FREIGHT LOGISTICS & INTERMODAL TRANSPORT

Implications for Competitiveness

Arvind Kumar

Working Paper 175

December 2014

ISID

Institute for Studies in Industrial Development
New Delhi

ISID
Working Paper
175

FREIGHT LOGISTICS AND INTERMODAL TRANSPORT
Implications for Competitiveness

Arvind Kumar

ISID
Institute for Studies in Industrial Development
4, Institutional Area, Vasant Kunj Phase II, New Delhi - 110 070
Phone: +91 11 2676 4600 / 2689 1111*; Fax:* +91 11 2612 2448
E-mail: info@isid.org.in; *Website:* http://isid.org.in

December 2014

ISID Working Papers are meant to disseminate the tentative results and findings obtained from the ongoing research activities at the Institute and to attract comments and suggestions which may kindly be addressed to the author(s).

CONTENTS

List of Box(s)

List of Figure(s)

List of Table(s)

FREIGHT LOGISTICS AND INTERMODAL TRANSPORT
Implications for Competitiveness

Arvind Kumar[*]

[***Abstract***: *India's placement behind many of its logistics comparators raises concerns on the state of preparedness of the country to provide the desirable logistics enabling environment to serve an economy which is expected to grow in the range of 8 per cent to 9 per cent over the medium term. Inadequate logistics infrastructure and supply chain procedures may become a serious bottleneck in preventing timely delivery of goods and general cargo to the main ports. The focus of this paper is to (a) look at the status of India's transport sector and logistics system and how it functions, and (b) offer recommendations on how to improve India's logistics system. The regional distribution of gains from reform is an important issue. Transport distances within India are considerable and without cost-effective transportation and logistics, the gains from trade could be distributed unevenly across different regions of India. For instance, goods produced in the Western or Southern regions of India destined for use/consumption in the Eastern or North East regions to be cost-effective could use transport combination of rail, road, inland waterways or coastal shipping. This would help reduce dependence on road transport. Lack of an integrated transport policy and skewed freight modal structure can penalize industrial products. The appropriation of FDI by a few States in the Western and Southern regions reflects to some extent high transport costs in other regions of the country. The different levels of infrastructure amongst the various regions are well recognized as a source of variation in regional performance. Transport efficiency is low. The cost of rail and coastal shipping in the country is higher than many economies. Even the road costs and transit time across different modes are high and unpredictable. Partly, it is because of the differing average speeds of movement across the various modes—Rail, Road, and Coastal Ships—are lower than those in more efficient economies. The other type of efficiencies arise due to high turnaround time of railway wagons/trucks ,pre berthing detention time, container/bulk handling rates of equipment at the ports, inadequate rail infrastructure.*

Logistic deficiencies must be tackled by policy makers in order to successfully move its industries up the value chain. Otherwise, with the dispersal of manufacturing activities into the interiors and further away from its seaports, India's already high logistics cost will

[*] (IES Retd), Former Senior Adviser (Transport Research), Ministry of Road Transport and Highways; and, Member, Tariff Authority for Major Ports, Ministry of Shipping. An earlier version of the paper was presented in the National Conference on 'India's Industrialization: How to overcome the Stagnation?' organised by the ISID, during December 19-21, 2013.

escalate further, putting the country at a competitive disadvantage. Logistics cost in India is comparatively high, and is estimated to be around 11 per cent of the national GDP and inventory holdings for organized manufacturing comprise around 18 per cent of the value added of the organized manufacturing. A reduction in logistics costs by even one percentage point will result in noteworthy savings annually. Besides, significant benefits can also be reaped through the multiplier effect of having a better logistics infrastructure, thus accelerating India's economic growth. Transport and logistics scene in the country reveals that despite substantial improvement of national highway network and addition to port capacity, the gap between India and East Asian countries in the domain of logistics efficiency persists which provides immense scope for improvement.

India's transport modal mix is heavily skewed towards road freight with all its attendant negative externalities. This provides ample scope for rebalancing the modal mix to cut logistics costs.

Defining and enforcing rules for multimodal transport operations which foster competition, promoting the standardization of equipment and electronic data inter-change formats, and establishing an effective conflict resolution mechanism would help promote multimodal transport. Important constraints impeding cost-effective transport options and reduced logistics costs include missing infrastructure and outdated inter-state check posts.

There are two main reasons why multimodal transport (MMT) needs to be a key element of any strategy in India. One, MMT impacts international competitiveness of goods exported and regional development within the country. In the backdrop of lower levels of import tariffs on manufactured goods in developed country markets, high transport costs have emerged as a sort of significant non-tariff barrier. Second, lower transport costs for many bulk cargoes can only be achieved by reducing the role of road transport through better use and combination of rail, inland waterways and/or coastal shipping.

This paper is a modest attempt at addressing a very complex problem. It does not aim at being exhaustive, which would be quite challenging in the backdrop of infinite regulations and the federal structure of the Indian economy. The main focus is to identify areas that have contributed towards many of the present problems and constraints which have distorted the modal mix in the transport sector, and to recommend options for addressing these constraints.]

1. Introduction

Movement of goods requires a "transport chain," which is a series of logistical activities that organizes modes and terminals, such as railway, maritime, and road transportation systems, for continuity along the supply chain. Transport terminal—port, rail or airport—is the key infrastructure where the physical flows are reconciled with the requirements of supply-chain management. They also facilitate movements of containers efficiently from ship to truck to rail. Facilities such as distribution centres often play a significant role in supply-chain management not when they act as more than buffers (warehousing), but as active elements in the physical flows. Freight terminals have become important trade and logistics platforms whose level of activity not only reflects the intensity of infrastructure

utilization, but also the logistical capabilities to support its operations. In the light of intense global competition, supply-chain efficiency remains one of the few strategies available to promote competitiveness. Global production networks are enhanced when supported by efficient logistics. Production networks need sufficient transport capacity as well as the ability to manage these flows to insure reliability and timeliness.

Freight logistics system is much more than merely transport infrastructure; it involves sub-sectoral transport operators and multimodal transport operators. A freight logistics system also consists of the following components: warehousing services, inland terminals, and intermodal transfer terminals that facilitate the transfer of freight from one mode to another. In addition, it involves government agencies such as customs and revenue, and other services which are in charge of verifying if all the documents required for exporting and importing complies with the law.

Freight logistics is the sourcing, purchasing, packaging, transport, storage and delivery of freight around India and the world. An efficient and effective freight logistics system is essential to the competitiveness of the national economy. It is a key to achieving economic and efficiency objectives. Logistics is a vital value-added service to the business community and an essential enabler of domestic and global trade. Efficient logistics services extend market reach by giving manufacturers access to a wider range of raw materials and supplies from different sources.

Logistics can be understood as the "process of planning, implementing, and controlling the efficient, cost effective flow and storage of raw materials, in-process inventory, finished goods and related information from point of origin to point of consumption for the purpose of meeting customer requirements"(US Council of Supply Chain Management Professionals, Council of Logistics Management). Freight logistics involves different physical and economic activities, which are more commonly categorized as: 1) Core Logistics Services: line-haul transport, pick-up and distribution, storage, loading/unloading, stuffing/stripping, load consolidation; 2) Value Adding Services: packaging, quality control, product testing/repair, assembly, installation, information and inventory control; and, 3) Support Services: equipment hiring/leasing, equipment maintenance, sanitary services, security services, trade insurance and finance. As such, logistics is one of the most important aspects for accessing markets, affecting both the volume and value of internationally traded goods. The focus of this paper is on transport infrastructure.

2. Logistics Cost, Structure and Freight Flows

Today, logistics costs are a more important component of total trade costs than tariff barriers. The gradual unilateral tariff reduction implemented in recent years by a large number of countries, together with free trade agreements, brought about an increase in the relative share of logistics costs in total trade costs. Both physical and regulatory or institutional shortcomings in the transport sector translate into high logistics and

transportation costs that constrain development and competitiveness of the economy. These costs often overshadow traditional trade barriers. This situation has at least two consequences: (a) it is detrimental to the participation of the country in world trade since it makes producers less competitive and pushes up the prices of traded goods; and, (b) it erodes the capacity to boost factor productivity.

> 'The purchasing power parity (PPP) adjusted benchmark of transportation costs by mode with the US shows that India's logistics infrastructure is inefficient. For instance, rail and coastal shipping costs in India are approximately 70 per cent higher than those in the US. Likewise, road costs in India are higher by about 30 per cent. This not only results in higher prices and lower competitiveness, but also hampers economic growth…..poor logistics infrastructure costs the economy an extra USD 45 billion or 4.3 per cent of GDP each year. Two-thirds of these costs are hidden i.e., not generally regarded as logistics costs. These hidden costs include theft and damage, higher inventory holding costs, facilitation and transaction costs.'[1]

Logistics Costs/GDP Ratio

This section examines India's logistics system against its global competitors. Three logistics measures are used for this comparison to rank India in comparison with other countries: a) Estimate of logistics costs as a proportion of GDP; b) the World Bank Logistics Performance Index; and, c) the World Bank Doing Business. The remainder of the section elaborates on the results of the four measures. A country's logistics cost to GDP ratio is a commonly used indicator to gauge country's logistic efficiency. Cross country comparisons based on this ratio hide differences in data included in the estimation of logistics costs as well as differences in methodology adopted in different countries. Logistics cost in India is comparatively high, and is estimated at 10.7 per cent of GDP in the year 2011–12 (*Table 1*), compared to other developed countries where the logistics cost is restricted to single digit percentage. In case of USA, logistics costs as a percentage of GDP were estimated at 8.3 per cent by the Council of Supply Chain Management Professionals (CSCMP); logistics cost as a proportion of GDP are estimated at much higher levels at 17.8 per cent for China in 2009 and 18.6 per cent for Thailand for the year 2008, but much lower for USA and Canada at 4.7 per cent, Europe 7.0 per cent (Rantasila and Ojala, p. 20, ITF, 2012). A reduction in logistics costs by even one percentage point will result in noteworthy savings annually. Nevertheless, high logistics costs GDP to ratio in India provide ample scope to improve logistics efficiency. Some of the factors responsible for high logistics costs in India are:

i) Resources are unevenly distributed and often located far from production/consumption centres, requiring long distance transportation of raw materials.

---

[1] *Building India: Transforming the Nation's Logistics Infrastructure*, McKinsey & Company, p. 13.

ii) At the present stage of industrial development, goods in India have a higher weight-value ratio, resulting in a higher transport cost relative to total product cost compared to other countries.

iii) Compared with other countries, India has a large share of rural population, which is geographically dispersed and more expensive to serve. This results in transport demand which is fragmented.

iv) Larger percentage of logistics cost in GDP for India compared to the developed countries can be explained by the different structure of the economy.[2] The developed countries, with much higher share in services sector as a percentage of GDP compared with India, generate far less freight movement. In addition, the average value of products manufactured in India is well below the corresponding values in the United States and Japan which are light weight and technology-intensive products. Thus, India's logistics costs constitute a larger share of GDP and consequently, a larger part of the delivery price of manufactured goods. India will need to move up the value chain, gradually reducing the ratio of transport to final prices and hence its logistics-to-GDP ratio.

Table 1. India: Structure of Logistics Sector in Terms of GDP

	1999–00	*2000–01*	*2005–06*	*2007–08*	*2008–09*	*2010–11*	*2011–12*
As percentage of GDP at Factor Cost							
Logistics (I+II+III)	7.4	7.8	8.7	9.1	9.5	10.5	10.7
I. Transport of which	5.7	5.8	6.7	6.7	6.6	6.5	6.6
a) Railways	1.1	1.1	1.0	1.0	1.0	1.0	1.0
b) Other Transport	4.6	4.7	5.7	5.7	5.6	5.5	5.6
II. Storage	0.1	0.1	0.1	0.1	0.1	0.1	0.1
III. Communication	1.6	1.9	1.9	2.4	2.8	3.9	4.0

Source: Based on National Accounts Statistics (various issues), Central Statistical Organization (CSO).

The report, *Connecting to Compete 2012: Trade Logistics in the Global Economy*, provides data on the Logistics Performance Index (LPI) and its six component indicators (*Table 2)*. The LPI measure of logistics efficiency is now widely recognized as vital for trade and growth. A country's ability to trade globally depends on its traders' access to global freight and logistics networks. And the efficiency of a country's supply chain (in cost, time, and reliability) depends on specific features of its domestic economy (logistics performance). Better overall logistics performance and trade facilitation are strongly associated with trade expansion, export diversification, attractiveness to foreign direct investment, and economic growth. The LPI provides an in-depth cross country assessment of the logistics gap among countries by drawing information from professional operators and users involved in the logistics sector. It uses a 5-point scale (1 for the lowest, 5 for the highest) which enables the

[2] Share of Services in GDP is 79 %,72% and 55% for USA, Japan and India respectively as per the Table 4.2, World Development Indicators 2012

Table 2. Logistics Performance Index(LPI): Scores

Country/(Overall Rank)	*LPI*	*Customs*	*Infrastructure*	*International Shipments*	*Logistics competence*	*Tracking & tracing*	*Timelines*
Singapore (1)	4.13	4.10 (1)	4.15 (2)	3.99 (2)	4.07 (6)	4.07 (6)	4.30 (1)
Germany (4)	4.03	3.87(6)	4.26(1)	3.67(11)	4.09(4)	4.05(7)	4.32(2)
USA(9)	3.93	3.67(13)	4.14(4)	3.56(17)	3.96(10)	4.11(3)	4.21(8)
France (12)	3.85	3.64(14)	3.96(14)	3.73(5)	3.82(14)	3.97(12)	4.02(23)
Australia(18)	3.73	3.60(16)	3.83(18)	3.40(28)	3.75(16)	3.79(19)	4.05(17)
S. Africa(23)	3.67	3.35(26)	3.79(19)	3.50 (20)	3.56(24)	3.83(16)	4.03(20)
China (26)	3.52	3.25(30)	3.61(26)	3.46(23)	3.47(28)	3.52(31)	3.80(30)
Malaysia (29)	3.49	3.28(29)	3.43(27)	3.40(26)	3.45(30)	3.54(28)	3.86(28)
Brazil(45)	3.13	2.51(78)	3.07(46)	3.12(41)	3.12(41)	3.42(33)	3.55(49)
India (46)	3.08	2.77 (52)	2.87(56)	2.98(54)	3.14(38)	3.09(54)	3.68(44)

Source: Connecting to Compete 2012 Trade Logistics in the Global Economy; Figures within parenthesis indicate Rank.

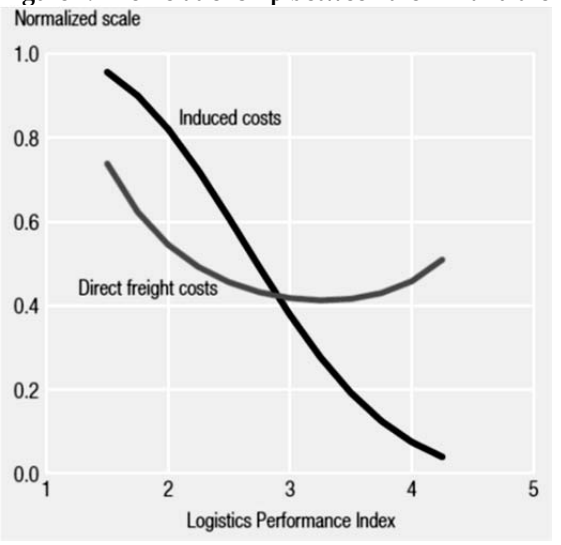
show of disparities as well as to benchmark against a country's competitors. LPI compares the trade logistics profiles of 155 countries and rates them on a scale of 1 (worst) to 5 (best). The LPI evaluates performance in terms of six parameters *viz.* customs procedures, infrastructure quality, ease and affordability of international shipments, domestic logistics industry competency, tracking and tracing, and timeliness in reaching the destination. India is ranked at the 46th position among a total of 155 countries, lagging behind its main competitors China, Malaysia, South Africa, Brazil Singapore, Australia, the United States and Germany. The Index reveals that on a global scale, for India, customs (including phytosanitary) performance, infrastructure, tracking and tracing and international shipments are perceived more as a problem than logistics competence and timeliness. In comparison with China, Brazil and South Africa as a whole, India performs below par.

There is a relationship between a country's LPI ranking and its level of logistics costs: countries with a low LPI score tend to have high costs. In particular, so-called induced costs (related to non-delivery or the avoidance of non-delivery and storage) tend to be low in countries with a high LPI score, and direct costs (freight and other shipment-related costs) tend to decrease until the LPI score reaches a value of around 3.3 (*Figure 1*).

The Cost of Trading Across Borders: According to the World Bank (Doing Business 2014), the cost of doing international trade, in terms of time, cost and documentation to export or import products, ranks India at 132nd position out of 189 countries (*Table 3*). In comparison, the overall rank for Singapore was 1, followed by Korea at 3, Malaysia at 5, Thailand at 24, Indonesia at 54, and China at 74, thus putting the East Asian competitors much ahead of India. India still has a long way to improve efficiency, as compared to the OECD and East Asian countries. Results indicate that the costs of exporting a container (TEU) are US $1170 for India and US $ 620 for China. It takes thrice as long for India to export as it does for Singapore, and five times as long as it takes Singapore to import goods. However, the time to export and import is better in India than in China, though the costs are considerably higher in India. However, there is still scope for improvement to be made on the cost

structure (as compared with OECD, Korea, Malaysia and China,). Specifically, the port handling charges (vessel related and cargo related tariffs) are much higher in India compared to her competitors in Asia. In conclusion, India's logistics system relative to the country's main competitors, for example China, Thailand, Korea, Malaysia and OECD countries, has generally been underperforming. The presently high levels of logistics costs could affect the competitiveness of the country, and particularly, products with high value added.

Figure 1. The Relationship between the LPI and the Level of Logistics Costs



Source: Arvis, Mustra, Panzer, Ojala and Naula 2007.

Table 3. Trading Across Borders

Region (Rank out of 189 countries)	*Export*			*Import*		
	Documents (Number)	*Time (Days)*	*Cost (US$ container)*	*Documents (Number)*	*Time (Days)*	*Cost (US$ container)*
OECD (31)	4	11	1070	4	10	1090
Singapore (1)	3	6	460	3	4	440
Korea (3)	3	8	670	3	7	695
Malaysia (5)	4	11	450	4	8	485
Thailand (24)	5	14	595	5	13	750
Indonesia (54)	4	17	615	8	23	660
China (74)	8	21	620	5	24	615
India (132)	9	16	1170	11	20	1250

Source: Doing Business Report, 2014, World Bank Figure within parenthesis indicates rank.

3. Market Conditions for Logistics Development

Market environment is not conducive towards growth of logistics and transport sector. First, market for logistics and transport operators is unorganised due to preponderance of

large number of small operators. Second, the framework of rules and regulations pertaining to logistics, different segments of logistics operations are under different Ministries/Departments. **Transport sector governance is fragmented due to the presence of too many players. For instance ,there are eight different Ministries looking after the key transport sectors, namelys Ministry of Shipping for Ports and Shipping, Ministry of Road Transport and Highways for Highway Development, Road transport and Road safety, Ministry of Civil Aviation looks after Airports and Airlines, Ministry of Rural Development looks after Rural Roads which form almost three-fourth of road network, Ministry of Urban Transport after Urban roads, Urban transport and Metro Rail, Ministry of Railways after all aspects of Railways, Ministry of Commerce looks after CFS/ICD, and Planning Commission which mainly looks after allocation of investment across all Ministries dealing with the transport sector. In this milieu coordination and inter-modality issues are relegated to the background. Further, it is hard to identify a nodal agency responsible for logistics.** Third, barriers to freight/truck movement across the States are subject to *en route* checks enforced by various state jurisdictions. Besides, movement of heavy vehicles in the urban areas is subject to restrictions in the interest of urban traffic management. These are in the nature of limiting the hours of freight carriers and closing access to urban areas during the day time. Fourth, effective use of operating strategies, such as hub and spoke network, drop and pull operations have yet to make their presence felt. Such systems are extensively used in the developed countries and support multimodal transport.

4. Structure of Logistic Service Providers

Only a small number of large, full-service logistics companies operate in India. They are multinational companies (e.g., APL, DHL, Maersk), together with a few privately owned companies. Large private logistics companies have succeeded in providing efficient services with minimal assets. Foreign logistics companies possess advanced logistics knowledge, strong operating capabilities, and leading information technology to provide customers with a one-stop service. Their market share is too small to drive the market.

Major state-owned logistics enterprises, such as CONCOR are well capitalized, well-staffed, and possess a network of Container Freight Stations (CFS)/Inland Container Depots (ICDs) which serve as intermodal transport and storage nodes. They also have good relations with all levels of government. Central Warehousing Corporation offers warehousing services but does not focus on high-end value-added logistics services. It is important for these enterprises to embrace the concept of modern logistics management and provide more supply chain management services.

The many small- and medium-sized logistics enterprises handle most of the logistics volume. They provide low-cost services to countless small- and medium-sized manufacturers. Small- and medium-sized logistics enterprises tend to be undercapitalized, with inadequate risk management capability and lack of modern technology as well as

information technology. The market has an abundance of domestic freight forwarders and truck brokers providing local warehousing, distribution, less-than-truckload transport, and express parcel service's operators. Owner operators providing low value added point to point transport services are also key players in the domestic logistics market. Their business model is "single good carrier" with minimal and inexpensive services. On the other side, the manufacturing landscape is dominated by small- to medium-sized firms. Due to their size and inadequate management capabilities these firms do not require a sophisticated logistics system and carrier selection is mainly driven by price. In such an environment, logistics providers focus on cost cutting and not on service quality. Therefore, advanced logistics management is not adopted on a large scale. *Box 1* provides a glimpse of various categories of logistics service providers.

Box 1. Categories of Logistic Service Providers

In recent decades there has been a profound change in the way companies organise their physical flow of goods, with the development of modern business logistics that integrate movements over distance (transport) and time (storage), from supply to distribution. The process of change in the organisation of physical flow of goods began in the more developed economies, and has been extending gradually into the rest of the world. Until the 1980s, companies managed the transport of their inputs, distribution of final products, and storage systems in a relatively independent manner. In recent years, companies **began to integrate processes**, considering logistics to be the complete cycle of materials, documentation and information, from purchase to final delivery to the consumer, covering transport, storage, inventory management and packaging processes, and the administration and control of these flows. The transformation of logistics from in-house management to outsourcing and its evolution to higher levels is captured below.

1PL or "first party logistics": the client irregularly subcontracts a very limited number of transport tasks, the provider's assignment being limited to transport of goods from origin to destination;

2PL or "second party logistics": the service provider is in charge of operational activities, ranging from goods transport to warehousing but not of value added logistics; the client and its supplier may have a contractual relation;

3PL or "third party logistics": 2PL plus value added services covering the flow of goods and increasingly, of information; the client and its supplier do have a contractual relation in this case; and,

4PL or "fourth party logistics": 3PL plus design, control and management towards services integration, whose aim is to maximize the value generated in the logistics chain. The mission of the lead logistics provider, i.e. supply chain integrator, is to manage all or a considerable part of the logistics operations provided by specialized subcontractors under its control, for the account of its client who decides to outsource their integration.

Source: National Bank of Belgium (2012)

Logistics services comprise physical activities (e.g., transport, storage) as well as non-physical activities (e.g., supply chain design, selection of contractors, freightage negotiations). Transport system is the most important economic activity among the components of business logistics

systems. Around one-third to two-thirds of the expenses of enterprises' logistics costs are spent on transportation. The transportation cost includes the means of transportation, corridors, containers, pallets, terminals, labours, and time. Hence, it is important to comprehend transport system operation thoroughly. Transportation is central to the whole production procedure, from manufacturing to the delivery to the final consumer.

Integrated Transport and Logistics Services

Efficient logistics is an important determinant of a country's competitiveness. Efficient logistics do not just reduce costs of transport and transit time, but also decrease the costs of production. If logistics services are inefficient, firms are likely to maintain higher inventories at each stage of the production chain, requiring additional working capital (bigger warehouses to store larger inventories). Gaush and Kogan (2001) estimated that developing countries could reduce the unit cost of production by as much as 20 per cent by reducing inventory holdings by half. At the sectoral level, logistics is most important for the electronic, pharmaceutical, automotive, and fashion clothing sectors, where timeliness is important.

Many studies at the micro level have illustrated the effect of infrastructure on unit costs. For example, infrastructure levels and quality are strong determinants of inventory levels. The impact of inventory levels on firm unit costs and on country competitiveness and productivity is extraordinarily significant. First are the financial costs associated with inventories, and those can be quite high because the cost of capital in many developing countries including India is usually well above 15 per cent. Second are the other associated costs of inventories, such as taxes, insurance, obsolescence, and storage that can add a few percentage points. Given the high cost of capital, the impact of that quasi-dead capital—the value of those inventories on unit costs and productivity or competitiveness—is enormous. And a key determinant is not interest rates, as classical models predict, but poor infrastructure (roads and ports). Thus, infrastructure matters significantly for productivity or competitiveness and growth. In case of India, the level of inventory holdings for manufacturing sector, particularly registered manufacturing, are quite high (*Table 4*).

Table 4. Level of Inventory Holding in Manufacturing Sector

2004–05	*2005–06*	*2006–07*	*2007–08*	*2008–09*	*2009–10*	*2010–11*	*2011–12*
Inventory holdings in Manufacturing Sector as a per cent GDP in Manufacturing							
12.3	14.2	10.4	18.6	4.9	14.8	18.8	8.6
Inventory holdings in Manufacturing (R) Sector as a per cent GDP in Manufacturing (R)							
17.5	20.7	14.2	26.9	7.2	20.8	26.1	11.9
Inventory holdings in Manufacturing (UR) Sector as a per cent GDP in Manufacturing (UR)							
2.8	1.6	2.8	2.5	0.2	1.4	1.9	1.1
Real Annual Growth in GDP at factor cost							
7.1	9.5	9.6	9.3	6.7	8.6	9.3	6.2

Note: R: Registered/organized sector; UR: Unregistered or unorganized Ratios have been derived based on Statement No. 10—Gross value added by economic activity (2004–05 prices) and Statement No.20-Capital formation by industry of use (at 2004–05 prices).

Source: National Accounts Statistics 2013, CSO.

During the 8 years the average level of inventory holdings in organised manufacturing as a proportion of manufacturing (organised) value added has been around 18 per cent, which is more than twice for many of the developed countries.

5. Structure and Composition of Freight Flows

Total Transport System Study (TSS) conducted by Rail India Technical and Economic Services (RITES) [RITES-TSS] for Planning Commission for the year 2007–08, road freight transport was estimated at 706 billion tonne kilometres (BTKM). As a proportion of total transport sector freight flow at 1409 BTKM, share of road transport was about 50 per cent, rail 36 per cent, pipelines 7.5 per cent, coastal shipping 6 per cent, inland waterways 0.2 per cent, and airways 0.01 (*Table 5*). Rail market share has gradually declined over the years. Freight is a derived demand, therefore land planning decisions, such as permitted locations for industry and residences have a critical impact on freight activities and the routes used by trucks and trains. Any existing inefficiency is passed on through the supply chain and results in the loss of national competitiveness.

Table 5. Modal Split: Interregional Freight Flows (2007–08)

Mode	*Million Tonnes*	*BTKM*
Rail	768.72 (30.1)	508.10 (36.1)
Road	1558.87 (61.0)	706.16 (50.1)
Coastal Shipping	59.10 (2.3)	85.70 (6.1)
Airways	0.28 (0.01)	0.29 (0.01)
IWT	54.88 (2.2)	3.38 (0.2)
Pipelines	113.59 (4.4)	105.45 (7.5)
Total	2555.35 (100.0)	1409.08 (100.0)

Figure in parenthesis indicate percentage share; Average lead in KMs: Coastal Shipping: 1450; Airways 1027; Rail 661; Highways 453.

Source: TTS-RITES

Comparison of Domestic Freight Flows (Road, Rail and Water borne) for the year 2007–2008 with China reveal that China's gross national income (GNI) in purchasing power parity (PPP) terms was larger by a factor of 2.5 while the volume of domestic freight flow was almost four times higher. The higher volume of domestic freight flows in case of China reflects higher share of its industry in GDP at 47 per cent compared with India's at 26 per cent. As a proportion of total freight flows (rail, road and water borne), the share of rail, road and waterborne mode was 47 per cent, 22 per cent and 31 per cent respectively in the year 2007 (*Table 6*). However, share of road doubled to 49 per cent and that of rail fell to 28 per cent in China's total domestic freight flows in 2011. In case of India, share of rail, road and waterborne mode in total freight flows (rail, road and water borne) was 39 per cent, 54 per cent and 7 per cent respectively in 2007–08. The average lead distance for rail freight was 661 kms for India compared to 762 kms for China; average lead distance for road freight in China was much shorter at 67 kms in 2007 which increased to 182 kms in 2011. In deciding the optimal modal mix for domestic freight flows, the following factors need to be

Table 6. Modal Mix (BTKM): Rail, Road and Waterborne

	China	*USA*	*India*
GNI (PPP)	US $ 10,222	US $ 14,636	US $ 4,160
Year	2007	2007	2007-08
Rail	2380 (47%) *762KM*	1962(47%)*1469 Km*	508 (39%) *661KM*
Road	1136 (22%) *67KM*	1959 (47%) *NA*	706 (54%) *453 KM*
Waterborne	1560* (31%) *2231KM*	229 (6%) * *KM*	89# (7%) *1450KM*
Total	5076 (100%)	4150 (100%)	1303

Note: Figures within parenthesis indicate percentage share in the total freight flow (rail, road and water) of the respective mode; Figures in italics indicates average lead distance in KM for respective modes in carriage of freight;

Source: For China data is as per China Statistical Yearbook: 2012; * includes inland waterways and coastal; for India data as per the estimates of TSS-RITES Study:# includes inland and coastal; For USA Table I-58 National Transportation Statistics 2012,US Department of Transportation; TKM for USA derived by using the factor 1 Ton Mile=1.459972; * range 1,783 KM coastwise, internal water 703 Km GNI-Gross national income at purchasing power parity (PPP) basis

kept in view: (a) the evolution of transport modal shares in large size economies like China and the US; (b) likelihood of two dedicated freight corridors on the Eastern sector (for coal and steel) and Western sector (for container traffic) getting operationalized by the end of the 12th Five Year Plan; (c) shorter average lead distance for rail freight and much higher average lead for road freight in India in comparison with China provides ample scope for rebalancing the modal freight mix towards rail mode. Keeping in view the constraints on rail capacity and experience of countries like China and longer average lead distance and shorter average lead distance for road and rail respectively, a modal share of 45 per cent for Railways, 45 per cent for road and 10 per cent for water mode (inland plus coastal) in conveyance of domestic freight appears to be feasible over the long run.

The tariff structure in Railways is seriously distorted because passenger fares are kept very low and freight fares are increased to cross-subsidise the low level of passenger tariff. In Purchase Price Parity terms, the tariffs bear no comparison. In terms of freight rates, however, the Indian freight rates are the highest whereas those of China, Russia and the USA are 58 per cent, 75 per cent and 51 per cent of the Indian rates adjusted for PPP. Even in nominal terms, Chinese freight rates are only around 72 per cent of the Indian fright rates (*Table 7*).

Table 7. Freight Yields in Major Economies

	Freight Yield US Cents/Tonne Km	
	Nominal Prices	*Adjusted for PPP (India=1)*
India	2.11	1.00
China	1.49	0.58
Russia	2.20	0.75
USA	2.28	0.51

Source: World Bank (2012): Railways International Overview Issues for India reproduced in p. 213, Vol. II, 12th Five Year Plan Document.

Composition of Freight Flows has Implications for Logistic Costs

Keeping in view the modal mix of transport flows in large economies like China and the USA provides ample scope for rebalancing the modal freight mix towards rail mode. Keeping in view the constraints on rail capacity and experience of countries like China, as well as the longer average lead distance for rail and shorter average lead distance for road in comparison to India, a modal share of 45 per cent for Railways, 45 per cent for road conveyance and 10 per cent for water-based (inland plus coastal) conveyance of domestic freight appears to be feasible over the long run.

i) In the absence of more efficient multimodal alternatives, road transport dominates the freight market (over 60 per cent of goods in terms of tonnage are transported by road), resulting in excessive economic costs in the long distance market. Maritime coastal transport is also limited, despite India's long coastline (7,500 Km) and strong concentration of the population in coastal regions. In terms of modal share, India's composition of freight flows is quite different from those found in larger countries, such as China and the USA, where shipping/waterways and railroads are of greater relevance.
ii) Dominance of trucking in freight transportation is a major challenge in a country saddled with high logistic costs. India's transport market which ships mainly large volumes of low value–to-weight commodities over long distances suits low cost coastal shipping or rail based options, but trucking clearly dominates. Rail based option is cost-effective, but its market share excluding a few items (coal and iron ore) is still too low.
iii) The costs and reliability of road freight services are not only affected by road conditions, but also by the system of discretionary checks en route. Detentions at inter-state checkposts undermine the utilization of truck fleet and turnaround time.
iv) Inventory and warehousing costs are high not only as a result of high interest rates, but also due to inventory levels. Firms' inventory levels are much higher compared to developed countries on account of quality and variability in terms of transit time of transportation services; and,
v) Logistic costs also incorporate high internal administrative costs in the absence of service providers.

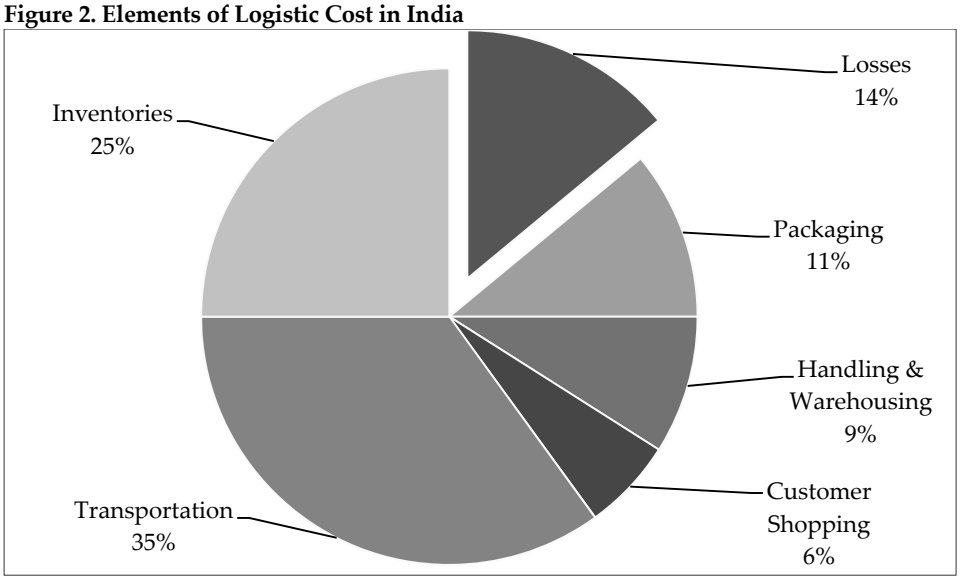
Transport Efficiency and Costs: Implications for Logistics

Transport cost is the largest component of logistics cost and accounts for more than one-third of the total logistics cost. India's road transport market is populated by many small carriers (with average fleet size of less than 2 trucks). Although transport rates are low, the highly fragmented supply and demand for road transport services means that short-haul truckers frequently return home empty and long-haul truckers have to wait an excessive amount of time to get loads, seriously affecting their operating efficiency. If payments to truck brokers are included, the cost of getting a backhaul load will be even higher. The high cost of finding backhaul cargo makes the profit margin of running a goods carrier

extremely thin after paying for fixed vehicle costs (e.g., acquisition cost of a truck, license fees); and fuel, repair, and maintenance costs.

About 75 per cent of trucking firms own small fleets of less than five trucks with only 11 per cent operating more than 20 trucks (CRISIL, 2009). Besides, light vehicles and double axle trucks dominate the Indian trucking fleet. Dominance of a large number of small owner operated road carriers has led to excessive competition resulting in excessively long driving hours, overloading, and unauthorized modifications in vehicle design to improve their payload. They pass on their internal costs to the society in the form of external costs such as excessively high accident rates, damage to road infrastructure, and high levels of pollution. However, the creation of large, negative externalities is not sustainable. Efficiency gains must come from improved operations efficiency (including eliminating empty backhauls through carrier and shipper collaboration, and reducing the search cost of backhauls) as well as promoting the use of multimodal transport for long hauls.

Figure 2. Elements of Logistic Cost in India



Source: 'Status and Leverage of Logistic Parks in India,' Nirav Kothary, Jones Lang LaSalle.

Table 8 provides a snap view of logistics cost for movement of export containers (20 feet) on select routes. Transit time by various modes is highly variable and bears little relationship with distance. For instance, transit time other than rail movement (which includes detentions on account of various clearances) between the national capital region (NCR) and Jawaharlal Nehru Port (JNP) for a distance of close to 1400 Km takes about three and half days compared to movement by rail between Hyderabad-Chennai and Hyderabad-JNP which takes three and four days respectively for a distance which is little more than half compared to the distance between NCR-JNP. In case of container movement by road between Banglore-Chennai/Cochin and Coimbatore-Chennai/Cochin, other transit time on account of clearances/detentions is 50 per cent or more. However, for intra-state

Table 8. Logistics Cost for the Movement of 20 Feet TEU (Origin-Destination pairs)

Mode	*Cost Parameters Rupees)*			*Time Taken (Days)*		
	LTC	*OTC*	*TTC[4]*	*LTT*	*OTT*	*TTT[7]*
[1]	*[2]*	*[3]*	*[4]=[2]+[3]*	*[5]*	*[6]*	*[7]=[5]+[6]*
Movement from National Capital Region to JNP (1388Km)						
Rail	28,620a (73%)	10,500 (28%)	39,120	3.5 (64%)	2.0 (36%)	5.5
Movement from Hyderabad to JNP (667Km)						
Rail	12,700b (47%)	14,500 (53%)	27,200	5 (63%)	3 (37%)	8
Movement from Hyderabad to Chennai (725 Km)						
Rail	13,200c (52%)	12,300 (48%)	25,500	4 (67%)	2 (33%)	6
Movement from Banglore to Chennai (334 Km)						
Road	15,000 (61%)	9,500 (39%)	24,500	2 (50%)	2 (50%)	4
Movement from Banglore to Cochin (550 Km)						
Road	18,500 (63%)	10,800 (37%)	29,300	2 (40%)	3 (60%)	5
Movement from Coimbatore to Cochin (175 Km)						
Road	14,000 (56%)	10,800 (44%)	24,800	1 (29%)	2.5 (71%)	3.5
Movement from Coimbatore to Chennai (492Km)-Intra State						
Road	18,000 (65%)	9,500 (35%)	27,500	1.5 (60%)	1 (40%)	2.5
Movement from Coimbatore to Tuticorin (352Km)-Intra State						
Road	14,500 (62%)	9,100 (38%)	23,500	1 (50%)	1 (50%)	2
Movement from Hoogly to Kolkotta (60Km)-Intra State						
Road	5,000 (16%)	27,200(84%)	32,200	1 (20%)	4 (80%)	5
Movement from Sabarmati to JNPT (550Km)						
Road	14,660 (58%)	10,500 (42%)	25,160	4 (80%)	1 (20%)	5

LTC: Land Transit Cost includes cost of freight movement by transport mode; OTC: Other Transit Cost includes cost on account of transit facility (CFS/ICD), customs clearance, terminal handling charges, documentation charges, other costs, etc.; LTT: Land Transit Time-Time taken in freight movement by transport mode; OTT: Other Transit Time includes time taken on account of detention at transit facility (CFS/ICD), customs clearance, terminal handling charges, documentation charges, other costs, etc.; a: includes ₹5,500 for inland road movement; b: includes ₹2,000 for inland road movement; c: includes ₹2,500 for inland road movement. Figures in parenthesis are percentage to total cost/transit time respectively in each row.

Source: Data Deloitte Research quoted in Table nos. 31, 32, 34 and 35 of the Final Report. Methodology for measuring the logistics cost for major manufacturing exports and assessing its impact on their competitiveness, FICCI, June 2011, nmcc.nic.in/pdf/NMCC_Final Report_June2011.pdf

movements (Coimbatore-Chennai/Tuticorin), it is 50 per cent or less of the total transit time. This clearly reflects lack of seamless container/freight movement for even export cargo. In case of container movement between Hoogly-Kolkotta (a distance of 60 KM), it takes one day and inland freight movement accounts for only 16 per cent of the total transit cost (Rs 32,200/TEU); other transit costs on account of transshipment and terminal handling make up for 84 per cent of total transit costs and other transit time as transshipment accounts for 80 per cent of the transit time. Due to draft limitations, no main line vessels call at Kolkotta Port. This entails use of feeder vessels and consequent transshipment of cargo at Colombo or Singapore. The feeder vessels usually do not run according to schedule specified and if the feeder vessels miss the main line vessel at Singapore or Colombo, the

consignment shipment is further delayed by 10–15 days. From Kolkata to Europe the average time taken is 35 days, while that from JN Port, it is around 18 days. Exports from Kolkata necessitate transshipment from Colombo or Singapore, which involves an additional cost of around US$ 350 /TEU. Exporters have to bear the expenses due to delays, which cannot be passed on to the buyer. These expenses (buffer yard charges, payments to the transporters for holding on to the consignment, time of the resource, etc.) eventually add up to a significant amount.Logistic deficiencies must be tackled by policy makers in order for India to successfully move its industries up the value chain. Otherwise, as India shifts its manufacturing to its interiors and further away from its seaports, its already high logistics cost will increase further, putting the country at a competitive disadvantage.

6. Time Cost of Transport

Despite the extensive growth of the road network beginning in the 1950s, seamless freight flow across the country is hampered by institutional barriers (multiple checks during the course of transit) and quality of road infrastructure (less than one-fourth of national highway network is four-laned and above). Presently there are 177 interstate check posts and 268 toll barriers on national highways. A well-functioning freight transport system is vital for a competitive logistics sector. Seamless freight flows reflect efficient loading/unloading and transfer in terminals, reliable vehicle performance, a minimum of halts/detentions on route, and high utilisation levels for the fixed assets required in the system. Interventions that interrupt trip flow or increase trip time typically add to the cost and erode asset turnover. To promote seamless freight movement across the country: (a) integrate Sales/State VAT tax administration with interstate freight flows; (b) adopt "green channel "for transit of secure/sealed containerized cargo. This is feasible in view of the introduction of smart cards for vehicle registrations (Vahan) and driver licences (Sarathi); (c) automate and unify Inter State Check posts and introduce "Single Window Clearance" for all authorized charges including toll fees.

The time required to export and import a good is an important barrier to trade. In particular, there are two aspects of time that represent a cost for trade. One is the lead time, that is, the length of time between placement of an order and receipt of the goods. This depends on the distance between customers and suppliers, the speed of the mode of transport chosen, the type of product, the management of the supply chain and the logistics as well as the type of administrative procedures related to exporting or importing, waiting time for shipment and delays related to testing and certification of goods. A long lead time represents a cost and therefore an obstacle to trade because it raises the costs of uncertainty and variation in demand for the final products.

The other aspect of time that represents an obstacle to trade is the variability of delivery time. The more varied the delivery time, the greater the buffer stocks needed to face demand. High variability of delivery time would make it very hard to organize "just-in-time" delivery, where inventories are kept to a bare minimum and inputs arrive at the

factory only when they enter the production process. When just-in-time technology is introduced, delayed delivery of a component can hold up the entire production and inflict costs.

Transit time and cost of conveyance of freight by road are important parameters to assess efficiency of road freight traffic. Transit time for various trip lengths pertaining to freight-related vehicular flows and commodities have been analyzed in terms of; short haul: origin and destination within a district; medium haul: origin and destination other than Ahmadabad district but within Gujarat: long haul: origin and destination outside Gujarat (*Table 9*). This shows that transit time varies from more than one day for short distances up to 60 km to 6 to 10 days for long distances of beyond 400 km up to 1800 km.

Table 9. Transit Time for Various Trip Lengths

	Long Distance	*Medium Distance*	*Short Distance*
Distance (KM)	1800	400	40-60
Duration (Days)	6-10	3-6	>1

Note: Impacts of Intrusion of Movement of Trucks in Urban Areas: Anvi Maniar and H.M. Shivanand Swamy, Centre of Excellence Urban Transport, CEPT University.

Source: These findings were displayed at 5th Urban Mobility Conference, India, New Delhi held on December 5-8, 2012.

Cost of Detention on Inter-state Check Posts

Check Posts impose following economic costs: (a) Surveillance and enforcement costs (operational cost), (b) Cost of Compliance (time related VOC and cargo holding costs), and (c) Cost of Externalities (congestion at check posts imposes cost on other vehicular traffic leading to loss of time distance related VOC and value of Travel Time on the passenger vehicles). Saving both time (that is wasted at the check posts) and compliance costs could help improve the profit margin of truck operations without any additional investment. Faster turnaround of trucks alone in the absence of Check Posts may improve the operational efficiency of road transport sector. Sample survey of en route expenses, (Mumbai-Delhi, Delhi-Kolkata and Kolkata-Chennai routes) showed that a major share ranging between 52 to 66 per cent of the total enroute expenses goes for fuel and oil; another 7 to 9 per cent on crew expenses; and, balance in the range 25 to 40 per cent of the total expenses were accounted for by other unspecified expenses including tolls, octroi, speedy clearance at check posts, etc., (Debroyand Kaushik (2002), *Barriers to Inter State Trade and Commerce*). This was due to overloading of goods. The percentage of actual moving time to the total trip time was about 69 per cent, 54 per cent and 38 per cent for Mumbai-Delhi, Delhi-Kolkata and Kolkata-Chennai routes respectively with average vehicle speed on these corridors in the range 30 to 35 Km per hour. Slow speed of trucks results in poor service quality in terms of reliability and on-time delivery. While low rates-poor quality is acceptable for low-value commodity items, for high-value, perishable and time-sensitive

items poor service quality is definitely a cause of concern. In contrast, Rail—rail is public sector monopoly and more capital-intensive, with no competition.

Freight sector is very diverse and consists of different modes of conveyance. Road—the road freight sector is highly competitive, but fragmented due to the relatively low barriers to entry. Participants range from owner operators with a single truck, to large intermodal companies with large fleets of more than 4,000 vehicles. In India, a truck can cover only 250–400 km per day compared to 700–800 km in developed countries. In a given year, a truck on Indian roads can cover 60,000–100,000 km while in the US, a truck can travel up to 400,000 km a year (*Report of the Working Group on Logistics*, p. 25, Planning Commission)

A well-functioning freight transport system is vital for a competitive logistics sector. Seamless freight flows reflect efficient loading/unloading and transfer in terminals, reliable vehicle performance, a minimum of halts/detentions en route, and high utilization levels for the fixed assets required in the system. Interventions that interrupt trip flow or increase trip time typically add to the cost and erode asset turnover. Conversely, modifications that improve flows and trip times usually reduce cost and improve asset turnover.

7. Role of Multi Axle Vehicle (MAV)

MAVs (gross tonnage including weight of truck of over 16.2 tonnes) are cheaper to operate compared to smaller trucks, i.e. medium commercial vehicles and light commercial vehicles, by over 25 per cent. In fact, cost per ton Km for 25 ton truck and 30 ton truck is estimated at 85 per cent and 75 per cent, respectively, relative to a 16 ton truck (*Building India*: *Transforming the Nations Logistics infrastructure*, Mckinsey & Company, 2010). The incremental cost of an MAV can be recovered in less than three years. Measures to promote the use of MAVs could be considered including excise duty reductions for MAVs (similar to that of small and fuel efficient cars), stringent monitoring of overloaded trucks and enforcing pollution and safety norms, which could lead to retirement of old trucks.

Under-capitalized small truck operators find it difficult to raise funds through organized banking or financial channels. Therefore, it is virtually impossible for them to invest in modern equipment and technology to increase efficiency and reduce the cost of transportation. Information on various transport markets as regards the availability of trucks and going rates is not available to truckers on a real-time basis, forcing them to rely on brokers for loading their trucks. Shippers also end up paying higher-than-market freight rates, if return loads are not assured. If market information were available to shippers and truckers on a real-time basis, shippers would have paid actual market rates. Also, very few transporters have real-time tracking facilities (GPS). Once a vehicle departs from the source, there is no way to track the movement of the vehicle on a real-time basis until it reaches the destination.

8. Efficiency of India's Port Sector

Ports constitute inter-modal interface between maritime and road and rail transport. India has a coastline of around 7,517 km with 12 major ports and 176 non-major ports along the coastline and sea islands. Almost 95 per cent by volume and 70 per cent by value of India's global merchandise trade is carried through the sea route. Maritime transport is the shipment of goods (cargo) and people by sea and other waterways. Port operations are a necessary tool to enable maritime trade between trading partners. Ports represent a complex structure in a country's transportation system providing **ship harbour interface** services such as pilotage, dredging, provision of berths, maintenance of navigational channels, etc.; **ship-port interface** in terms of loading and unloading cargoes; and, **port-land interface** in delivering cargo to and from the hinterland. Thus, seaports serve as the interface between maritime and inland transportation, and play a significant role in the economic development of a country.

A seaport is an interface between two modes of transport, namely land and sea, and its efficiency is directly related to the connectivity covering both the modes of transport. Seaside would require sheltered water, sufficient draught, navigational and communication facility and proper port management. Land side would require handling equipment, sufficient and well-designed stack yard, cargo evacuation facility and hinterland connectivity with supporting infrastructure and systems. Container terminals should provide rapid transit facilities for containerized cargo (similar to an Airport where passenger arrive and depart with ready luggage / cargo). This would enable the ports to plan and utilize land optimally for the benefit of the ships and not for stowage for which CFS/ICD are planned.

The average capacity utilization of Major Ports is over 80 per cent with ports like JNP, Mumbai, operating above 100 per cent capacity followed by port at Vizag, Kandla and Mormugao operating at capacity utilization levels between 92–95 per cent in 2011–12. This has led to deterioration in their average turn round time (TRT), which has increased from 3.6 days in 2005–06 to 4.6 days in 2011–12 (*Table 10*)**.** This rise was mainly on account of an increase in pre-berthing time at the ports. The high TRT at Indian ports can be attributed to the fact that many of the ports operate at capacity utilization levels which are above the optimum level of 70 per cent (internationally accepted norm), resulting in high congestion levels which impacts their operational performance. Almost all major ports in India have a TRT of more than 3.5 days except Ennore and Cochin which have around 2 days. Some of the ports which have high turnaround time are Kandla (6.4 days), Paradip (6.3 days), Vizag (5.7 days), Mumbai, Mormugao and Tuticorin (about 5 days), Chennai (about 4 days), and JNP (2.5 days). In case of JNP, which is India's premier container port and handles more than 50 per cent of India's total container throughput, it is abnormally high at 1.1 days compared to international levels of less than 12 hours in case of Colombo, Singapore, Dubai, and Shanghai.

Table 10. Major Ports: Select Efficiency Indicators

Ports	*1990–91*	*2000–01*	*2005–06*	*2011–12*
Average PBD (Days)	2.1	1.2	1.1	2.1
Average TRT (Days)	8.1	4.1	3.6	4.6
Average Output# (tones)	3372	6701	9543	10917

Note: PBD: Pre-berthing detention; TRT: Turnaround time; # per ship berth day.

Source: Various Issues of Basic Port Statistics, Port Update, Government of India, Ministry of Shipping.

9. Draft and Vessel size

Presently, vessels of greater than 11,000 TEU, such as the Emma Maersk, are in service. The movement towards larger ships is driven by the inexorable search for economies of scale. The need to maximize utilization of these vessels will in turn lead to reduction in number of port calls on major routes, and push for the development of global mega ports served by fully integrated global networks. In Southern India, Vallapadam Port – developed by DP World may compete with Colombo for transshipment volume. New ports with larger drafts in South India like Gangavaram (on Eastern Coast, 21 metres draught, already commissioned) and Krishnapatnam (on Eastern Coast – 19 metres draught), in addition to new terminals at Tuticorin, Ennore, etc., can also be expected to provide competition to operational container ports in Sri Lanka. In case of containership for 1,000 TEU capacities, the average draft is 8.3 metres which rises to 15.5 metres for ships above 11,000 TEU capacities. Container vessel with a capacity of 4,000 TEU requires a minimum draft of 12.5 metres. Smaller ship classes are marked with greater variability in draft due to design specifications. Ships above 8,000 TEU capacities have uniform design and little variation.

10. Cargo Evacuation by Transport Modes

Evacuation of cargo from the port and movement to the port areas have to be properly synchronized so that the inter-modal network functions smoothly. Road and rail connectivity forms an integral part of the port infrastructure as inefficient evacuation of cargo can undermine the entire operation of a port. In particular, containerization of cargo presupposes a seamless link with the road and rail network in an "end to end" transport system. Port congestion results on account of delayed evacuation of cargo due to inadequate road and rail capacity. This adversely impacts the competitiveness of Indian industry. Port connectivity has ramifications that go beyond the operation of a port *per se*. There is need to allocate the regional distribution of cargo to different modes of land transport. Though in certain cases of bulk cargo, it is easy to identify the mode for a particular cargo at a particular port; assumptions regarding percentage split have to be made in respect of cargo such as POL, LPG, fertilizer, fertilizer raw material, other bulk cargo, containers and break bulk cargo. These assumptions need to be made depending upon the features of the respective regions, nature of cargo, quantum of cargo and the spread of hinterland.

11. Hub-and-Spoke

While containership size has increased, and container volume has grown, shipping networks have increased in complexity as well as in scale. The key development has been the evolution of hub-and-spoke systems (with cargoes are carried from smaller ports by feeder vessels) loaded on to large mainline vessels calling at major transshipment hubs. However, using a hub and spoke system means incurring the costs of feeder services and of extra handling movements in the hub port. In many cases, it means longer transit times, and where common carrier feeder services are used, a less visible presence in the port of origin (or destination) of the cargo. Shipping lines are therefore required to constantly balance the benefits of transshipping over a hub port against those calling directly at the port of origin (or destination) of the cargo. For any particular market, this will change over time—as volumes increase, making direct calls becomes more attractive. Transshipment cargoes offer port authorities and terminal operators an opportunity to develop their businesses at a faster rate than the development of their economic hinterlands permit. Therefore, it is not surprising that competition for transshipment business is intense, and volumes can be very volatile.

Given the container traffic growth in the past few years, there seems to a scope for hub operations in India, possibly one each on the east and west coasts. The absence of a hub port means that a significant share of containers leaving an Indian port goes through a feeder, transshipment and mainline movement. This implies additional delay due to the feeder voyage from India to the hub port and then at the hub port while it waits for the mainline ship to call. The reasons for a hub port not evolving in India are: (a) Cabotage law which under Merchant Shipping Act does not allow carriage of goods between any two ports within India by a foreign registered vessel; however, this rule is subject to discretionary relaxation; and; (b) insufficient infrastructure including draft requirement for a mainline ship. The advantages of having a hub port in India would be: (i) feedering time to other ports would reduce, and (ii) marine side traffic from and to the hub port will move faster and become cheaper.

12. Development of Intermodal Transport and Key Issues

The notion of "multimodal transport" is generally used for the carriage of goods by at least two modes. The United Nations Economic Commission for Europe defines intermodal transport as: *The movement of goods (in one and the same loading unit or a vehicle) by successive modes of transport without handling of the goods themselves when changing modes* (Glossary for Transport Statistics: prepared by the Inter-secretariat Working Group on Transport Statistics (EUROSTAT, ECMT, UN/ECE 2nd edition 1997). In the same terminology, the term "combined transport" is used for intermodal transport of unitized cargo when the major part of the European journey is by rail, and any initial or final leg is carried out by road. Essentially, *Intermodalism implies the use of at least two different modes of transport in an integrated manner in a door-to-door transport chain.* All freight movements involving at least

two or more modes of transportation, from a point of origin to a destination, can therefore be defined as intermodal.

UNECE defines **multimodality** as "carriage of goods by two or more modes of transport" and **intermodality** as "the movement of goods in one and the same loading unit or road vehicle, which successively uses two or more modes of transport without handling the goods themselves in changing modes," thus stressing the (non)-handling of the goods in the transfer situation. **The main distinction between these definitions seems to be that intermodality is required to use some form of uniform packaging (e.g., containers) of the goods which facilitates transfers without direct handling, while multimodality is not concerned with the means of obtaining the modal combination. Thus, transportation of bulk materials such as grain or coal, and liquid materials would be an example that can be classified as multimodal, but not intermodal transportation, using the above-mentioned definitions.**

A multimodal transport operator is responsible for the entire carriage and takes on contractual responsibility for the whole journey from the seller's warehouse to the buyer's warehouse and issues a multimodal transport document. A multimodal transport operator is called a "**contractual carrier,**" which distinguishes them from an actual carrier such as the shipping company and the master (captain) of the ship which carries the cargo from the port of loading to the port of discharge. Multimodal transport is therefore a concept which places the responsibility for transport activities under one operator, with more than one mode of transport under the control or ownership of one operator. It involves the use of more than one means of transport such as a combination of truck, railcar, aeroplane or ship in succession to each other, e.g., a container line which operates both a ship and a rail system of double stack trains.

MMT offers many benefits in terms of: (i) more efficient ways of getting goods to market; (ii) container and ICT applications; (iii) using a combination of transport modes more effectively; (iv) provides faster transit of goods as MMT reduces the disadvantages of distance from markets and the tying-up of capital; (v) reduces burden of documentation and formalities involved in issuing multiple documents and other formalities connected with each segment of the transport chain; and, (vi) establishes only one agency to deal with—the consignor has to deal with only the multimodal transport operator in all matters relating to the transportation of his goods, including the settlement of claims for loss of goods, or damage to them, or delays in delivery at destination.

13. Need for an Alternative to Pure Road Transport

The productivity of road transport is declining as a result of congestion, enforcement of regulation, Inter State Check posts and social standards (training, driving times) and is leading to higher costs and loss of competitiveness of road transport. Road transport capacities will not increase in tandem with growth because of the costs of new infrastructure. Road transport (trucks) is heavily dependent on fossil fuel and high fuel

prices, and price instabilities have to be faced. Economic growth involves increased traffic flows, and to cope with this, the different transport modes need to combine their services to create an efficient and sustainable transport system. Intermodality is seen as one possible approach with a high potential to make freight transport more sustainable and ensure economic development. Intermodality is needed so that better use can be made of alternative modes that have accessible spare capacity. Making better use of available resources is not an expensive solution and reduces stress on over-used road Networks.

14. Trends in India's Intermodal Transport

An intermodal terminal is a facility that enables containers to be transferred from road to rail or alternatively from rail to road. Containerized imports may be offloaded from a ship and then directly loaded onto a train at a rail facility located at the seaport. Similarly, export containers can be efficiently transported from the point of production to a seaport via an intermodal road/rail transfer as well. Intermodal terminals can also be an efficient and effective way of transporting high volumes of containerized freight from one inland location to another, either within one region or between regions, by combining a long rail leg with a relatively short road trip.

The data and statistics pertaining to intermodal transport are not easily captured because in today's times, data collection is mode-related and not consignment-related. It is therefore difficult to find significant and comparable data. This has to be kept in view when assessing the following developments in intermodal transport. The most familiar example is the transfer of cargo in containers or trailers between rail, marine and road modes. At present, railways in India carry intermodal transport, mainly containers. In spite of a very long coastline of more than 7,500 Km and industrialized coastal regions, there are no regular domestic RO-RO[3] (roll on-roll off) ferry services. Intermodal transportation of containers through rail is undertaken by CONCOR (*Table 11*). Although intermodal

Table 11. Number of Containers Exim and Domestic Handled by CONCOR (Thousand TEUs)

	2001–02	*2006–07*	*2007–08*	*2008–09*	*2009–10*	*2010–11*	*2011–12*
Total-Rail a	1232	2105	2448	2308	2421	2562	2604
Exim	905	1715	1977	1855	1882	2018	2136
Domestic	327	390	470	453	539	544	468
Total-Port b					7541	9288	9937
Major Ports	2884	5541	6712	6578	6863	7561	7778
Non-Major Ports*					678	1727	2159

* includes container traffic of Adani and Pipavav Ports.

Source: a. Container Corporation of India http://www.concorindia.com/index.asp; b. Basic Port Statistics, Ministry of Shipping.

[3] **Roll on roll off (RO-RO) maritime operation** refers to the transport of Lorries trailers/semi-trailers, containers or swap bodies to ships on their own wheels or on wheels attached to them for this purpose. This covers railway ferries which are extensively used in Europe.

transport is growing, its share is still relatively low. **The container is a transport unit as well as a logistics unit.** Efforts are made to ensure that containerized assets are used as efficiently as possible. Empty container flows remain an enduring challenge in freight distribution.

During the last decade (2001–02 to 2011–12), the total container volumes moved by rail grew by a compound annual growth rate (CAGR) of 7.8 per cent with exim and domestic segment growing by 9 per cent and 4 per cent respectively. During the last decade, the share of exim containers by rail in total containers carried by rail increased from 73 per cent in 2001–02 to 82 per cent in 2011–12 and that of domestic containers fell from 27 per cent to 18 per cent. Another aspect has been the robust growth in container volumes both in terms of TEUs and tonnage at major Ports. The CAGR in container volumes in TEUs during 2001–12 was 10.4 per cent but in terms of tonnage it was higher at a CAGR of 12.4 per cent, almost double the rate for India's seaborne traffic (excluding container volumes) at a CAGR of 5.8 per cent. However, share of railways in conveyance of cargo handled at Indian Ports fell from 31 per cent in 2001–02 to 27 per cent in 2011–12 due to capacity constraints. IMT requires long distance and high cargo volume corridors. IMT offers various alternative techniques. Before choosing, techniques should be evaluated carefully. Most importantly, economies of scale, i.e. it should use equipment produced in mass production. IMT should be based on internationally standardized equipment.

Box 2. Benefits of Intermodal Transport

IMT has the potential to transfer cargo flows from road to rail to inland waterways and to coastal shipping – IMT allows *en route* change from a given transport mode such as road transport to another such as rail or coastal ship in order to carry larger volumes in one transport operation.

i) A coastal vessel may carry 1200 TEUs, i.e. load of 600 trucks
ii) IMT eases pressure on road capacity. A train/rail covers only 1 slot in the rail network, but takes 45 wagons/90 containers (20 ft) 45 truck movements off the road.
iii) The train will use much less energy than the 40 trucks would have consumed
iv) A train needs, for the long haul operation, 4 persons while the 45 trucks would have needed a minimum of 45 drivers and 45 cleaners/helpers
v) The movement of 1 train is normally cheaper than the cost to operate 40 trucks

Economies of IMT

Economies of IMT consist of: (a) a pick up operation; (b) a terminal transfer that will create additional costs; (c) a line haul that should be much cheaper than the line haul in road transport; (d) a 2nd terminal transfer with its additional costs; and, (e) a final delivery operation that might be more costly than delivery after direct road transport.

All potential savings are concentrated in the line haul, which increase with distance. Longer the line haul distance of an IMT operation, the higher the savings. On the other side, the additional costs do not depend on the distance but are additional costs per

operation. So a certain minimum distance is necessary for IMT operation to be viable. The minimum transport distance for IMT to be viable in most cases is in the range of "beyond 400 Km". If an intermodal operation starts at a seaport, the minimum viable distance may be lower (250–300 km) because the loading units are already concentrated on one end of the journey and the cost of assembling them into the larger transport unit can be saved.

Another issue pertains to "concentrated traffic flows," that concentrate on cargo movement from a single truckload (with some 20 tonnes of cargo) to train load (with some 2500 tonnes of cargo or more) mean that such a large volume should be available on a given corridor. A shipper or forwarder expects a minimum number of departures per week in both directions. If we assume that: (i) each train will carry an average of 90 TEU (20 feet) to be commercially viable, and, (ii) each TEU contains some 28.25 tonnes of cargo, one can conclude that a corridor should offer a volume of around 2500 tonnes of cargo in each direction to justify a viable IMT operation. Economies of scale work in favour of large concentrated cargo transport corridors.

Problems in Intermodal Transport

Intermodal transport involves modal haulages, transshipments and terminals, and requiring the intervention of variety of operators, whose roles may overlap and compete. Intermodal transportation refers to transport of goods in containers that can be moved on land either through rail or truck and on water through ship or barge. When freight is transferred from one mode to another (e.g., from ships to trucks), it helps save handling charges for containers; also, a truck-rail container movement can generate savings compared with truck alone if the cost of the transfer (the cost of the added handling of the container plus the cost of the difference in speed and reliability between truck and intermodal) is offset by rail's lower cost per ton mile. Besides, its external costs are significantly lower. Despite these advantages, competitiveness of intermodal transport is beset with problems.

The three main problems with intermodal transport are: quality, price and coverage. More specifically, intermodal transport is often slow, less reliable and more expensive than truck-only transport, and furthermore it is only offered in selected corridors. Quality is the most important factor in today's freight transport market. The three most important aspects of quality in the main haulage process are schedule reliability, service frequency, and speed. These problems can only be solved with freight infrastructure investments (capacity upgrades) and policy changes. Yet another problem is the low quality of services currently offered, which inhibit growth of intermodal transportation.

Transshipment entails significant costs. According to industry observers, transshipment costs could represent up to one-fourth of the total transport costs in the continuous haulage scenario and up to one-third of total transport costs in the broken main haulage scenario. Due to the costs of transshipment, it is clear that by eliminating pre-haulage or post-haulage, intermodal transport can be a good alternative to truck-only transport even for

medium distance trips. The seaport industry particularly is an attractive option for intermodal transport because, apart from eliminating the need for pre-haulage, it is more likely to fill a train to capacity, given the greater commodity flows passing through a typical seaport.

The intermodal transport process is a chain of independent companies working together to move a container from shipper to receiver. It consists of three main processes: pre-haulage and post-haulage (picking-up/delivering the container to the intermodal terminal), transshipment (loading the container onto/off the train), and main haulage (container carried by train to destination terminal). Today, these processes are often completed by different companies; in fact, the main haulage process may even be completed through coordination among several companies. However, the best option would be that a single company be responsible for managing all transport chain partners. There are several alternative organizational structures that could achieve these objectives. One common requirement is that the intermodal terminal operator be responsible for providing the pre-haulage and post-haulage services (PPH). Ideally, both the origin and destination terminals would be under the control of the same operator. The terminal operator could either enter into a contract with a railroad partner for the main haulage or (preferably) operate its own trains between terminals. In cases where the origin and destination terminals are operated by different companies, these companies must develop a real working partnership.

Barriers to Intermodal Transport

The main reasons for the slow development of intermodal transport are certain impediments as detailed below:

a) **Organizational barriers**, i.e. many modes/participants partners are involved, a lack of cooperation amongst key players, unclear responsibilities and liabilities, etc.
b) **Technical barriers,** i.e. lack of door-to-door tracking and tracing, friction at transfer points, lack of standardization (semi-trailers, certain loading units), etc.
c) **Infrastructural barriers**, i.e. lack or inadequate and unsuitable infrastructure at terminals, capacity restraints at terminals and their access roads, lack of standardization at terminals, etc.
d) **Operational, logistical and service-related barriers**, i.e. a lack of information about available services, a lack of awareness of possibilities of intermodal transport, problems integrating intermodal transport in logistics chains of companies, etc.
e) **Financial impediments:** There are no financial or regulatory incentives in place to assist the promotion of intermodal transport which entails high investment costs.
f) **Legal barriers:** Multi IMT operations face many problems in practice; one of these concerns the determination of the law to be applied to a specific transport operation, when several transport modes with different civil liability regimes are used. As IMT takes makes use of containers, it becomes difficult to determine the leg in which damage has occurred.

g) **Liability for delay:** Traditionally a carrier (i.e. commercial entity which contracts for the carriage of goods and their delivery in good condition to the contracted consignee) is liable for the delivery of the consignment, but not necessarily for its timely delivery. Specifically, railways are reluctant to accept responsibility for the delivery of goods at a given date and hour. Due to competitive environment, organized road transport operators are willing to accept obligation to deliver the consignment on time and agree to penalty payments for goods not delivered in time to retain customers. This is not the case with railways as they happen to be monopoly service providers. Clients have no choice. For example, a freight forwarder takes over a consignment for carriage by road and decides to use IMT services for a part of the total carriage. If the delay is attributed to railway authority, they may refuse any liability, because the concerned railway authority in India does not guarantee timely delivery. Thus, the IMT operator may have to pay a penalty for a deficient service for which he is not responsible.

h) **The damage problem:** Another major problem of IMT is the continuous change of responsible factors along the intermodal chain. A moot point is: when damage occurs, how to attribute responsibility and determine which party pays the damage. The efficiency of the whole logistics supply chain largely depends on the structure and network of intermodal nodes/dry ports [these are Container Freight Stations (CFS) Inland Container Depots (ICDs)] storage and distribution hubs as they act as the integrating and coordinating mechanism between different components, e.g., shipping lines, inland transportation and warehousing. Essentially the evolution of dry ports is a direct result of development of global transport strategies. The phenomenon of shifting manufacturing basis from coastal areas to further inland locations was a consequence of capacity limitations of gateway ports.

15. Concept of Dry Port

The dispersion of industrial/economic activities and saturation of port capacities brought to the fore the need for a network of dry ports. Dry ports can be on distant, mid-range or short-range to seaports. As mid-range and short-range dry ports are close to the seaport and transport distances are relatively short, inbound and outbound flows are mostly handled by road transport. Long distance dry ports are located further in the hinterland, the transport distance between the seaport and the dry port is much larger. Inland shipping and rail become more competitive on **such** long distances. A dry port provides all the services of a port except for the loading of cargo to and from seagoing ships. A dry port facility typically provides container handling and storage, break bulk cargo handling and storage, and customs inspection and clearance. As per the ESCAP, the term "dry ports" is defined to *include full customs-related services*, in contrast to the ICD where this need not necessarily be the case (*Review of Developments in Transport in Asia and the Pacific 2007*, UNESCAP, p. 225). Establishing dry ports would not only allow shippers to undertake consolidation and distribution activities, but also help with export/import procedures at

inland locations that are at relatively short distances from factories and farms. Completing necessary documentation and procedures at such facilities could help reduce congestion and delays at border crossings and ports, thereby reducing transaction costs for exporters and importers. Approximately 200 dry ports were located in Europe in 2005, providing important logistic services to industry and trade. In the United States of America, there are approximately 370 major inland container depots, and at least 200 smaller ones (*Review of Developments in Transport in Asia and the Pacific 2007*, UNESCAP, p. 226). The operator at the dry port usually outsources most of the services to several contractors/vendors while giving full freedom to its customers/users of the facility to choose their CHA (Customs House Agent) or Freight Forwarder, Shipping Line, etc. The CFS/ICD (Container Freight Stations/Inland Container Depot) operator looks after infrastructure development, asset management and regulatory function such as obtaining permission from Customs, transport safety, environmental clearances, etc.

In Europe and North America, dry ports function as modal interchange and freight storage facilities, often located at close proximity to strategic rail and road hubs. They are known by different names across countries, e.g. *Strategic Rail Freight Interchanges* in the United Kingdom, *Inland Ports* or *Multimodal Transport and Distribution Hubs* in the United States, and *Freight villages* in Europe. Essentially, a freight village is a European concept which comprises an area of land that is devoted to a number of transport and logistics facilities, activities and services, which are not just located in the same area, but also coordinated to encourage maximum synergy and efficiency. A feature that is central to a freight village is an intermodal terminal that is connected to major freight corridors and a nearby ***seaport***. This enables flexible, quick movement of containerized and de-containerized cargo between wharf, warehouse and ultimate destination by both road and rail. The juxtaposition of the intermodal terminal with facilities such as container storage (full and empty) and handling areas, and warehouses that are linked to rail, is intended to significantly reduce cargo handling costs and time, and reduce the use of roads for container transportation. The second distinguishing feature of a freight village is shared access to other facilities, equipment and common user services. A centralized management and ownership structure is the third distinguishing feature of a freight village. This is similar to the strategic management role of a port authority/corporation. Centralized management has the responsibility for planning the long-term investment and growth of the freight village as well as the short-term maintenance of the village infrastructure. It is responsible for establishing corporate governance and administrative arrangements for the village, including those related to quality control, safety, and risk and environmental management (*Review of Developments in Transport in Asia and the Pacific 2009*, UNESCAP, p. 127). A well thought-out application of these concepts to India could bring in immense user benefits at much lower resource costs to the economy. The "freight village" concept is a European model that takes the concept of the clustering of related logistics activities to a new level. Within the Asia Pacific region there are well-established logistics centres and distriparks that share many of the features of a freight village. A distripark is a large-scale, advanced, value-added logistics centre with comprehensive facilities for distribution

operations at a single location, typically with an emphasis on consolidation and deconsolidation of containerized goods. Distriparks are typically located close to container terminal and multimodal transport facilities (*Review of Developments in Transport in Asia and the Pacific 2005*, UNESCAP, p. 156,).

16. Container Freight Stations (CFS)/Inland Container Depots (ICD)

CFS/ICDs in India play the role of a dry port and are served by rail or/and road. An ICD/CFS typically located inland from seaports, provides container handling and storage, break-bulk cargo handling and storage and customs inspection and clearance. In essence, they have the same functions as a port terminal, except ship to shore transfer. While the transportation of containers to and from many ICDs is by truck, in some cases it also involves rail. In this case an intermodal facility may form part of the ICD or may be located nearby. **Indian Customs Manual defines an ICD as** 'a common user facility with public Authority status equipped with fixed Installations and offering services for Handling and temporary storage of Import/export laden and empty containers carried under customs transit by any applicable mode of transport placed under customs act. All activities related to clearance of goods for home use, warehousing, and temporary admissions, re-export, temporary storage for onward transit and outright export, transshipment take place from such stations.'

Functionally there is no distinction between an ICD and CFS as both are transit facilities, which offer services for containerization of break bulk cargo and vice-versa. These could be served by rail and /or road transport. An ICD is generally located in the interiors (outside the port towns) of the country, away from the servicing ports. CFS, on the other hand, is an off dock facility located near the servicing ports, which helps in decongesting the port by shifting cargo and Customs related activities outside the port area. CFSs are largely expected to deal with break bulk cargo originating/terminating in the immediate hinterland of a port and may also deal with rail borne traffic to and from inland locations.

The benefits as envisaged from an ICD/CFS are: transfer of cargo (mainly unitized) between two modes) concentration points for long distance cargoes and its unitization, customs clearance facilities obviating the need for customs at ports thereby decongesting ports. CFS/ICDs offer a range of services like rail siding in case of rail based terminal, storage facilities in the yard area, and warehousing. The CFSs/ICDs function as dry ports and help reduce congestion and augment terminal capacity at ports.

Number and Geographical spread of ICDs/CFS

Location decisions of CFS/ICDs have significant bearings on the efficiency and competitiveness of the whole supply chain, e.g., transport cost, connectivity, and transport modes. CFS/ICDs are a key part of the logistics industry infrastructure. Inter-Ministerial Committee (IMC), constituted in 1992 under Ministry of Commerce, is the nodal agency for approving CFS/ICDs. Currently, 177 CFS/ICDs (both rail and road based) are functioning

out of a total 227 approved by the Ministry of Commerce (commerce.nic.in/trade/icd_list.pdf). Terminals handling lower volumes are usually road fed. Tamil Nadu (47 CFS/ICDs in operation) ranks first according to numbers, followed by Maharashtra (33) and Gujarat (25). CONCOR has joined hands with a number of private as well as other public sector entities in order to develop synergies and strengths, cost reduction, and efficiency enhancements. There has been participation of the private sector in the development of dry ports (ICD and CFS) in India as well. Out of the total 177 ICDs and CFSs in operation, as many as 99 (56%) are in the private sector; of a total of 177 functional ICDs and CFSs, CONCOR facilities account for only 17 per cent.Due to uneven spatial distribution of manufacturing activity, the distribution of functioning CFS/ICDs within India is uneven, with about 39 per cent, 33 per cent and 20 per cent being located within the southern, western and northern regions respectively (the central and eastern regions are conspicuous by the smaller presence of dry ports). This uneven spatial distribution has led to congestion in a few dry ports, breakdown of infrastructure and under-utilization of capacity.

In **India,** the Container Corporation of India, Ltd. (CONCOR) has put in place an extensive network of 62 CFS/ICDs (as per the information on their website), of which 18 are pure exim terminals, 14 pure domestic terminals, and 30 mixed terminals which handle both exim and domestic cargo. The CONCOR customs-bonded inland container depots are dry ports in the hinterland, and serve to bring all port facilities to the customer's doorstep, including customs clearance. The terminals are almost always linked by rail to the Indian Railway network, unless their size or location dictates that they be linked by road. CONCOR terminals provide a spectrum of facilities in terms of warehousing, container parking, repair facilities and even office complexes. The corporation adds value to the logistics chain by offering the provision of a single window facility coordinating with all the different agencies and services involved in the containerized cargo trade, including customs, gateway ports, railways, road haulers, consolidators, freight forwarders and shipping lines. Container traffic for CONCOR has seen a more than two fold jump from 1.2 million TEUs in 2000–01 to 2.6 million TEUs in 2011–12. Currently, the market share of CONCOR is about 85 per cent.

Pricing and Structure of CFS

To recover initial capital costs such as land acquisition, leveling, paving, access roads, etc., a *private* dry port operator needs to charge a price equal to his long-run average cost. This places new entrant at a competitive disadvantage vis-à-vis a public operator whose investment costs need not be recovered. Successful PPPs and greater involvement of the private sector in dry port operations would require pricing policies based on *long-run average cost pricing* aimed at full cost recovery by public and private dry port operators alike. This would eventually help establish a level playing field among the public and the private sectors. Container train operations are dominated by a few operators with state owned CONCOR accounting for a dominant market share. Given the significant entry

barriers in terms of regulatory barriers and large upfront costs makes container train operations inherently oligopolistic. Given homogenous service offerings and exogenous demand, oligopolistic market bestows a leadership or price setting role on the dominant player. Dominant player can reap supernormal profits in a situation of strong demand and can even indulge in predatory pricing to protect its market share. CONCORs pricing strategy to some extent reflects traits of oligopolistic behaviour. Indian CFS/ICD segment in the logistics chain in particular is marked by a strong public sector presence, substantial excess capacity, skewed spatial distribution of ICDs/CFs, smaller size in terms of handling capacity vis-à-vis operators abroad which handle million plus TEUs annually.

In India, the Government (its agencies and departments) is also the owner of huge tracts of land which has a bearing on land prices. In addition to this, the government, through its corporate entities, is also the leading dry port service provider (CONCOR) and warehouse owner (Central Warehousing Corporation). Public sector dry port owners enjoy a huge advantage of having land available for use at token cost or leased out for long periods at very low, subsidized rates. The government thus becomes a price setter for dry port services. In contrast, the private sector does not get similar preferential treatment and has to acquire land at market value. A dry port is essentially a land-intensive venture but its related infrastructure is in the nature of public utility. Competition between the public and private sectors has not been taking place on a level playing field.

The size of dry ports varies according to the industrial production and commercial transactions in the area served by the facility. In the European Union, there is considerable variation in the average size of dry ports (typically 40,000 to 1.9 million TEU throughputs per year), land area (typically 30–200 hectares), number of firms (typically 25–100) and overall employment (approximately 7,000 to around 37,000 people). Highly urbanized countries tend to have more dry ports, but of smaller size—for example, Spain (23 dry ports), Belgium (9), Switzerland (4), and Slovenia (3) [UNESCAP (August 2006, p. 8]. In the Republic of Korea, four dry ports have been built. Yang San ICD was built in 2000 close to Busan Port and is running around 66 per cent of its capacity. Uiwang inland container depot near Seoul was developed in 1992 under a Build-Operate-Transfer contract with a private concessionaire. It currently handles close to 1 million TEUs per year (*Table 12*)**.**

Table 12. Inland Container Handling Facilities in Republic of Korea

Region	*Location*	*Area (Sq.m)*	*Throughput (TEU)*	*Capacity (TEU)*
Seoul	UiwangKyunggi	753,127	903,000	1,370,000
Busan	YangsanKyungsangnam	951,940	395,000	1,400,000
Honam	Jangsung,Chollanam	520,782	5,700	340,000
Central	ChungbooChungchungbok	480,736	3,500	350,000
Youngnam	ChilgokKyungsangbuk	456,499	6,600	330,000

Source: Review of Developments in Transport in Asia and the Pacific 2011, UNESCAP, p. 72, 2011.

17. Conclusion: Need for a Coordinated Approach to IMT

To achieve enhanced integration in the global economy, India needs to respond to global changes swiftly. With this in view, a multimodal, viable and competitive transport system should be an integral part of trade and transport policy. As a first step, there is need for "Intermodal and Logistics National Plan" to help outline the intermodal network and provide a framework for the introduction of IMT and logistics. This National Plan should define a network of intermodal corridors, nodes and gateways. The plan should make a distinction between corridors to be served by IMT and others which will be served by road transport. Of particular importance are the locations of intermodal logistics centre and port areas and their linkages with the transport corridors. The IMT Plan should cover objectives in terms of modal shift to reduce road congestion and promote efficiency.

References

Annual Reports of Ministry of Road Transport and Highways for the following years: 2011-12, 2010-11, 2009-10, 2008-09, 2007-08, 2006-07, http://morth.nic.in/index2.asp?slid=297&sublinkid=139&lang=1

Arvis, J.F., M.A. Mustra, J. Panzer, L. Ojala and T. Naula (2007), 'Connecting to Compete: Trade Logistics in the Global Economy, The Logistics Performance Index and its Indicators,' The International Bank for Reconstruction and Development/The World Bank.

Basic Port Statistics: 2010-11 (2012), Transport Research Wing, Ministry of Road Transport and Highways, Government of India, New Delhi, April, http://www.shipping.nic.in/showfile.php?lid=925

Basic Road Statistics: 2008-09, 2009-10 & 2010-11 (2011), Government of India, Ministry of Road Transport and Highways, Transport Research Wing, New Delhi, August, http://morth.nic.in/showfile.asp?lid=839

Building India: Transforming the Nations Logistics infrastructure, Mckinsey & Company, 2010.

China Statistical Yearbook (2102), http://www.stats.gov.cn/tjsj/ndsj/2012/indexeh.htm

CRISIL Research (2009), *Roads and Highways*, Annual Review, August.

Debroy, Bibek and P.D. Kaushik (2002), 'Barriers to Inter-State Trade and Commerce: The Case of Road Transport,' Vol. II, Book 3, Background Papers, http://lawmin.nic.in/ncrwc/finalreport/volume2book3.htm

Department of Shipping, Government of India official website: www.shipping.gov.in.

Doing Business 2014, Regional Profile: East Asia and the Pacific (EAP), 11th Edition, a co-publication of The World Bank and the International Finance Corporation.

Doing Business 2014, 12th Edition, The World Bank.

Glossary for Transport Statistics (1997), Document prepared by the Intersecretariat Working Group on Transport Statistics (EUROSTAT, ECMT, UN/ECE), 2nd Edition, www.fondazioneitl.org/intranet/libretti/libretto83-01-1.pdf

Guasch, J.L. and J. Kogan (2001), 'Inventories in Developing Countries: Levels and Determinants – A Red Flag for Competitiveness and Growth,' Policy Research Working Paper 2552, The World Bank, http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-2552

Guasch, J.L. and J. Kogan (2003), 'Just-in-Case Inventories: A Cross Country Analysis,' Policy Research Working Paper 3012, The World Bank, http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-3012

Haralambides, H.E. (2002), 'Competition, Excess Capacity and the Pricing of Port Infrastructure,' *International Journal of Maritime Economics*, Vol. 4, No. 4, December, Pp. 323–347.

Haralambides, H.E. and Girish Gujar (2011), 'The Indian Dry Ports Sector, Pricing Policies and Opportunities for Public Private Partnership,' *Research in Transportation Economics*, Vol. 33, Iss. 1, Pp. 51–58, Elsevier.

Hummels, D. (2000), 'Time as a Trade Barrier,' Purdue University, mimeo.

Hummels, D. (2001) 'Toward a Geography of Trade Costs,' University of Chicago.

Kothary, Nirav (2011), 'Status and Leverage of Logistic Parks in India,' Jones Lang LaSalle.

Lagneaux, Frédéric (2008), 'Economic Importance of Belgian Transport Logistics,' Working Paper Document-Series No. 125, http://www.nbb.be/doc/oc/repec/docwpp/wp125En.pdf

Limão, N. and A.J. Venables (2001), 'Infrastructure, Geographical Disadvantage, Transport Costs, and Trade,' *The World Bank Economic Review*, Vol. 15, Iss. 3, Pp. 451–479.

List of ICDs/CFs Approved by the IMC which are under Implementation or Functioning as on 16-06-2014, commerce.nic.in/trade/icd_list.pdf

Methodology for Measuring the Logistics Cost for Major Manufacturing Exports and Assessing its Impact on their Competitiveness (2011), Final Report, FICCI, June, accessed on January 8, 2013, nmcc.nic.in/pdf/NMCC_FinalReport_June2011.pdf

Ministry of Road Transport and Highways, Government of India.

Ministry of Shipping, Government of India, shipping.nic.in

National Accounts Statistics 2013: Central Statistical Organization, Government of India.

12th Five year Plan Document (2012-17), Planning Commission, Government of India, Vols. I, II and III.

National Transportation Statistics 2012, US Department of Transportation, http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/nts_entire_with_q4_updates.pdf

Notteboom, T.E. and J-P Rodrigue (2005), 'Port Regionalization: Towards a New Phase in Port Development,' *Maritime Policy and Management*, Vol. 32, No. 3, Pp. 297–313.

Rantasila, Karri and Lauri Ojala (2012), 'Measurement of National Level Logistics Costs and Performance,' Discussion Paper 2012-04, International Transport Forum, Paris.

Report of the Working Group on Logistics, General Reports, Planning Commission, Government of India, Transport Division, New Delhi, http://www.planningcommission.nic.in/reports/genrep/index.php?

Report of the Sub Group on Policy Issues (2011), Ministry of Road Transport and Highways, Government of India, September, http://morth.nic.in/writereaddata/linkimages/Policy%20Issues-9224727324.pdf

Report of the Working Group for the Port Sector for the Twelfth Five Year Plan 2012-17 (2011), Government of India, Ministry of Shipping, October, http://planningcommission.nic.in/aboutus/committee/wrkgrp12/transport/report/wg_port.pdf

Report of the Working Group on Central Roads Sector, Government of India, Ministry of Road Transport and Highways 12th Five Year Plan (2012-17), http://planningcommission.nic.in/aboutus/committee/wrkgrp12/transport/report/wg_cen_roads.pdf

Road Transport Year Book: 2009-10 & 2010-11 (2012), Transport Research Wing, Ministry of Road Transport and Highways, Government of India, New Delhi, July, http://morth.nic.in/showfile.asp?lid=838

Statistics of Inland Water Transport: 2010-11, Transport Research Wing, Ministry of Road Transport and Highways, Government of India, New Delhi, March, http://www.shipping.nic.in/showfile.php?lid=827

UNESCAP (2006), *Cross Cutting Issue for Managing Globalisation Related to Trade and Transport: Promoting Dry Ports as a Means of Sharing the Benefits of Globalisation with Inland Locations*, E/ESCAP/CMG(3/I)/1, August 17.

UNESCAP (2005), *Review of Developments in Transport in Asia and the Pacific 2005*, Flagship publications and book series, January.

UNESCAP (2007), *Review of Developments in Transport in Asia and the Pacific 2007*, Flagship publications and book series, December.

UNESCAP (2009), *Review of Developments in Transport in Asia and the Pacific 2009*, Flagship publications and book series, February.

UNESCAP (2011), *Review of Developments in Transport in Asia and the Pacific 2011*, Flagship publications and book series, December.

UNESCAP (2006), *Cross-cutting Issue for Managing Globalization Related to Trade and Transport: Promoting Dry Ports as a Means of Sharing the Benefits of Globalization with Inland Locations*, No. E/ESCAP/CMG(3/1)1, Bangkok: UNESCAP.

UNESCAP (2009), *Development of Dry Ports*, Transport and Communications Bulletin for Asia and the Pacific No. 78, New York: United Nations.

Update on Indian Port Sector (31.03.2012) (2012), Government of India, Ministry of Shipping, Transport Research Wing, New Delhi, June, http://www.shipping.nic.in/showfile.php?lid=954

List of ISID Working Papers

174 Industrial Policy: Its Relevance and Currency, *Biswajit Dhar*, December 2014

173 INDIA: Structural Changes in the Manufacturing Sector and Growth Prospect, *T.P. Bhat*, December 2014

172 Post-Fordism, Global Production Networks and Implications for Labour: Some Case Studies from National Capital Region, India, *Praveen Jha and Amit Chakraborty*, November 2014

171 From the Phased Manufacturing Programme to Frugal Engineering: Some Initial Propositions, *Nasir Tyabji*, November 2014

170 Intellectual Property Rights and Innovation: MNCs in Pharmaceutical Industry in India after TRIPS, *Sudip Chaudhuri*, November 2014

169 Role of Private Sector in Medical Education and Human Resource Development for Health in India, *ISID-PHFI Collaborative Research Programme, Pradeep Kumar Choudhury*, October 2014

168 Towards Employment Augmenting Manufacturing Growth, *Satyaki Roy*, September 2014

167 Import Intensity and Its Impact on Exports, Output and Employment, *Mahua Paul*, March 2014

166 Challenge of In-vitro Diagnostics for Resource Poor Settings: An Assessment, ISID-PHFI Collaborative Research Programme, *Nidhi Singh and Dinesh Abrol*, March 2014

165 Out-of-pocket Expenditure on Health and Households well-being in India: Examining the Role of Health Policy Interventions, ISID-PHFI Collaborative Research Programme, *Shailender Kumar Hooda*, March 2014

164 Labour Processes and the Dynamics of Global Value Chain: A Developing Country Perspective, *Satyaki Roy*, March 2014

163 Health Policy Changes and their Impact on Equity in Health Financing in India, ISID-PHFI Collaborative Research Programme, *Swadhin Mondal*, March 2014

162 Technological Upgrading, Manufacturing and Innovation: Lessons from Indian Pharmaceuticals, *Dinesh Abrol*, February 2014

161 FDI into India's Manufacturing Sector via M&As: Trends and Composition, *Foreign Investments Study Team,* February 2014

160 Growth and Structure of the Services Sector in India, *Jesim Pais*, January 2014

159 Unemployment in an Era of Jobless Growth, *N. Chandra Mohan*, January 2014

158 Access to and Financing of Healthcare through Health Insurance Intervention in India, ISID-PHFI Collaborative Research Programme, *Shailender Kumar Hooda*, November 2013

157 Parental Education and Infant Mortality in India: Understanding the Regional Differences, ISID-PHFI Collaborative Research Programme, *Pradeep Kumar Choudhury*, November 2013

* Most of the working papers can be downloaded from the Institute's website: http://isidev.nic.in/ or http://isid.org.in/

About the Institute

The Institute for Studies in Industrial Development (ISID), successor to the Corporate Studies Group (CSG), is a national-level policy research organization in the public domain and is affiliated to the Indian Council of Social Science Research (ICSSR). Developing on the initial strength of studying India's industrial regulations, ISID has gained varied expertise in the analysis of the issues thrown up by the changing policy environment. The Institute's research and academic activities are organized under the following broad thematic areas:

Industrialization: Land acquisition, special economic zones, encroachment of agricultural land, manufacturing sector, changing organized-unorganised sector relationship, rise of service economy in India, training and skill formation etc.;

Corporate Sector: With special emphasis on liberalization-induced changes in the structures of the sector, corporate governance, individual firms/groups, emerging patterns of internationalization, and of business-state interaction;

Trade, Investment and Technology: Trends and patterns of cross-border capital flows of goods and services, mergers & acquisitions, inward and outward FDI etc. and their implications for India's position in the international division of labour;

Regulatory Mechanism: Study of regulatory authorities in the light of India's own and international experience, competition issues;

Employment: Trends and patterns in employment growth, non-farm employment, distributional issues, problems of migrant labour and the changes in workforce induced by economic and technological changes;

Public Health: Issues relating to healthcare financing, structure of health expenditure across states, corporatisation of health services, pharmaceutical industry, occupational health, environment, health communication;

Media Studies: Use of modern multimedia techniques for effective, wider and focused dissemination of social science research to promote public debates;

Other Issues: Educational policy and planning, role of civil societies in development processes etc.

ISID has developed databases on various aspects of the Indian economy, particularly concerning industry and the corporate sector. It has created On-line Indexes of 210 Indian Social Science Journals (OLI) and 18 daily English Newspapers. More than one million scanned images of Press Clippings on diverse social science subjects are available online to scholars and researchers. These databases have been widely acclaimed as valuable sources of information for researchers studying India's socio-economic development.

ISID

Institute for Studies in Industrial Development

4, Institutional Area Phase II, Vasant Kunj, New Delhi - 110 070

Phone: +91 11 2676 4600 / 2689 1111; Fax: +91 11 2612 2448

E-mail: info@isid.org.in; Website: http://isid.org.in