

[13] *http://www.concorindia.com/map.asp*

Table 34: Incoming and Outgoing Zonal EXIM container traffic (TEUs)

Zones		Incoming TEUs	Outgoing TEUs	(Incoming - Outgoing)
		(1)	(2)	(3) = (1) -(2)
Northern Railway	NR	6,61,223	4,52,153	2,09,070
North Western Railway	NW	4,58,019	3,37,660	1,20,359
East Central Railway	EC	48,258	2,747	45,511
South Western Railway	SW	74,481	49,605	24,877
South Central Railway	SC	73,055	58,518	14,538
North Central Railway	NC	1,76,342	1,68,051	8,291
South Eastern Railway	SE	5,656	1,891	3,765
North Eastern Railway	NE	7,470	7,111	359

Source: CRIS

Recommendations: The issue has been resolved when the Indian Railways granted 25% discount on the extant haulage charge applicable for empty containers and empty flat wagons in December 2018[14]. Further, TERI also recommends FOIS database management by CRIS to map the empty container flows in India. The FOIS data could be effectively used by CTOs to source and optimise usage of empty containers.

Inter-modal coordination for last mile connectivity

It is crucial to improve the coordination of IR with the shipping and trucking industry in order to promote container traffic on railways. It was expressed by the shippers that transfer of containers (or the goods within) from rail to road for the last mile connectivity often leads to a considerable loss in transit time.

Rail–Port connectivity

As has been highlighted by the earlier data analysis, only 18%–20% of the total container traffic handled by Mundra and JNPT ports are moved by rail. With the introduction of the Direct Port Delivery (DPD) scheme, it is mandated to decongest ports of import containers within 24 hours of their arrival. This has impacted the flow of container traffic to port side CFSs and has in turn impacted adversely the rail movement of import containers.

Coordination with trucking companies

Rail is the cheaper mode for long-distance movement of heavy, intermediate or light cargo. However, shippers still opt for trucks due to transit time losses on account of poor trucking coordination at the destination or origin CFS/ICD.

Recommendations: Improving the linkage from ICD to the factory through partnerships with trucking companies will help manage most cargo movement across long distances.

[14] *http://www.indianrailways.gov.in/railwayboard/uploads/directorate/traffic_comm/Rates_Master_Circulars/2018/Corri_2_RC_20_20180001.pdf*

Issues in Freight Marketing and Commercial Services

Lack of Streamlined Procedures

TERI's discussions with the industry stakeholders brought forward that there are no streamlined procedures for changes in stabling charges, hub and spoke policies, weightment and haulage charges for containers. In fact, Arshiya Rail Infrastructure Ltd (ARIL) and KRIBHCO Infrastructure Ltd even filed a case with the Competition Commission of India (CCI) against the MoR and CONCOR for arbitrary changes in stabling charges in violation of the competition policy to establish dominance . Meanwhile, the case was closed after detailed discussion among the involved parties.

Issues in Container Logistics Services

- Improving containerisation services at Inland Container Depots and (inland) Private Freight Terminals.

It was highlighted in the data analysis that the import traffic carried by IR is significantly more than the export traffic carried by IR. Through discussions with other stakeholders and literature review, it was also found that containerisation of export cargo is cheaper at the ports due to economies of scale. Hence it is likely that the export cargo is carried by truck to the port and containerised there, in contrast to import cargo which is already arriving in containers. Therefore, TERI recommends IR to facilitate improvement of container handling at the ICDs/PFTs so as to attract the export traffic to railways – probably through rate incentives, faster approval process in conjunction with the customs department, better infrastructure not only within ICD/PFT but also around the terminals for faster evacuation/entry, etc.

- Specialised services for commodities that could be aggregated over a train load

Commodities compatible to be carried in containers which could be aggregated over a train load for origin-destination pairs must be identified based on industry flows and existing FOIS data. Such commodities may be offered specialised rates, guaranteed transit or other such freight marketing services for promoting rail usage. This report suggests automobile and textile as two industries where commodities could be aggregated over a train load for OD pairs.

- Improving efficiency in operations

The railways board may strategize capturing empty container flows, especially the return containers from major consumption points in Northern India like Kathuwas, Tughlakabad, and Ludhiana. As it is highlighted in the OD analysis in this report, there is a huge deficit in the number of outgoing containers over the number of incoming containers to these terminal stations. Capturing the same may increase the payload to fare ratio of flat wagons for containers operated by railways.

Other Recommendations

Tapping the Potential of Domestic Container Movement

As per CRIS data, 92% of the domestic traffic moved by IR is heavy cargo. Light cargo movement through rail is negligible. As per FOIS data, only 45.8 TEUs of light cargo (less than 4 tonnes per TEU) was moved in 2017-18 by IR. There was no movement of light cargo for distances greater than 1,000 km. Most electronic consumer goods fall in the light goods category. There is wide scope for IR to capture the long lead traffic of light goods. TERI recommends further analysis into this for identifying specific commodities.

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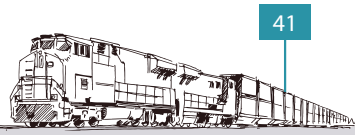


ANNEXURE 1

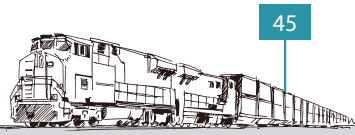
Station codes of container handling centres

Station Code	Details
ACDA	AJNI CONTAINER DEPOT
ALIK	ADANI LOGISTICS LTD-ICD
ALUM	THE RAMCO CEMENTS LTD SDG BY ALU
ARIK	ARSHIYA RAIL INFRASTRUCTURE LTD. (ARIL) ICD SDG
ASGN	AARTI STEELS LTD SDG
BAT	BATALA JN.
BBN	BARBIL
BGKT	BHAGAT KI KOTHI
BIZ	BAIHATA
BMSB	BHIMASAR
BNGD	M/S BOISAR NEW GOODS SHED
BPRD	BARPETA ROAD
BRGW	BARGAWAN
C	KIDDERPORE DOCKS
CBKB	ICD SIDING AT BGKT
CCJS	PFT OF CONCOR
CCMP	CONCOR SIDING.MANDIDEEP
CCPP	M/S CONCOR PRIVATE SIDING
CCTA	CONCOR CONTAINER TERMINAL ANKLESHWAR
CCTB	CONCOR CONTAINER TERMINAL SIDING VADODRA YARD
CEDC	COSSIPORE CONTAINER RAIL TERMINAL
CFCV	CONTAINER FREIGHT STATION (CFS)
CGDM	CONCOR SIDING GANDHIDHAM
CGPT	M/S CONCOR GREEN FIELD PFT
CHD	CHANDIA ROAD
CHIC	PORT SIDE CONTAINER TERMINAL AT HOM
CKYR	CONCOR SIDING KHODIYAR
CMCK	ICD CONCOR MULTIMODAL CONTAINER TERMINAL SRV KLH
CMCN	DOMESTIC CONTAINER TERMINAL SIDING OF M/S.CONCOR NAGALAPALLE
CMCT	M/S CONTINENTAL MULTIMODAL TERMINALS LTD.
CMLK	M/S GREENFIELD PFT OF CONCOR NEEMRANA SERVED BY KATHUWAS
CNCP	CONCOR'S PORT SIDE CONTAINER TERMINAL AT PARADEEP PORT

Station Code	Details
CNGT	GUNTUR JN. CONCOR SIDING
CP	CHITPUR
CPIB	CONCOR PVT. SDG OF M/S CONCOR
CRCC	CHINCHWAD CONTAINER DEPOT
CRNM	CONTAINER DEPOT NEW MULUND
CRTK	TURBHE CONTAINER DEPOT
CSRP	CONCOR SIDING
CSRR	CONCOR DEPOT SIDING RAVTHA ROAD
CSTN	SANAT NAGAR CONCOR SIDING
CTCS	CONCOR TERMINALS , SHALIMAR
CTCT	CONCOR TERMINALS AT TATANAGAR
CTDI	BROWNFIELD PFT OF CONCOR TERMINAL DURGAPUR
CTKR	CONCOR TERMINAL KOPT COAL DOCK ROAD
CWCJ	M/S. CONTINENTAL WAREHOUSING CORPORATION (NHAVA SEVA) LTD.
CWCN	CENTRAL WARE HOUSING CORPORATION, NOLI
DCCS	DAULATABAD CONCOR SIDING
DICD	INLAND CONTAINER DEPOT DHANDARI KALAN
DLIB	M/S DISTRIBUTION LOGISTICS INFRASTRUCTURE PVT.LTD.
DRTA	DRONAGIRI RAIL TERMINAL
DSO	DESHNOK
FCON	CONTAINER SIDING FATUHA
FSL	FOOD SPECIALITIES LTD, MOGA
GDGH	GATEWAY DISTRIPARKS LTD GARHI HARSARU
GFCJ	GREENFIELD PFT OF M/S CONCOR AT JSG
GFPA	M/S.PUNJAB LOGISTICS INFRASTRUCTURE LTD.
GISN	GRASIM INDUSTRIES LTD SDG, NAGDA
GRFV	M/S GATEWAY RAIL FREIGHT LIMITED SERVED BY VIRAMGAM
GTS	GHATSILA
HACG	HINDALCO INDUSTRIES LTD.
HDCG	HALDIA DOCK COMPLEX AND GENERAL
HIMB	HINDALCO INDUSTRIES LTD. (MAHAN ALUMINIUM SMELTER)
HMH	HANUMANGARH JN.
HMY	HARMUTI
HSA	HASIMARA
HTPP	M/S HIND TERMINAL PVT LTD
HTSD	HIND TERMINALS PVT LTD
HZL	HINDUSTAN ZINC SDG, CHANDERIYA
IAGR	ICD SIDING ASAOTI
IBBM	M/S INTRENATIONAL CARGO TERMINALS AND RAIL INFRASTR.PVT.LTD.
ICAK	M/S ADANI LOGISTIC LTD

Station Code	Details
ICB	IOC SIDING BAHAULI
ICBD	BHUSAVAL ICD CONTAINER DEPOT
ICDA	INLAND CONTAINER DEPOT
ICDD	INLAND CONTAINER DEPOT, DADRI
ICDG	INLAND CONTAINER DEPOT AT JUHI/KANPUR
ICDK	ICD KANAKPURA SIDING
ICDM	INLAND CONTAINER DEPOT,MALANPUR
ICDP	INLAND CONTAINER DEPOT AT DHAPPAR
ICDS	INLAND CONTAINER DEPOT SIDING SABARMATI
ICDT	INLAND CONTAINER DEPOT AT CHENNAI TONDIARPET
ICDW	INLAND CONTAINER DEPOT SERVED BY SGWF
ICDY	INLAND CONTAINER DEPOT AT YAMUNA BRIDGE
ICMB	INLAND CONTAINER DEPOT AT MORADABAD
ICOD	INLAND CONTAINER DEPOT
ICPH	INLAND CONTAINER DEPOT PHILLAUR
IDBR	ICD BIRGANJ
IGCS	INLAND CONTAINER DEPOT AT CHENNAI IRUGUR
IRLS	KHARIYA KHANGAR CEMENT SIDING
ISNL	INNOVATIVE B2B LOGISTIC SOLUTION LTD.
JNPT	JAWAHAR LAL NEHRU PORT
JSLS	PFT OF M/S JINDAL STAINLESS LIMITED
JSWV	M/S JSW STEEL COATED PRODUCTS LTD.
KIFH	M/S KASHIPUR INFRASTRUCTURE AND FREIGHT TERMINAL PVT.LTD SDG
KIIP	M/S KRIBHCO INFRASTRUCTURE LIMITED ICD SERVED BY PALI
KKPS	DALMIAPURAM CEMENT SDG, KALLAKKUDI-PALANGANATHAM
KPRK	KANDLA PORT DOCK RAIL TERMINAL
KTIG	TISCO SIDING, KALAMBOLI EXCHANGE YARD
KXG	KHARIA KHANGAR
LNN	LONAND
MAAL	PRIVATE SIDING OF M/S HINDALCO INDU. LTD.(ADITYA ALUMINIUM)
MATP	ASSOCIATED CONTAINER TERMINAL LTD.(ACTL) SIDING
MAVB	PRIVATE SIDING OF M/S VEDANTA LIMITED
MDCC	MUNDRA PORT CARGO COMPLEX
MGPV	M/S GANGAVARAM PORT LTD.
MHPL	M/S HASTI PETRO CHEMICAL & SHIPPING LTD AT SANAND
MHZR	M/S HINDUSTAN ZINC LTD SIDING
MILK	M/S CENTRAL WAREHOUSING CORPORATION
MJCG	M/S J.K. CEMENT WORKS LTD. SDG.
MJOG	JUBILANT LIFE SCIENCES LIMITED
MKIG	M/S KRIBHCO INFRASTRUCTURE LTD SIDING SERVED BY GOTHANGAON

Station Code	Details
MKPP	M/S KANPUR LOGISTICS PARK PRIVATE LIMITED
MLSW	M/S UTTAM VALUE STEEL INDUSTRIES LTD.
MPIB	M/S PRISTINE MAGADH INFRASTRUCTURE PRIVATE LIMITED
MRB	MUNIRABAD
MRCJ	M/S.RAMCO CEMENTS LTD SDG SERVED BY JAGGAYAPET TOWN RLY STN
MRWN	RAJASTAN SPINNING AND WEAVING MILLS SIDING
MVI	MORBI
NAC	NAWA CITY
NKKH	NIMPURA GOOD SHED COMPLEX
NNL	NARNAUL
NTSJ	M/S NAVKAR TERMINAL LIMITED AT TUMB
PAPK	M/S. ADHUNIK ALLOYS AND OWER LTD. SERVED BY KANDRA STN
PCWD	M/S.CONTINENTAL WAREHOUSING CORPORATION (NHAVA SEVA) LTD.
PDCR	M/S DOMESTIC CONTAINER TERMINAL(CONCOR)
PDLL	M/S ADDANI LOGISTIC, PATLI
PGFS	M/S GATEWAY RAIL FREIGHT LTD SDNG
PKPK	MS Krishnapatnam Port Company LTD,Siding
PLPC	M/S PRISTINE MEGA LOGISTICS PARK PVT. LTD. (PFT)
PMKM	M/S KRIBHCO INFRASTRUCTURE LTD.
PMSB	M/S MONET ISPAT AND ENERGY LTD. SDG
PNCS	M/S NAVKAR CORP. LTD
PPSP	PIPAVAV PORT SDG.
PRTK	RELIANCE RAIL TERMINAL,KANALUS
PSPG	M/S. J K PAPER LIMITED
RICD	INLAND CONTAINER DEPOT SIDING RATLAM
RK	ROORKEE
ROU	RAURKELA JN.
SCIC	M/S SIDCUL CONCOR INFRA COMPANY LTD. PFT SIDING
SCLS	M/S SHIV CARRIERS ROADWAYS PVT LTD
SICD	SALEM MARKET-CONTAINER RAIL TERMINAL
SLH	SILIARI
TICD	INLAND CONTAINER DEPOT TUGLAKABAD
TMGP	TATA METALIKS LTD
TPSK	M/S BHARAT ALLUNINIUM CO. LTD, KORBA
TSIM	TATA SPONGE IRON LTD.
TSLJ	M/S PRIVATE SIDING OF M/S TATA STEEL LIMITED
TWS	TISCO WORKS SITE, TATANAGAR JN.
VEN	VERNA
VPDP	INTERNATIONAL CONTAINER TRANSHIPMENT TERMINAL SIDING
VZP	VISHAKHAPATNAM-PORT



ANNEXURE 2

Terminals owned and operated by CONCOR

CONCOR's region	Exim terminals (14)	Mixed EXIM+Domestic terminals (36)	Domestic terminals (23)	Strategic tie-ups (8)	No. of terminals (Oct 2018)
CENTRAL (Services are available in Maharashtra , Chhattisgarh & MP)	-	1. Daulatabad (Aurangabad)	1. Mihan - Nagpur***(MMLP)		7
		2. Nagpur	2. Naya Raipur***(MMLP)		
		3. Raipur			
		4. Mandideep (Bhopal)			
		5. Bhusawal			
EASTERN(Services are available in West Bengal, Bihar, Odisha, Jharkhand, Chhattisgarh & North Eastern states)	1. Paradip Port (PSCT)	6. Majerhat (Kolkata)	3. Fatuha (Patna)		12
		7. Balasore	4. Shalimar (Kolkata)		
		8. Tatanagar (Jamshedpur)	5. Durgapur***		
		9. Amingaon (Guwahati)	6. Rourkela		
			7. Haldia		
			8. Jharsuguda ***(MMLP)		
			9. Bodhjungnagar		
NORTHERN (Services are available in Delhi , UP, Haryana, Punjab , Rajasthan, Himachal Pradesh)	2. Tughlakabad (Delhi)	10. Moradabad	10. Okhla (Delhi)	1. Diwana	19
	3. Babarpur (Panipat)	11. Rewari	11. Phillaur (Ludhiana)	2. Pali	
	4. Dhandharikalan (Ludhiana)	12. Kanakpura (Jaipur)	12. Khemli (Udaipur)	3. Dhappar	
		13. Bhagat ki Kothi (Jodhpur)	13. Suranassi		
		14. Ballabhgarh	14. Dhappar		
		15. Baddi	15. Ahmedgarh - JVC-PLIL ***(MMLP)		
		16. Kathuwas (Neemrana)***(MMLP)			

CONCOR's region	Exim terminals (14)	Mixed EXIM+Domestic terminals (36)	Domestic terminals (23)	Strategic tie-ups (8)	No. of terminals (Oct 2018)
NORTH CENTRAL (Services are available in U.P, Uttarakhand, M.P. & Rajasthan)	-	17. Dadri (Greater Noida)	-	4. Modi Nagar	8
		18. Pantnagar - JVC-SCICL***(MMLP)			
		19. Malanpur (Gwalior)			
		20. Agra East Bank (Agra)			
		21. Kanpur			
		22. Ravtha Road (Kota)			
		23. Madho Singh (Varanasi)			
NORTH WESTERN (Services are available in Gujarat, Diu)	5. Khodiyar (Ahmedabad)	24. Vadodara	16. Sabarmati (Ahmedabad)	5. Jakhwada	10
	6. Chhanni (Vadodara)	25. Gandhidham	17. Varnama ***(MMLP)	6. Hazira	
		26. Ankleshwar		7. Sukhpur (PFT)	
SOUTHERN (Services are available in Tamilnadu, Karnataka & Kerala)	7. Milavattan (Tuticorin)	27. Whitefield (Bengaluru)	-	-	8
	8. Tiruppur	28. Irugur (Coimbatore)			
	9. Harbour of Madras (Chennai)	29. Tondiarpet (Chennai)			
		30. Vallarpadam			
		31. New Mangalore Port (NMPT)			
SOUTH CENTRAL (Services are available in Andhra Pradesh, Karnataka & Telangana)	10. Vishakhapatnam (MMLPV)***	32. Sanathnagar (Hyderabad)	18. Nagulapally (Hyderabad) ***(MMLP)	8. Thimmapur	8
	11. Krishnapatnam (K-1)	33. Vishakhapatnam-CFCV	19. Guntur		
		34. Desur (Belgam)			
WESTERN (Services are available in MP, Maharashtra & Goa)	12. New Mulund (Mumbai)	35. Chinchwad (Pune)	20. Turbhe (Mumbai)		9
	13. Pithampur (Indore)	36. Dronagiri Node (Mumbai)	21. Miraj		
	14. Ratlam		22. Tihi***(MMLP)		
			23. Balli***		
Grand Total					81

Source: CONCOR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