

**MULTI MODAL TRANSPORTATION IN
INDIA: OVERCOMING THE CHALLENGES**

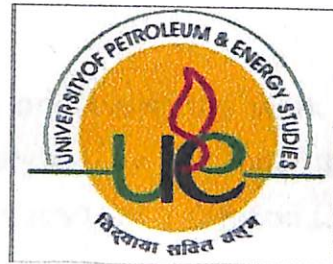
**PROJECT DISSERTATION SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENT FOR**

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BY

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UNDER THE GUIDANCE OF PROF. S.Mohan



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This is to certify that Dissertation report on ***"Multimodal Transportation In India - Overcoming The Challenges"*** completed and submitted to University of Petroleum & Energy Studies by ***Soumya Biswal*** in partial fulfillment of requirements for award of Degree of Master of Business administration (Port & Shipping Management), is a bonafide work carried by him under my supervision and guidance.

To the best of my knowledge and belief the work has been based on investigation made, data collected and analyzed by him and this work has not been submitted anywhere else for any other University or Institution for award of any degree / diploma.

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Introduction

20th century revolution in transport has made us aware of the relationship of immobility with poverty with transport innovations influencing most profoundly the pace and growth of economic development. Obstacles to movement restrict the market, increase production cost and raise prices beyond competitive reach of the consumer.

The total world of transportation is not only too large but of great scope, diversity and complexity. Transport comes into play for everything and remains an essential part of everything, remaining as various as life itself. The great difference between modes is obvious enough but the more subtle differences that exist between groups and classes can be even more important in their consequences.

For the last 3 millenniums shipping ruled the transport industry and nearly a hundred years, the railways remained the dominant mode for land transport and continues to remain the land carrier that can carry anything anywhere the rail tracks go and do it at a cost lower than other types of land or air transportation. Today, other modes have developed providing transport more effectively and efficiently. Pipelines for the movement of liquids, aircraft for high speed long distance travel and trucks offering speed, flexibility and door to door service for short and medium levels provide better alternatives. All these have affected the market share and role of different modes of transport.

The fluctuations in demand for transport services can be rapid, both in volume and in direction. There could be an almost chronic imbalance between supply and demand in many services, at any rate, over the short term. This causes both pricing and operating problems. It is sometimes a question of too little or too much. Unlike many other sectors of the economy, transport can neither be stored nor traded and to meet the peak demands of traffic extra capacity needs to be created, which necessarily idles in the non peak periods. The shrinking of the world paradoxically increase transport volume and demand with more exchange of

goods. Enterprises which are efficient and flexible, which move with the changing times and provide appropriate technologies and remain commercial in their attitude, will survive and continue to have an important role to play.

The Indian economy has been growing at an average rate of more than 8 per cent over the last four putting enormous demands on its productive infrastructure. Whether it is the physical infrastructure of road, ports, water, power etc. or the digital infrastructure of broadband networks, telecommunication etc. or the service infrastructure of multimodal – all are being stretched to perform beyond their capabilities. Interestingly, this is leading to an emergence of innovative practices to allow business and public service to operate at a higher growth rate in an environment where the support systems are getting augmented concurrently. In this paper, we present the status of the evolving multimodal transportation sector in India, innovations therein through interesting business models and the challenges that it faces in years to come.

Broadly speaking, the Indian multimodal transportation sector, as elsewhere, comprises the entire inbound and outbound segments of the manufacturing and service supply chains. Of late, the multimodal transportation infrastructure has received lot of attention both from business and industry as well as policy makers. However, the role of managing this infrastructure (or the multimodal management regimen) to effectively compete has been slightly under-emphasized. Inadequate multimodal transportation infrastructure has an effect of creating bottlenecks in the growth of an economy; the multimodal management regimen has the capability of overcoming the disadvantages of the infrastructure in the short run while providing cutting edge competitiveness in the long term. It is here that exist several challenges as well as opportunities for the Indian economy. There are several models that seem to be emerging based on the critical needs of the Indian economy that can stand as viable models for other global economies as well.

Transportation costs (i.e., inventory holding, transportation, warehousing, packaging, losses and related administration costs) have been estimated at 13-14 per cent of Indian GDP which is higher than the 8 per cent of USA's and lower than the 21 per cent of China's GDP. Service reliability of the multimodal transportation industry in emerging markets, like India, has been referred to as slow and requiring high engagement time of the customers, thereby, incurring high indirect variable costs. However, the Indian multimodal transportation story is one with islands of excellence though there has been a general improvement on almost all parameters. The paper is organized as follows: the next section gives a brief introduction of some of the peculiarities of the Indian multimodal sector. Later we

will be bringing in light determinants of growth in this industry. Then we will provide some interesting initiatives that point towards a renewal of the sector.

The multimodal transportation and supply chain industry in India is evolving rapidly and it is the interplay of infrastructure, technology and new types of service providers that will define whether the industry is able to help its customers reduce their multimodal transportation costs and provide effective services (which are also growing). Changing government policies on taxation and regulation of service providers are going to play an important role in this process. Coordination across various government agencies requires approval from multiple ministries and is a road block for multi modal transport in India. At the firm level, the multimodal transportation focus is moving towards reducing cycle times in order to add value to their customers. Consequently, better tools and strategies are being sought by firms in order to enhance their decision making. In this paper, we provide a perspective on these issues, outline some of the key challenges with the help of secondary information, and describe some interesting initiatives that some firms & industries are taking to compete through excellence in managing their multimodal transportation.

Objectives of the Research

- To understand the historical development of multimodal transportation.
- To understand the challenges involved in multimodal transportation in India.
- To study domestic and international regulatory framework governing Multimodal Transportation.
- To study the market opportunity available with multimodal transportation.
- To study the way forward towards harmonization of laws related with multimodal transportation.

RESEARCH METHODOLOGY

The available literature on this subject merely describes multimodal transport and its legal aspects in India. It analyses and attempts to establish a relationship between various modes of transportation and the GDP of India. This thesis not only covers the above mentioned lacunae but also attempts to synchronize the various laws relating to the multimodal transportation. Furthermore this thesis also provides solutions and recommendations to the challenges that would be created due to rapidly rising multimodal use.

It further observes and focuses upon the trade of the goods majorly through different modes of transport from the gateway ports to the final destinations and vice-versa. It then tries to establish relationship between the GDP growth, foreign trade and the various legs of transportation, while doing so it attempts to identify the problems faced in the movement of goods and tries to find the solution of concerned problems.

PROBLEM DEFINATIONS:-

Since the commencement of the project, we have focused on the following issues:-

1. **REGULATORY CONSTRAINTS:-** The focus of this constraint is the lacunae in the multimodal transportation of goods act enacted in 1993 are as follows:
 - The air freight operators are excluded from this act.
 - The MTO license needs to be renewed annually.

- Higher liabilities for the operators.

2. **OPERATIONAL CONSTRAINTS:-** This constraint highlights the absence of modern equipment, bad infrastructure and reliable Transport services from the ports to the hinterland destinations which result in expensive delays and higher cost of land leg multimodal transportation resulting in loss of competitive edge of Indian products. Due to unpopularity of the MTD the operators continue to issue mode specific documents like the bill of lading for the sea leg and lorry or railway receipts for the land leg of transport. However these separate documents don't provide a legal regime for uniform liability nor are they negotiable. Hence, most of the Indian exports move on FOB basis. Moreover the problems also consist of congested roadways, absence of dedicated freight corridor, financial assistance and absence of railway tracks which are strong enough to carry heavy loads at high speeds. Due to lack of operational efficiency assured transit times, reliability, security, door to door, cost effective and better customer service are lacking and perishing. There is also dire need to streamline documentation procedures. Development of coastal shipping will relieve stress from the congested road network.
3. **INSTITUTIONAL CONSTRAINTS:-** it is very well know that Indian bureaucracy is very rigid and reluctant to give up controls, the regulations and laws are cumbersome which add to delays and expenses. There are several central ministries regulating the transport sector with over lapping powers in addition to state and local government bodies adding their bit to the chaos.
4. **INFRASTRUCTURAL CONSTRAINTS:-** There is urgent need for developing the national roads highway network, conversion of

narrow gauge rail tracks and dredge the inland waterways. The capacity of major and minor ports needs to be increased.

5. **FINANCIAL CONSTRAINTS:-** India has been a socialist country with a welfare state. This result in subsidized pricing of infrastructure. In addition to this the tax base of Indian is very narrow hence revenue generation is not satisfactory. Furthermore due to the centralized planning model industrial growth is stifled. To further aggravate the problem infrastructure development receives low priority.

The only solution out of this quagmire is to allow private investment to invest in infrastructure development, permitting a reasonable a reasonable rate of return.

Multimodal transportation in Indian scenario

ACT, 1993 & MULTIMODAL TRANSPORT DOCUMENT (MTD) AND ITS IMPLEMENTATION IN INDIA

1. The Multimodal Transportation of Goods Act, 1993 (MMTG) provides for the regulation of Multimodal Transportation of Goods from any place in India to any place outside India involving two or more modes of Transport on the basis of a single Multimodal Transport Contract. This act came into force from 2.4.1993 and it provides for Registration of a person a Multimodal Transport operator and Multimodal Transportation can be carried out only by persons registered as MTO under MMTG Act, 1993. The Director General of Shipping has been notified as the competent authority to perform functions under the Act including registration of MTOs. The MTO registration is valid for period of 1 year and may be renewed for further period of one year from time to time. The Director General of Shipping has, after obtaining the prior approval of Ministry of Surface Transport, prescribed the Multimodal Transport Document under Rule 3 of Multimodal Transport Document Rules, 1994.
2. The Multimodal Transportation of Goods Act, 1993 was introduced to facilitate the exporters and give them a sense of security in transporting their goods. The concept of door to door delivery, which is MULTIMODAL Transportation is all about, is catching up fast in international trade. Reduction of multimodal transportation costs is one of the important aspects of Multimodal Transportation, thereby reducing the overall cost to the exporter and making his products more competitive in the international market. It is in this context that the Government of India thought it necessary to codify the rules and regulations governing Multimodal Transportation and enacted the Multimodal Transportation of Goods Act, 1993 based on the UNCTAD/ICC rules which have gained widespread acceptance. The Multimodal Transportation Act lays down the standard terms and conditions governing this activity. Under the provision of the Act only those companies who are registered by the competent authority which has been notified to be

the Director General of Shipping, can carry out Multimodal Transportation. This requirement of registration has been imposed by the government to ensure that only such companies which have the necessary expertise infrastructure and financial capability are allowed to undertake Multimodal Transportation so that the interests of shippers are fully protected.

3. As per the MMTG Act three categories of companies are eligible to be registered as MTO's. They are (1) shipping Companies (2) Freight Forwarding Companies (3) Companies which do not fall in either of the above two categories. In the case of Shipping Companies (which own and operate vessels) as well as Freight Forwarding Companies the turnover of the last three years should be Rs. 50 lakhs or more to make them eligible for registration as MTO.

In the case of a company falling under third category above, the Subscribed share Capital of the company should be Rs.50 lakhs or more. In addition the applicant company should satisfy the following:

- a) Submit a certificate of turnover duly signed and issued by a Chartered Accountant within the meaning of C. A. Act, 1949.
- b) Have offices/agents/representative in atleast two other countries.

Multimodal Transport Document and its implementation in India

1. The business environment is moving faster than ever before. Increased competition at home and abroad means quality as well as profitability must be preserved. We live in a constantly evolving world where harmonization is extremely important and the trade desperately requires an efficient and simple door to door liability system. This was one of the reasons why ICC and UNCTAD developed the new UNCTAD/ICC Rules for Multimodal Transport Documents.
2. Increased containerization has resulted in Multimodal Transport of Goods under a single transport document covering all modes of transport from the exporter's premises to the consignee's premises such Multimodal Transportation under a single document has a number of advantages like reduction in overall transport cost reduction in delays, smoother and quicker movement of and improvement in quality of services. In India there was no uniformity followed in respect of MULTIMODAL Transport of goods. Government felt that absence of uniformity in such practices, leads to ambiguity and imbalance of interests between the operators and the cargo owners. A working ground was accordingly; set up to examine the prevalent situation and to recommend a law which should clearly determine the responsibilities and liabilities of MULTIMODAL transport operators for loss or damage. The new law on MULTIMODAL transport was enacted by issue of an ordinance in October 1992 and was later on replaced by the Multimodal Transportation of Goods Act 1993.
3. **WHAT IS THE MULTIMODAL TRANSPORT DOCUMENT:**
With the advent of containers, the ocean carriers started extending their services to Inland locations, as containers, are smoothly and easily handled from one mode of transport to another. One of the most important ingredients involved in such Multimodal Transport is the existence of a legal regime to govern the terms of the contract and specify the basis of liability and responsibilities of the Multimodal Transport Operator. Previously, a document called Combined Transport Document (CTD) was being issued. However, although the format of the document broadly conformed to a

specimen prescribed by the International Chamber of Commerce (ICC), the CTD has not been adopted by all operators uniformly. Thus, there was an absence of uniformity of liability and other condition. In India the Foreign Exchange Dealers Association of India (FEDAI) has evolved its own rules laying down the responsibilities and liabilities of Combined Transport Operators from the inland container depots. However, these rules could not obtain wide acceptance mainly because the Combined Transport Document evolved by FEDAI did not confer negotiability and title to the goods and also because such documents were required to be exchanged for a regular on-board ocean bill of lading at the port unless the letter of credit specifically permitted the production of a combined transport Document in place of a regular Bill of Lading. Looking to the urgent need of Industry and keeping in view the provisions of the Multimodal Transportation of Goods Act 1993 which is substantially based on the rules framed by the ICC and also taking into account the provisions of the UN Convention of 1980 on Multimodal Transportation of Goods, the Director General of Shipping, with the approval of the Govt., has issued an Order on 17th March, 1994 prescribing a model for the Multimodal Transport Document (MTD). The document has been prepared for carrying out the provisions of the Act keeping in view the primary objective of the legislation that the carriers are thereto serve trade and not the other way around. The Multimodal Transport Document issued under the present law would be:

- i) a contract for the Transportation of Goods by Multimodal Transport.
- ii) a negotiable document unless it is marked non negotiable at the option of the consignor.
- iii) a document of title on the basis of which its holder can take delivery of the goods covered by it. The concerned parties who would have commercial interest who would be governed by the document once it is executed would be:
 - iv) The MTO who is the person responsible for the execution of the Multimodal Transport Contract.
 - v) The consignor who places the goods in question with the MTD for transporting the same and the consignee who is to take delivery at the destination.
 - iii) The bankers who would provide the mechanism for documentary credit.
- vi) The insurers who insure the goods against loss or damage and the liability insurers who would cover the MTO's liability under contract.

“MTD” AS AN INSTRUMENT TO ENFORCE THE PROVISIONS OF THE ACT.

Once the Multimodal Transport Operator executes the Multimodal Transport Document, he immediately assumes the role of the owner of the goods, the Principal thereby authorizing the MTO to exercise the rights as that of the owner for claiming damages etc. and for other purposes, wherever necessary. The provisions of the Act shall have overriding effect over all other laws and any contract for MULTIMODAL Transport made in contravention of the provisions of the Multimodal Transport Act would be null and void. The issuance of the Multimodal Transport Document confers and imposes on all interested parties the rights, obligations and defenses set out in the act. In issuing the MTD, the MULTIMODAL transport operator assumes responsibility for the execution of the contract as well as would be liable for the loss or damage to goods or delay in delivery as contained in the Multimodal Transportation of Goods Act 1993.

CONTENTS OF THE MTD - GENERAL NATURE

The document contains, inter-alia, particulars regarding general nature of goods, the name and principal place of business of MTD, the name of the consignor, the name of the consignee if specified by the consignor, the place and date of taking charge of the goods by the MTO, the place of delivery of the goods, the date or the period of delivery of the goods at the place of delivery, whether it is negotiable or non-negotiable, the place and date of its issue, etc. In addition, the standard terms and conditions regarding basis of liability of the MTO for loss or damage, delay etc. have been incorporated in the document. Relevant particulars contained in the internationally accepted documents recognized by International Chamber of Commerce have been taken into consideration while prescribing the document. The MTOs can now issue on a uniform basis Multimodal Transport Document as a

negotiable instrument as per the Multimodal Transportation of Goods Act, 1993 and the banks will have no difficulty in discounting the bills when such a document is presented.

STANDARD CONDITIONS GOVERNING MULTIMODAL TRANSPORT

There are 24 main paragraphs with sub-paragraphs laying down the standard conditions governing Multi Modal Transportation in accordance with the Multi Modal Transportation of Goods Act 1993. Definitions of relevant terms are given in para 1 and are in accordance with the Act. Since this is a recent legislation required to be applied in connection with India's overseas trade and the consignees would be outside the country, it is necessary to give the definitions in these standard conditions so that all concerned parties in different countries are aware of the meaning of various terms as understood under the Act. The scope of applicability of the document is to be restricted in accordance with the preamble of the Act and has, therefore, been specified in the second condition. Similarly, the effect of issuance of the MTD should be well known to the parties affected by the document as this is an essential part of the Multimodal Transport contract and therefore, the same has been shown in the document. The negotiability and the title to the goods has been incorporated in the standard conditions in accordance with Section 8 of the Act. Reservations regarding inaccuracies, grounds of suspicion or the absence of reasonable means of checking have been mentioned in condition 5 and are in line with Section 10 of the Act. The evidentiary effect of the Multimodal Transport Document is in accordance with Section 11 of the Act. Guarantee by the consignor as stipulated in Section 12 has been specified in Condition No.7. Conditions governing Dangerous Goods, as required in Section 21 of the Act, have also been incorporated in the standard conditions. Basis of liability and conditions of liability of the MTO for loss or damage when the stage of transport where the loss or damage occurred is not known/known have been covered in Condition Nos. 10, 11 & 12 and are in accordance with corresponding provisions in the Act. Similarly, the liability for delay, which is in keeping with Section 16 of the Act, has been stated in the standard conditions. The

limits of liability are clearly spelt out in the said conditions. Section 20 of the Act lays down the conditions relating to notice of loss, damage or delay and these have been brought out in Condition No. 17. Further, provisions in respect of liens, limitation of action, jurisdiction, general average clauses, etc. have been clearly spell out in the document in accordance with corresponding provisions of the Act. Besides, specifying the applicable provisions of the Act the document also contains some of the conditions which are necessary to facilitate smooth transaction of Multimodal Transport. There is a residuary condition No. 25 relating to arbitration which permits concerned parties to incorporate suitable provisions by mutual agreement.

STATUS OF THE MTD VIS-SIS PRESENTLY USED CTD

The combined transport document, which is presently being used also for Multimodal Transportation, is essentially a document of contract for the carriage of goods for one mode of transport with the facility of inbuilt documentation for carriage of the same goods by another one or more mode of transport after the completion of the first mode. It may thus be appreciated that the CTD used in overseas carriage of goods is basically a commercial document for inter-modal transportation and a legal document for uni-modal transportation for each particular mode of transport covered under the CTD. The CTD facilitates onward movement of cargo by one mode to another mode on the basis of the original document with suitable endorsements. However, it is not meeting the requirements of providing a legal regime of uniform liability on the basis of a single contract of carriage of goods by Multimodal Transportation. The CTD, therefore will not meet requirements of the MULTIMODAL Transportation of Goods Act 1993 or even for that matter the UN Convention on Multimodal Transportation, strictly. The Multimodal Transport Document Model prescribed by the Govt. of India will not only be a commercially acceptable and negotiable document but will also be the basis for a contract of carriage governed by uniform liability regime for Multimodal Transportation of Goods in International trade besides being a legally tenable and enforceable instrument.

The Changing Multimodal Infrastructure

With rising consumer demand and the resulting growth in global trade, the role of infrastructure support in terms of rails, roads, ports & warehouses hold the key to the success of the economy. Here we provide a quick overview of the status of the multimodal transportation and multimodal infrastructure in India and the current initiatives, both private and public, in this area.

Goods are transported predominantly by road and rail in India. Whereas road transport is controlled by private players, rail transport is handled by the central government. With the second largest network in the world, road contributes to 65 per cent of the freight transport. Road is preferred because of its cost effectiveness and flexibility. Rail, on the other hand, is preferred because of containerization facility and ease in transporting ship-containers and wooden crates. Sea is another important mode of transport. Ninety five per cent of India's foreign trade happens through sea. India has 12 major ports, six each on the West and East coasts and 185 minor ports.

Determinants of MULTIMODAL Growth in India

The Indian multimodal transportation business is valued at US\$ 14bn and has been growing at a CAGR of 7-8 per cent. As mentioned earlier, the multimodal transportation cost represents 13-14 per cent of the country's GDP. The market is fragmented with thousands of players offering partial services in multimodal transportation; it is estimated that there are about 400 firms capable of providing some level of integrated service. The economy is expected to grow around ten per cent over the next ten years and sectors like chemicals, petrochemicals (especially distribution), pharmaceuticals, metals and metal processing, FMCG, textile, retail and automobile are projected to grow the fastest. New business models are emerging as new firms, both domestic and foreign, enter the market. As a result of the ensuing competition, linkages with global supply chains and domestic market growth promise to change the face of multimodal transportation industry beyond recognition. In this section, we discuss how these are going to determine the growth of the sector.

The scale of operations in manufacturing is changing and so are their markets and sourcing geographies. Growth in manufacturing in India has happened across clusters that are located in different parts of the country, e.g., Ludhiana, NCR, Baddi and Dehradun in North, Rajkot, Jamnagar, Pune and Mumbai in West (along with Ankleshwar, Vapi, Aurangabad, and Kolhapur and most recently Kutch), and Coimbatore, Vishkahpatnam, Bangalore, Hosur, Chennai, Pudduchery and Sriperumbudur in the South. Assembly plants at these locations are being fed with raw materials and intermediate products from all over the country and abroad (as well as these locations). Moreover, distribution networks with emerging hubs in Indore and Nagpur (i.e., Central India) supply all over the country and abroad. This is going to increase the nature and extent of movement of goods and services across the country. This has been accompanied by the expansion of domestic production capacity (e.g., ORPAT in Morbi has added capacity to produce 40,000 units of quartz clocks and time pieces at a single location) as well as a big MNC entry into the Indian manufacturing scene (e.g., NOKIA's new factory at Sriperumbudur produces 1 million mobile phones per month). As the volume of

production grows, so will the extent of movement of goods either to the ports for export or to the rest of the country. Some of the large players to enter (or expand significantly) the Indian market recently have been Reliance Retail, Big Bazaar Hypermart, Pantaloon and RPG in Retail; Nokia, LG, Samsung, Motorola, Sony, Blue Star in Consumer Electronics; Bajaj, Hero Honda, Maruti, Honda, Toyota, Audi, Volkswagen, Renault, Volvo in the Automotive sectors; Holcim in Cement; etc. It can be expected that their operations will drive the growth of multimodal transportation industry.

The liberalizing Indian economy is experiencing entry of large domestic and global firms in new businesses as well as enlargement of distribution network of many regional Indian firms. The announcement of large retail projects by Reliance and Bharti (in collaboration with Wal-Mart) will bring new technology, add additional warehouse capacity and will require fast and reliable movement of goods across the country. Reliance is thinking of establishing large warehouses in Thailand to take advantage of low cost sourcing from South-East Asia once the Free Trade Agreement with Thailand (as well as ASEAN) gets finalized.

Subhiksha who are present very extensively in the South Indian market are now entering the rest of the country with more than 600 new retail stores in 2007. Their multimodal transportation strategy and needs are transforming very significantly with this nationwide expansion. New retail chains are entering the non-metro towns and non-State capitals. It may be mentioned that the growth of the courier industry post-liberalization has helped change the parameters of service evaluation in the industry from cost alone to cost, time, and reliability. This sector has also seen number alliances between regional and local players especially in the small package (less than 500 grams) market thereby creating networks of small players who are not only cost effective but also more flexible than the large national players. This segment of the industry has taken advantage of the large manpower and is gradually moving away from "Angadiyas" or manual inter-city couriers to a more organized network that shares transport infrastructure (and even consolidates sub-packages from various small couriers in a single large courier bag to be transported by air cargo or road transport rather than these sub-packages being carried by several manual couriers on the train; the courier firms are gaining on service and are sharing fixed costs).

The entry of large third party multimodal transportation (3PL) carriers like Federal Express and DHL and the expansion of domestic networks of Indian firms like Gati and Shreyas Shipping is also transforming the nature of services and the business practices across the sector. Table 4 gives an idea of the investment plans announced by the various firms for the coming financial year and gives a sense of their increasing activity. Another trend driving growth in this sector has been the consolidation amongst the multimodal transportation player. Mergers & Acquisitions amongst Indian and MNC multimodal transportation firms is starting to increase the reach of MNC 3PLs in the domestic

Investment Plans of Major 3PL Service Providers

Firms	Investment Details/ Plans (2007-08) (in US \$ mn)
DHL	260
TNT	115
Gati	200
*Shreyas Shipping and Logistics	350

market while consolidating the business (e.g., DHL acquired Blue Dart, TNT acquired Appendage Express Cargo Service, Fedex bought over Pafex etc.). Consolidation is expected to be beneficial to both the service providers as well as the consumers. Initially MNC 3PL firms were providing only custom clearance and freight forwarding facility to their international clients. With the multimodal transportation market growing we should see a shift in this trend. The complexity of managing the supply chain in the pre-consolidation era is illustrated through the following scenario at Nokia. Logistics activity for Nokia's India Hub was maintained by a large number of service providers. Coordination and handover was a problem at times. With DHL acquiring Blue Dart, it is now able to provide seamless end-to-end integrated supply chain solutions. Downstream distribution channels have also seen some consolidation. Manufacturing firms, particularly, in the FMCG sector have started to reduce the number of wholesalers (and at times,

distributors) so as to increase the reach and consequently the returns to each wholesaler. This also induces them to invest in new productivity enhancing technology and effective managerial practices. Technology in the multimodal transportation chain is being upgraded bringing better visibility on customer off-takes (though an absence of cash registers and the accompanying regulatory discipline to avoid tax evasion stand in the way of automated data updation). Introduction of more efficient transport technology and mobile communication has the potential of changing the multimodal transportation practices in the industry. Increasing competition and the low penetration of IT also implies that the scope for change is immense and imminent. The agri-business sector's supply chain, for example, has changed significantly with increasing investment in cold-chains across the country. With this, fruits and vegetables are being transported long distances (often more than 1500 kms) and milk grid is able to pickup and delivers liquid milk from and to remote areas more frequently. Here the role of cooperatives like AMUL has been exemplary both in increasing the size of the distribution network and also in re-organizing the supply network very efficiently along with enormous buildup of social capital – a pre-requisite for growth in emerging economies. Low penetration of hand held technologies for order processing and tracking, product tracking and material handling accessories, as well as IT for improved decision making can be seen as opportunities for growth. Mobile technologies also hold the potential for rapidly using information for real time decision making as well as for coordinating both the inbound and outbound multimodal transportation. Indian customers exhibit strong value and variety seeking behaviour hence developing capabilities in the process of product and service delivery will induce loyalty (i.e., process loyalty).

Government policies have been another driver of change in the multimodal transportation industry. The trend towards higher road cargo traffic as compared to rail is going to require better multimodal transportation control and coordination. The golden quadrilateral road project and the east & west rail corridors are expected to change the reactivates of Indian firms through shorter lead times as well as lower maintenance costs on the transport equipment. They also have the potential of reducing the procedural delays on highways by reducing the number of checks and related stoppages of vehicles. Its impact on perishable good will be most significant. Thirteen States and three UTs have already amended the State laws allowing private sector participation in direct purchases of farm produce from

farmers which is making procurement more efficient and is bringing better technology as well as products in the rural production and distribution network. Banks have developed venture capital funds for multimodal transportation players. Small Industries Development Bank of India or SIDBI, for instance, has invested \$ 2.3 mn in the Mumbai based firm Direct Logistics. The unbundling of the multimodal transportation supply chain (the physical pickup, storage and movement of goods as well as allied services like invoicing, order management, freight forwarding, customs clearance, octroi tax management etc.) will lead to business opportunities and add value to the customers. An interesting example is that of Reliance Connect Service Centres that have been established on Indian highways by Reliance industry along with petrol stations. The Connect Centres provide a place for truckers to relax (sometimes with overnight stay facilities), send information (including data) to parent firms on their location, completed transactions etc., receive material/instructions from the firm, remit money to parent firm, etc. It has become a one-stop shop for truckers and their companies to keep in touch. Similarly, once VAT is introduced, it will simplify the process of goods servicing and will lead to rationalizing of many operational decisions.

The implication of the emergence of a strong service industry on multimodal transportation performance is not well understood. Perhaps, a new business segment will emerge that is technology driven and will help coordinate activities across business channels. For example, there is a need to integrate the flow of information, goods and services between a medical physician, a diagnostics center, hospitals & nursing homes, and retail medical outlets – all of which are uncoordinated independent entities at the moment. This could range from digital transmission of MRI scans from a diagnostics center to a physician's computer to blood collection and delivery from various city centers to nursing homes/blood banks or directly to dispersed operation theatres. The role of a coordinating agency becomes, organizationally, valuable in such an environment. The need is to link physical multimodal transportation processes with communication technologies – building on the strengths of the IT and mobile communication industries.

The Renewal of the Sector: Some Innovative Experiences

There have been several instances of firms undertaking innovative re-design of their multimodal transportation systems or deployment of interesting business models to enhance the effectiveness of their networks in order to deliver value to their customers. Sometimes it was done to overcome an inherent disadvantage that may exist in the supply chain. In this section, we present a few such experiences both at the firm level and at the industry level, through brief case lets highlighting their innovative contribution. They also represent the renewal process that is transforming the multimodal transportation sector and the distribution strategy of firms.

GATI

Established at a time (in 1989) when firms in India hardly outsourced their multimodal transportation requirements, Gati has transformed itself from a cargo movement company to become one of the leading end-to-end multimodal transportation and supply chain solutions provider in India. Continuous innovation and high end technological investments to improve service quality speed and efficiency can be ascribed as the reasons behind their success. It is starting to connect with mass retail market in several cities through 1500 Customer Convenient Centres. It is also the first Indian company to operate in the far-east market with its own subsidiary in Hong Kong. On the service front, there have been several firsts in India by Gati – a money back guarantee on cargo services, cash-on-delivery and a toll-free number for convenience of customers. Gati operates one of the largest road networks linking 594 districts out of a total of 602 districts in India at a turnover of \$104mn in 2005-2006. It covers 3.2 lakh-km every day with a fleet size of 2000 trucks. Its automated shipment tracking ability has brought it closer to the customers – for example, the SMS based tracking system has allowed the customers to continuously get an update on the status of their consignment. Another feature also enables customers to get email based conformation of any delivery.

Gati has also transformed the warehouse management practices in India with its modern system, WMS - a web based warehouse management system that provides both functionality and flexibility to customers in managing their warehouse operations. WMS enables Gati and its customers to track inventory status in real time. Along with its transportation related capabilities, this has allowed Gati to manage the entire outbound multimodal transportation (i.e., warehousing, transport

and dealer/retailer replenishment) of Blue Star for his home air-conditioning division. Order processing times and shipping errors have decreased and customer service levels have improved, as a consequence. Currently, Gati operates with 10 warehouses and plans to setup another 25 over the next three years at an investment of \$100mn. It is designing these new warehouses with mechatronic systems that could lead to a paradigm shift in warehouse management in India. It has implemented CRM and ERP systems, using IT to full advantage delivering value to the customers.

AMUL

The Kaira District Milk Cooperative Union or better known as AMUL was established in 1946 in Anand in the western State of Gujarat with an aim to remove the intermediaries in the milk procurement and distribution process and thereby increase return to milk farmers. The milk farmers were mostly marginalized members of the society and most of them barely poured a few litres of milk each day. They, however, depended on this for their livelihood and any money lost to the middleman or to uncertainty in the environment meant a threat to their existence. Thus was born AMUL (which means invaluable in Hindi)! The Story of AMUL is an extraordinary story of vision, effort and power of networks for the benefit of the poor. From being a net importer of milk in 1947 when India became independent, India has now emerged as the largest milk producer in the world. This remarkable story has been scripted by a network of cooperatives called AMUL.

The AMUL network is coordinated by the Gujarat Cooperative Milk Marketing Federation (or GCMMF) which markets milk and milk products that are produced by 12 Milk Unions (each having several factories) one of which is AMUL at Anand. The Unions are spread in twelve districts of Gujarat. Each Union collects milk from farmers through cooperative Village Societies. (This structure is now replicated in almost all the States of India.) In 2005-2006, GCMMF had a sales turnover of \$860mn through milk and milk products (its Unions or plants produce 15 categories of milk products with several products in each category).

The 12 Unions collect about 6.3million litres of milk every day from 2.5 million farmers through 11,962 Village Societies. (with an annual collection of 2.28 bn litres in 2005-2006). Each village society may have 100 to 1000 member farmers who pour milk twice a day. Twice daily, about 500 trucks collect milk from these Village Societies and bring them to either of the five chilling centers or the processing plants (or Unions). The Unions process the liquid milk – produce milk

of various types for consumption, convert some to powder as inventory and use both powder and liquid milk for producing milk products. These products are distributed to consumers through a channel comprising 4000 stockists (or distributors) and 5,00,000 retailers. It is not difficult to imagine the complexity of coordinating such a network of perishable products with an explicit social objective, in addition to a commercial one. The network realized the need for a unique model to deliver value to customers and through that serve the key objective of setting up of the cooperative – making a producer out of a poor consumer and helping her get better returns. Briefly, we will illustrate the unique mechanisms used by this network to coordinate the complex supply chain through the intervention of a number of third party service providers (distributors, retailers, multimodal transportation service providers and IT support groups). The network practices frequent delivery and works with low inventory levels in the chain, supported by extensive information network and IT kiosks at the milk pickup locations that provide a variety of services. Payment to farmers for RM procurement is instantaneous (well, almost!) – during the same or in the next pouring shift by the Village Society staff. Milk is carried in cans by trucks (twice daily) or in chilling trucks, once in a day, to the plants. The routes of the trucks are well established and the arrival timetables at each Society well known and rarely is there any delay. This helps provide visibility to every member of the chain and improves the return on investment in the channel. The network operates with a zero stock out through improved availability of products and quick delivery. Disciplined planning to reduce variability at each stage helps in maintaining timeliness in the channel. GCMMF coordinates the production plan between the twelve Unions and ensures matching of geographic markets with supplies. TQM and change programmes – these have facilitated a six-sigma performance throughout the network and have led to a doubling of sales revenue in the last ten years. Most interestingly, AMUL has the largest market share in every product category that it competes in – its competitors are both large MNCs and large & small Indian firms.

AMUL illustrates how good managerial practices can help bridge the gap between profits for the supplier and low cost, high quality products for consumers – all through exceptional coordination of multimodal transportation operations across an extensive network. AMUL operates with one umbrella brand for products from all

its member Unions – a testimony to strong quality and cost coordination across all Unions and Village Societies. In addition, its has been singularly responsible for pulling out several million of its members from poverty, ill health and illiteracy through its business model and social programmes.

Transforming the Auto-Component Replacement Supply Chain

With changing government policies and consumer preferences, the distribution supply chain of Indian companies has been affected significantly. This poses new challenges for various channel partners. I illustrate this transformation process through the lens of the auto component replacement market supply chain and discuss its implications.

The auto component industry produced parts worth \$6.7 billion (2004-05) with 57 per cent of the demand coming from the replacement market. Low entry barriers have led to a large number of players in the replacement market. There are about 400 firms in the organized sector and more than 5000 in the unorganized sector. Another feature of this sub-sector is the long duration of ownership of vehicles in India which leads to high requirement of parts. It is also found, anecdotally, that willingness to pay for parts decreases with the length of ownership. This has led to an intense segmentation of the parts market by price.

This industry was still in a nascent stage. It was characterized by few manufacturers and low demand. Consequently, the distribution network was flat. Availability of spare parts was a key issue with long delivery lead-times and manufacturers sought large order sizes. This also led to the growth of un-branded parts or parts branded by regional producers in the replacement market. The product was sold chiefly on personal relationship with the buyer; quality, brand and price were not the selling propositions. Maruti Udyog Limited had created a network of suppliers of quality parts for its vehicles. Hero Honda had done the same for its motorcycles.

Post-1991, the liberalization of the automotive industry led to an entry of many foreign auto players. Because of the impending automobile industry boom and high margins for distributors, the demand for spare auto-parts was expected to grow. The distribution channel was modified with the entry of two more channel members, i.e., wholesalers and semi-wholesalers. The latter were smaller versions of the former and locally oriented.

The period 1994-2007 saw a major transformation of the distribution structure. OEMs started to operate in the replacement market through a parallel supply chain selling parts through their service stations. Additionally, the entry of large number of channel members caused semi-wholesalers to move out of the supply chain - they either moved up the chain to become wholesalers or moved down to become retailers. To strengthen the coordination of this extended supply chain and to buffer against the differential tax structure across states, companies started to operate with Carry and Forwarding Agents (C&FA). Transportation related activities are carried out by all the members of the supply chain. Manufacturers use services of 3PL for transferring their stock to C&FA and distributor locations. But thereafter, the transportation activity is solely managed by channel members themselves.

An analysis of the available IT infrastructure and its usage pattern for all the channel members in our sample survey indicates that there is a high deviation in the usage of IT in the replacement market supply chain. Eighty seven per cent of the sampled firms use an ERP package – most of which is customized and developed locally. The main impediment in the use of a branded packages is the high cost of purchase and implementation. These packages are used to generate sales report, order from suppliers, account for the financial transactions and track the level of inventory at plant and C&FA. Manufacturers order the stock from suppliers mostly through emails. In order to track inventory in the channel, firms also made IT investments both at C&FA and within the firm. Linking the C&FA to the company website enabled firms to check stock status at the C&FA and reduce the order processing and customer response times. Larger firms are also providing a similar setup to their distributors. Since the C&FA is mostly owned and managed by the firms, manufacturers are also able to check the inventory status, dispatching status and customer records. Distributors have invested primarily in computers for keeping track of the inventory and updating accounting details. On the other hand, rest of the channel partners (wholesalers and retailers) don't even own computers. Parts are ordered primarily on the phone. Interestingly, most distributors were found to be following periodic review policy while the rest of the channel members were following continuous review policy because of their low sales volume.

Post 2007, with the implementation of a uniform tax structure across all states, there will be some changes in the way firms operate. The C&FA will, perhaps, become redundant as most manufacturers will prefer to deal directly with distributors. The concept of an exclusive distributor is expected to vanish. It is expected that with the increase in variety of components, distributors might become wholesalers and will stock multiple brands for the same product. Two

parallel distribution channels are expected to be in operation – the OEM chain and the non-OEM chain. OEM network will primarily handle the passenger car replacement parts and the non-OEM distribution network will sell parts for Light Commercial Vehicles, Heavy Commercial Vehicles, 2-wheelers and 3-wheelers as the car customer is becoming more brand conscious even while replacing parts which comes along with superior service. Further, we perceive that the more advanced automobiles, Free Trade Agreement with other Asian countries and VAT are going to change the way the replacement market operates. There will be a rationalization of this market in terms of number of firms competing thereby leading to an improvement in quality, delivery time and availability of parts. The size of the firms is expected to increase with an emergence of large national players (in addition to OEMs). This may reduce the number of producers exclusively focusing on the local markets.

Challenges Ahead

Several challenges remain before the Indian multimodal sector and its future success will depend on the ability of the industry to overcome these hurdles. Some of these impediments are at the firm level while others are at the policy level.

At the policy level, the issues of infrastructure and integration of the nation's multimodal transportation network remain the two most critical areas that require attention. The growth of infrastructure, since 1991, has been quite extensive (covering a wide geographical area) as well as strategic – linking the key industrial, consumption and transshipment centers. However, some imminent weaknesses need be addressed. Movement beyond the golden quadrilateral is required to bring goods from upcountry production sources to main shipment centers. The rate of growth of expressway has to increase. Poor road conditions increase the vehicle turnover, pushing the operating cost and reducing efficiency. National highways are being upgraded but they account for a meager 2 per cent of the total road network. More importantly, due to non-contiguous development of expressways, truck traffic has to frequently move from the expressway on to old national highways and vice-versa. This is inconvenient and is restricting the utilization of the excellent road network that is being developed. The pricing of the toll on these expressways especially for cargo traffic has also been a deterrent to be usage – perhaps, one need to understand the price elasticity of this demand and develop appropriate price packages for heavy and frequent users. Here, the role of transport technology needs to be mentioned as well. Once the cost of manufacturing multi-axle trucks comes down, it will see higher penetration and consequently lower per unit cost of transportation. Volvo is trying to develop this market but the volumes of high capacity truck continue to be low (about 7 per cent of the total truck production, 2006-2007). The East & West bulk rail transport corridor will divert some traffic from road provided the secondary movement (i.e., from the nearest station to the plant/warehouse) can be minimized and the issue of security of the goods is addressed adequately. Similarly, river navigation in the North and North-Eastern India can pose useful options for cargo movement in hinterland where road congestion is high.

Goods vehicle run only 250-300 km a day in India as compared to 800-1000 km in developed countries. Inter-state check posts, surprise checks and unauthorized hold ups on highways (some due to security reasons while others are to establish the authenticity of the cargo as declared) create bottlenecks. Entry taxes into cities for goods also create procedural bottlenecks. The Motor Vehicles Act and the Motor Transport Workers Act that regulate driver licensing, loading norms etc. and duty hours of drivers respectively require modification to address the quality of services in this sector. Similarly, while the regional permits that allow a truck to ply between certain states come at a lower cost (as compared to a national permit), it limits the flexibility of truckers to convert opportunities. Indian multimodal transportation market remains fragmented on these counts and the national market (as well as service) does not appear as one integrated entity. Harmonization of taxes, procedures and policies across States is required to facilitate a seamless flow of goods and services. For instance, if there was a nation-wide broadband multimodal transportation IT-network then a trucker starting in Chennai (in the southern Indian State of Tamilnadu) could file all the papers in Chennai, get all inspections done there and move without interruptions to say, Jammu (in the northern Indian State of Jammu & Kashmir) . Each state entry point could have access to those papers and they could flag the truck through their check-post as it reached there with no stoppages or delays. Today, it could take anywhere from half hour to few hours to get papers and goods inspected at each check post. The later could be taken care of by having sealed container carriers. Changes in process technology are needed to increase the effectiveness and responsiveness of the transport network.

In privatizing the operations of container traffic through rails, new entrants are expected to face serious problems. Because of limited manufacturing capacity for producing wagons, these firms will have to import wagons at high cost. Huge investments in storage capacities near railway stations will also add to their cost. All these factors will increase the entry barriers for the private operators. Moreover, the tariff structure and revenue sharing is still a hindrance for public-private partnership projects to succeed in infrastructure development.

While the use of IT for multimodal transportation management is increasing, it is largely limited to large size firms. This represents an opportunity to further

improve the decision making abilities across the supply chain and reduce costs further. For instance, order processing and delivery status are two areas that reflect a certain weakness in servicing. With the growth of the IT sector in India, these are clearly areas that can gain from the IT sector's engagement. For example, manufacturing firms can collaborate with the extensive network of call centers for managing order processing and actual integration of order servicing with the physical supply chain. Similarly, there is a role for emergence of a segment (e.g., a service provider) in the multimodal transportation chain that manages dispatch information and performs delivery tracking across manufacturers for their customers. Similarly, only a few thousand vehicles out of a total of several millions have tracking system. Truck manufacturers could integrate the tracking technology in its products and IT servicing firms could provide information service on highways tracking movement of vehicles. This would provide information to distribution firms and help track both the consignment as well as the truck better. As of now, the best service is the one provided by Reliance Connect at their petrol pumps on the highways where truckers stop by and call their firms to inform them of there whereabouts. Such service providers become very valuable to tiny and small trucking companies that proliferate the multimodal transportation industry and who do not have the wherewithal to either install or operate their own IT systems. As the concentration in the industry increases, the need to manage larger number of trucks, routes, warehouses and customers will require decision support systems that perform dynamic planning & scheduling. The IT base is indeed low and firms need to compete on the basis of real multimodal transportation costs instead of clever accounting practices before the sector will see increased IT penetration. As the need to have visibility in the supply chain increases, better technology applications will also appear.

Another area that will see tremendous growth is outsourcing of multimodal transportation service. While multimodal transportation outsourcing has been in existence for several decades, it was limited to transportation and warehousing. Post-liberalization, the country has seen outsourcing of value add services like freight forwarding, fleet management, import/export and customs clearance, order fulfillment, consulting services like distribution network planning etc. These are early years for the 3PL service providers and a recent survey cites lack of trust and awareness as the key hurdles to its growth. Service tax on outsourced cost and the

requirement to establish multiple warehousing facilities in order to avoid double taxation (and thereby lose the advantage of scale economies with fewer warehouses) were also found to undermine the 3PL business. According to this survey, most of the 3PL service providers offer limited services. In future, their role as coordinators will require that they offer a wider menu of value adds services. They also have the potential of integrating SME channels through a variety of multimodal transportation services and technology across a network of small producers.

The multimodal transportation industry is evolving rapidly and it is the interplay of infrastructure, technology and new types of service providers that will define whether the industry is able to help its customers reduce their multimodal transportation costs and provide effective service. Changing government policies on taxation and regulation of service providers will also play an important role in this process. Coordination across various government agencies require approval from multiple ministries and is a road block for multi modal transport in India (e.g., ports, roads, railways, container freight operations etc. are all managed by different ministries in the Government of India. At the firm level, the multimodal transportation focus will have to move towards reducing cycle times in order to add value to their customers. These are few of the issues one need to take account before the multimodal transportation industry can boom significantly in India.

Typical Logistics Supply Chain of Nokia

Coordination and handover was a problem at times. With DHL acquiring Blue Dart, it is now able to provide seamless end-to-end integrated supply chain solutions. Downstream distribution channels have also seen some consolidation. Manufacturing firms, particularly, in the FMCG sector have started to reduce the number of wholesalers (and at times, distributors) so as to increase the reach and consequently the returns to each wholesaler. This also induces them to invest in new productivity enhancing technology and effective managerial practices. Technology in the multimodal transportation chain is being upgraded bringing better visibility on customer off-takes (though an absence of cash registers and the accompanying regulatory discipline to avoid tax evasion stand in the way of automated data updation). Introduction of more efficient transport technology and mobile communication has the potential of changing the multimodal transportation practices in the industry. Increasing competition and the low penetration of IT also implies that the scope for change is immense and imminent

STRUCTURE OF THE TRANSPORT SECTOR

Defining Sector Components While many activities in the transport sector in India are strictly state controlled, there are other significant segments which are almost entirely in the private sector. It would be useful to broadly classify the transport sector into three primary segments, namely infrastructure (hardware), services, and regulation. There are broadly three components of infrastructure with increasing possibility of being attached to the specific services provided: (a) right of way, (b) terminals, and (c) rolling stock and equipment. Services too can be broadly categorized into three types with increasing closeness to the customer: (a) maintenance, (b) operations, and (c) customer services. Both maintenance and operations can be further classified as being for the right of way, or for terminals, or rolling stock. Customer services can be classified into basic and special (value-added) services. Thus, the distinct activities may be seen as under:

INFRASTRUCTURE

1. Ownership and asset creation

- . Right of way
- . Terminals
- . Rolling stock and equipment

2. SERVICES

- . Maintenance
- . Right of way
- . Terminals
- . Rolling stock and equipment

3. Operations

- . Right of way
- . Terminals
- . Rolling stock and equipment

4. Customer services

- . Basic services

. Special services

REGULATION

1. Licensing
2. Environmental impact
3. Safety
4. Pricing
5. Service levels

The relative importance of the state and the current structure of provisioning of each of the above activities for all the transport modes are brought in Table. The provider who has primary responsibility and accountability for the infrastructure and services is also identified. Even when activities are contracted (out), the principal continues to bear primary responsibility, though that brings in the principal. Agency problem. Hence stake holding and appropriateness of incentives become important.

AIR

When air is considered as a mode of transport, right of way is not a significant infrastructure. However, the operation associated with it, namely air traffic control, and has significant regulatory and safety aspects. The terminals have also never been privatized, though they have been privatized in so far as the terminal buildings or portions thereof are concerned. The rolling stock and equipment, customer services, and other special services (for example reservation) are all privatized.

Air transport consists of airports, air services, aircraft manufacture, and air traffic control. Since air traffic control is closer to a public good and regulatory in nature, it has been in government hands in most countries. In the aircraft manufacturing sector, India has developed little or no capabilities, except in certain low end defence aircraft. Airports and air services have much scope for private provisioning.

There are over sixty airports, either under the Ministry of Civil Aviation and managed by the Airports Authority of India (AAI), or under the Ministry of Defence. The total traffic handled by them in 2007 was 47 million passengers and 0.7 million tonnes of cargo, using 0.42 million aircraft movements. The traffic trends over the past four years have not shown any significant growth. What is worth noting is that the cargo traffic has gone up at a compound annual growth rate (CAGR) of 2.5 per cent and the numbers of international passengers have gone up at a CAGR of 3.9 per cent. Forecasts, however, had been estimating the growth in domestic passengers at 8.5 per cent and international passengers at 6 per cent annually. At those rates, India is expected to handle 63 million passengers by 2004.5. In 1998.9, Mumbai and Delhi handled 51.1 per cent of passenger traffic, 63.2 per cent of cargo traffic and 45.0 per cent of aircraft movements. International cargo constituted 67.8 per cent of the total cargo (in tonnes), of which these two airports handled 70.6 per cent. Chennai, followed by Calcutta and Bangalore, are next in order of importance. This is followed by the airports of Hyderabad, Trivandrum, and Ahmedabad, and Goa and Calicut.

These ten airports account for 84.9 per cent of passenger traffic, 95.6 per cent of cargo traffic, and 76.5 per cent of aircraft movements. The key requirement at airports is enhanced service levels and reduction of congestion. Towards this end the AAI envisages an expenditure of Rs 34.21 billion in the Ninth Plan period. A significant share of this is expected through private sector participation. The

government formulated a policy on airport infrastructure development in 1997. This policy allows up to 74 per cent foreign equity through automatic approval, and 100 per cent through special permission. It proposes to set up an independent regulatory board to fix tariffs, allot time slots, and allocate space in airports.

In May 1999, the first private sector airport built by Cochin International Airport Limited at Nedumbassery near Cochin was inaugurated. The total project cost was Rs 2.3 billion, financed through equity of Rs 0.9 billion and term loans of Rs 1.4 billion. The Kerala state government has 26 per cent equity participation. New private sector airports at Bangalore, Hyderabad, and Goa have been sanctioned. Privatizing a variety of services at Mumbai, Delhi, Calcutta, and Chennai airports has also been approved. The need now is to pursue these privatization goals proactively. One of the problems has been lack of consistency in the approach of the government. In the case of the Bangalore airport, the contractual conditions between the interested parties and the government were contentious. The contract documents were sent back and forth among the parties. There was much wasted effort, and finally the private parties withdrew. One of the important conditions stipulated by the parties was the closure of the existing airport, which the government after having raised their hopes finally refused to carry out.

PASSENGERS TRAFFIC AT AIRPORTS

(numbers in millions)

Airports	Domestic	% share	International	% share	Total	% share
Mumbai	6.18	25.7	4.84	37.5	11.02	29.8
Delhi (IGIA)	4.09	17.0	3.79	29.4	7.88	21.3
Chennai	1.79	7.4	1.74	13.5	3.53	9.5
Calcutta	1.91	7.9	0.61	4.7	2.52	6.8
Bangalore	1.86	7.7	0.14	1.1	2.00	5.4
Hyderabad (Begumpet)	1.17	4.9	0.18	1.4	1.35	3.7
Trivandrum	0.31	1.3	0.83	6.4	1.14	3.1
Ahmedabad	0.63	2.6	0.14	1.1	0.77	2.1
Goa (Dabolim)	0.51	2.1	0.19	1.5	0.70	1.9
Calicut	0.22	0.9	0.28	2.2	0.50	1.4
Others	5.40	22.4	0.17	1.3	5.57	15.1
All airports	24.07	100.0	12.91	100.0	36.98	100.0

CARGO TRAFFIC AT AIRPORTS

(000 tonnes)

Airports	Domestic	% share	International	% share	Total	% share
Mumbai	58.9	26.3	184.7	38.9	243.6	34.8
Delhi (IGIA)	47.9	21.3	150.6	31.7	198.5	28.4
Chennai	15.4	6.9	58.7	12.4	74.1	10.6
Calcutta	26.6	11.9	22.5	4.7	49.1	7.0
Bangalore	21.9	9.8	22.6	4.8	44.5	6.4
Trivandrum	5.8	2.6	24.9	5.2	30.7	4.4
Hyderabad (Begumpet)	8.6	3.8	4.6	1.0	13.2	1.9
Ahmedabad	6.4	2.9	1.5	0.3	7.9	1.1
Goa (Dabolim)	2.8	1.3	0.5	0.1	3.3	0.5
Calicut	2.1	0.9	1.0	0.2	3.1	0.4
Others	28.0	12.5	3.1	0.7	31.1	4.4
All airports	224.4	100.0	474.7	100.0	699.1	100.0

AIRPORT MOVEMENT AT AIRPORTS

(000)

Airports	Domestic	% share	International	% share	Total	% share
Mumbai	80.9	25.3	33.1	33.2	114.0	27.2
Delhi (IGIA)	44.7	14.0	30.0	30.1	74.7	17.8
Chennai	20.7	6.5	11.2	11.2	31.8	7.6
Bangalore	25.1	7.8	2.8	2.8	27.9	6.7
Calcutta	17.7	5.5	6.7	6.8	24.4	5.8
Hyderabad (Begumpet)	12.7	4.0	2.1	2.1	14.8	3.5
Ahmedabad	10.0	3.1	0.9	0.9	10.9	2.6
Trivandrum	2.6	0.8	6.4	6.5	9.1	2.2
Goa (Dabolim)	5.7	1.8	1.1	1.1	6.8	1.6
Calicut	3.4	1.1	3.1	3.1	6.5	1.6
Others	96.3	30.1	2.2	2.2	98.5	23.5
All airports	319.6	100.0	99.6	100.0	419.2	100.0

While considering new airports, location and land acquisition are important issues. Location has to be seen in conjunction with urban growth, access to key urban centers and environmental problems, especially pollution, and ease of land acquisition. While considering access to urban centers, an intermodal perspective is important.

For example, it is possible to think of a new international airport location midway between Ahmedabad and Vadodara, with direct access from the Ahmedabad. Vadodara Expressway, rather than upgrading the two airports independently. Also, scheduled coach services and even rail connections could improve catchment areas for airports, thereby allowing them to take advantage of economies of scale. Most European airports are examples of good design. The existing airports at Mumbai and Delhi are connectable by rail, since suburban rail lines go very close to the airport boundary. At Chennai, the situation is even easier, with the suburban rail having a railway station very close to the terminal. However, the systems do not feel integrated. A dedicated covered walkway over a dividing highway would solve the problem.

Both the proposed Bangalore and second Mumbai airports have faced problems regarding location. Apart from local resistance, there are also concerns that locations are being moved around to permit insider trading in land, in view of the expected high land compensation prices.

One of the first areas of liberalization in the early 1990s was permitting private participation in domestic scheduled air services. Luckily, the country had not forgotten that air services in the country had emerged with private entrepreneurship, until they were nationalized after Independence to form the Indian Airlines and Air India. Though many airlines entered the fray, only two have survived and one of them (Jet Airways) is now a major competitor to Indian Airlines, scoring better on most dimensions of service. Private scheduled airlines now account for more than 40 per cent of domestic air traffic. Fares and schedules are deregulated. However, the policy of bundling, according to which a proportion of seat kilometres operated in the Category I routes (inter-metro routes, expected to be highly commercially viable) must be offered in Category II and III routes, which constitute the unviable, and metro to smaller city routes respectively.

The policy allows the required offers of seat kilometres in these categories to be traded among the private firms. However, this approach to bundling is problematic because the airlines have been known to drag their feet in operating the less lucrative and unviable routes and operational monitoring by the regulator is weak. In fact, this categorization of routes should really be an approach to unbundling, wherein airlines willing to provide such services are allowed to bid on a minimum subsidy basis for the unviable routes. The current policy of private investment in domestic air transport permits 40 per cent foreign equity holdings. However, equity participation by foreign airlines is not permitted! This aspect of the policy is questionable since it would imply incentive incompatibility. Surely foreign airlines know-how would be an important ingredient in upgrading domestic service levels and efficiency. International air services are controlled by bilateral agreements between countries. However, the route rights are tradable, as in the recent example of Air India offering its unused rights to Virgin Airways of the UK in the India.UK sector. A recent welcome policy decision is that of privatization of Air India (to the extent of 60 per cent equity), in which foreign airlines are also allowed to participate. One hopes that after the hiccups have been ironed out, the privatization would go through. Cargo traffic is completely deregulated, both in the domestic and international segments. This has given a boost to especially international cargo traffic during the 1990s. In the domestic segment, courier/third party multimodal transportation companies entered the fray, and one (Blue Dart) still operates.

As part of the open skies policy of the early 1990s, non-scheduled air taxi operators were allowed free entry. Today, there are over forty operators providing air taxi services, catering to tourist circuits, executives of industries, etc. A fairly

extensive infrastructure of landing facilities across the country (thanks to British development initiatives during the Second World War) has come in handy for such air travel operations. Safety is a matter of serious concern for air transport in India. Maintenance standards, airport landing and take-off facilities, and disaster management need to improve considerably. The recent examples of the air crashes in India (Patna) and in France (Concord) provided a stark contrast in disaster management abilities.

The Director General of Civil Aviation (DGCA) needs to get tough in implementing safety standards.

RAIL

In the case of rail, currently all activities are being handled by one organization, namely Indian Railways. Only recently, certain value-added special services like tourist trains on popular tourist circuits are beginning to be offered through the private sector. The Indian Railways are viewed as providing a robust and bare minimum service, but with poor customer service.

Rail transportation is managed by a single organization, the Indian Railways (IR), a departmental enterprise and possibly the largest business in India. As on 31 March 1999, there were 62,809 route kilometres, 81,511 running track kilometres (btkm) and 6896 stations. Its total freight traffic was 442 billion tonnes kilometres (btkm) and passenger traffic 404 billion passenger kilometres (bpkm), of which non-suburban traffic was 321 bpkm the investment input and traffic output indices, normalized at 100. Wagon capacity, number of passenger coaches, tractive efforts of locos, which are the average input indices, had grown by 124 per cent and 156 per cent respectively over the same period. The route and running track kilometres went up similarly by 17 and 37 per cent respectively. The output indices have gone up sixfold. The above growth in factor productivity has come about due to improvements in technology, improved operating practices, and upgradation of congested infrastructure. However, scope for further improvements, especially in asset utilization, is very large.

Freight and Passenger Traffic (Chinese Railways) 2007

	National	Railways		Highways	Waterways	Civil Aviation	Petroleum and gas pipelines	Total
		Local	Total					
Freight traffic (mt)	1618.8	78.5	1697.3	9765.4	1134.1	1.3	160.0	12,758.1
Freight km (btkm)	1304.6	5.1	1309.7	527.1	1923.5	2.9	57.9	3821.1
% of freight to total	34.1	0.1	34.3	13.8	50.3	0.1	1.5	100.0
Passenger traffic (million)	919.2	6.6	925.8	12,045.8	225.7	56.3	-	13,253.6
Passenger km (bpkm)	354.4	0.5	354.8	554.1	15.6	77.4	-	1001.9
% of passenger to total	35.4	0.0	35.4	55.3	1.6	7.7	-	100.0

Comparison of Indian and Chinese Railways

	CR (1997)	IR (1998-9)
Route km	57,566	62,809
Double track route (per cent)	33.1	24.8
% of Route electrified	20.9	21.9
Tonnes (million)	1619	421
Tonne km (billion)	1305	282
Market share of freight (per cent)	34.3	32.7
Passengers (million)	919	4411
Passenger km (billion)	354	404
Market share of passenger (per cent)	35.0	16.5
Total traffic units (btkm + bpkm)	1659	686
Freight % of traffic units	78.6	41.1
Traffic units per route km (million)	28.8	11.9
	CR (1995)	IR (1994)
Route km/1000 sq km	5.7	19
Route km/million population	50	69
No. of staff (million)	3.37	1.62

Passenger Business of IR

Particulars	Suburban			Non-suburban						Grand total
	Season tickets	full fares	Total	Upper class	Mail/express	Sleeper	Second class ordinary	Total of mail/express/sleeper and second class	Total non-suburban	
<i>1998-9</i>										
No. of passenger journeys (million)	1715.0	953.0	2668.0	30.0	336.0	125.0	1252.0	1713.0	1743.0	4411.0
(%)	38.9	21.6	60.5	0.7	7.6	2.8	28.4	38.8	39.5	100.0
Passenger km (billion)	53.2	29.5	82.8	17.2	109.6	88.0	106.2	303.8	321.0	403.8
(%)	13.2	7.3	20.5	4.3	27.1	21.8	26.3	75.2	79.5	100.0
Passenger earnings (crores)	444.0	556.0	1000.0	1484.0	2362.0	2328.0	1353.0	6043.0	7527.0	8527.0
(%)	5.2	6.5	11.7	17.4	27.7	27.3	15.9	70.9	88.3	100.0
Average lead (km)	31.0	31.0	31.0	573.3	326.2	704.1	84.8	177.4	184.2	91.5
Earnings per passenger km (paise)	8.4	18.8	12.1	86.3	21.6	26.5	12.7	19.9	23.4	21.1
Earnings per passenger journey (Rs)	2.6	5.8	3.7	494.7	70.3	186.2	10.8	35.3	43.2	19.3
<i>1988-9</i>										
No. of passenger journeys (million)	1414.0	591.5	2005.5	14.0	322.0		1158.5	1480.5	1494.5	3500.0
(%)	40.4	16.9	57.3	0.4	9.2		33.1	42.3	42.7	100.0
Passenger km (billion)	36.6	15.3	51.9	7.9	121.6		82.3	203.9	211.8	263.7
(%)	13.9	5.8	19.7	3.0	46.1		31.2	77.3	80.3	100.0
Passenger earnings (crore)	122.7	164.4	287.1	279.8	1330.1		557.1	1887.1	2167.4	2454.3
(%)	5.0	6.7	11.7	11.40	54.2		22.7	76.9	88.3	100.0
Average lead (km)	25.9	25.9	25.9	564.3	377.6		71.0	137.7	141.7	75.3
Earnings per passenger km (paise)	3.4	10.7	5.5	35.4	10.9		6.8	9.3	10.2	9.3
Earnings per passenger journey (Rs)	0.9	2.8	1.4	199.8	41.3		4.8	12.7	14.5	7.0

The number of journeys for a monthly season ticket is assumed to be 50.

Nevertheless, there is increased potential to restructure the organization to make it more commercial in orientation and responsive to the needs of stakeholders, including customers and capital markets. A way to restructure the IR is to separate the facilities infrastructure from the provision of services. Thus infrastructure or facility could be kept under a single entity, while services are restructured to bring in competition and private participation. A regulator is essential to oversee the process and ensure equity of access of the service providers to the infrastructure. The British restructuring has been on these lines. But some arguments against a major break up of the IR are that (i) its integrated nature has strengths of better coordination and lower transaction costs, and (ii) unlike the railways companies of Europe, which were restructured, IR is not a marginal player in the transportation

business struggling for survival. It is possible without the break up of the IR, to have joint ventures (JVs) and special purpose vehicles (SPVs) for both infrastructure development and service provisioning. These JVs and SPVs would have to be built on the leverage of the complementary strengths and risk taking capabilities of the partners.

ROAD

In the case of road, in contrast to rail, a variety of organizations are involved, with regard to the right of way state governments, the central government (for national highways), and local governments are involved. Apart from these, the Defence Ministry (border roads) and large industries (project roads) too are involved in a minor way. In recent years, some financing for rural roads has come from the Agriculture Ministry. Regarding terminals, for mass passenger transport either State Road Transport Undertakings (SRTUs) or local governments are generally involved. For freight transport, large industries have their own loading and unloading areas while smaller organizations tend to use public roads. Trans-shipment terminals are usually provided by various carriers. A few cities have organized truck terminals under supervision of the local governments. The rolling stock and equipment are manufactured by a few large auto manufacturers, while ownership is diffused across a large number of owners (usually drivers themselves). Many operators often own no more than five trucks.

The total road length in the country is 2.5 million km, which represents about a sevenfold growth over the past fifty years. The net outcome of this has been extensive connectivity across the country. However, the quality of the connectivity in terms of reduction of journey times may not have been much. More importantly in com-parison to other countries in East Asia and elsewhere, this achievement is very much below the average! Roads are classified as national highways, state highways, other district roads (all three of which are maintained by the Public Works Department [PWD]), panchayat raj roads, urban roads, project roads, and JRY (Jawahar Rozgaar Yojana) roads. illage connectivity still remains a problem. Only 47.5 per cent of villages with population less than a thousand were connected as of 31 March 2006! Besides the capacity and quality of even many national highway segments is very poor. The same is true of many of the state highways and many of the urban roads. An important aspect of road development is safety. Unfortunately this is not integral to the design of road and highway systems in India. Safety indicators with

regard to vehicles, such as accidents per 10,000 vehicles or persons killed per 10,000 vehicles are presented. At an all-India level, while the parameters with respect to vehicles have come down, they have gone up with respect to the road length. This is a reflection of both increased traffic on roads and the vehicle profile having changed. The proportion of motorized two wheelers (MTWs) has gone up substantially. MTWs are accident-prone, especially in conjunction with heavy vehicles. Some inter-state comparisons with respect to vehicles would not be valid, since the base is against number of vehicles registered, while accidents could be on any vehicle passing through the state. For example, a state like Arunachal Pradesh, which has fewer registered vehicles, would reflect poorer performance compared to Delhi, Pondicherry, or Chandigarh on the vehicle-related statistics. Another significant aspect is developing higher capacity roads on key segments, to take advantage of the fact that less than 2 per cent of the roads carry over 40 per cent of the tonne km traffic. Success of private involvement in long stretch road development has been poor, while de-bottlenecking investments in bypasses, bridges, and over/under passes have been more successful.

Transport Sector Components and Involvement of the State and Private Sector

<i>Physical basis/assets</i>	Ownership/control			
	Air	Rail	Road	Water
Right of way	(State controlled) DGCA, AAI	(State controlled) Indian Railways	(State controlled) NHAI, PWD, urban administrations, local governments, defence	(State controlled) Major ports—Government of India, State Maritime Boards, Port Directorates
Terminals	(State controlled) AAI, Defence	(State controlled) Indian Railways, large industries for captive sidings	(Open to all) SRTUs, large industries, trucking companies, etc.	(Partly Open) Major Ports—Government of India, State Maritime Boards, Port Directorates, some private and captive ports
Rolling stock and equipment	(Open to all) IA, AI, other private airlines	(State controlled) Indian Railways	(Open to all) SRTUs, private vehicle owners	(Open to all) SCI, Great Eastern, ESSAR, and others
<i>Maintenance Services</i>				
	Air	Rail	Road	Water
Right of way	—NA— DGCA, AAI	(State controlled) Indian Railways	(State controlled) NHAI, PWD, urban administrations,	(State controlled) Major ports—Government of India, State Maritime Boards, Port Directorates
Terminals	(State controlled) AAI	(State controlled) Indian Railways, large industries for captive sidings	(Open to all) SRTUs, large industries, trucking companies, etc.	(State controlled) Major Ports—Government of India, State Maritime Boards, Port Directorates, some private and captive ports
Rolling stock and equipment	(Open to all) IA, AI, other private airlines	(State controlled) Indian Railways	(Open to all) Innumerable small-scale garages, large organized workshops for SRTUs, few private sector large workshops	(Open to all) Port Dry Docks, HSL, CSL, Chokhani, and others
<i>Operations</i>				
	Air	Rail	Road	Water
Right of way	(State controlled) DGCA, AAI	(State controlled) Indian Railways	(State controlled) Police Department in case of high traffic density	(State controlled) Major ports—Government of India, State Maritime Boards, Port Directorates, Light House Authority
Terminals	(State controlled) DGCA, AAI	(State controlled) Indian Railways, large industries for captive sidings	(Open to all) SRTUs, large industries, transport companies, Control and State Warehousing Corporation	(Partly Open) Major Ports—Government of India, State Maritime Boards, Port Directorates, some private and captive ports
Rolling stock and equipment	(Open to all) IA, AI, other private airlines	(State controlled) Indian Railways	(Open to all) SRTUs, private vehicle owners	(Open to all) SCI, Great Eastern, ESSAR, and others

<i>Customer Services</i>				
<i>(associated)</i>	Air	Rail	Road	Water
Basic services	(Open to all) IA, AI, private airlines	(State controlled) Indian Railways	(Open to all) SRTUs, private bus operators, TCI, Patel Roadways, forwarding agents, etc.	(Open to all) brokers, chartering agents, forwarding agents
Special services	(Open to all) IA, AI, private airlines	(State controlled) Indian Railways	(Open to all) SRTUs, private bus operators, tour operators, TCI, Patel Roadways, forwarding agents, etc.	(Open to all) brokers, chartering agents, forwarding agents
<i>Regulation</i>				
	Air	Rail	Road	Water
Licensing	DGCA	IR	RTO	DG Shipping
Environmental controls	DGCA	Department of Environment	RTO	DG Shipping
Safety	DGCA	CRS	Traffic Police	DG Shipping
Pricing	-	Parliament, Railway Rates Tribunal	-	DG Shipping, TAMP
Service levels	DGCA	IR, Railway Claims Tribunal	-	DG Shipping

In road services, the maintenance of right of way and terminals is vested with the respective governments and organizations providing such infrastructure. The maintenance services for rolling stock and equipment is largely sought from a vast number of small-scale garages dotted over the country by the owners of the rolling stock. Only in the case of mass passenger transport provided by the SRTUs are organized large scale workshops available. Regarding operations and customer services in mass passenger transport, the SRTUs and private parties provide both.

About 20 per cent of vehicle (rolling stock) ownership is under the SRTUs. Special services like school trips and contract services are provided by various organizations who hire buses. In the case of freight transport, operations are largely in the hands of the truck owners, while customer interface and value-added services are provided by trucking companies. Given this complex web of organizations involved in the road sector, the services are seen to be very competitive, though not always of sufficient quality and reliability. The poor condition of roads has adversely affected the quality and reliability of road services.

WATER

Water transport is another area where a large number of organizations are involved. The right of way (approach channels to port) and terminals (ports) are under the central and state governments. A few private terminals exist for captive use. The rolling stock (ships) ownership is open to private parties. However, nearly 50 per cent of the ship tonnage is owned by one public sector organization, the Shipping Corporation of India. Customer services and special services are significantly privatized. While services are viewed as being competitive, the major bottleneck is in the terminal (port) delays.

A REVIEW OF TRENDS AND PATTERNS

Coastal shipping constitutes about 30 per cent of the total traffic handled at our ports. The time series data for major, minor, and intermediate ports of overseas, coastal, and total cargo, split as unloaded, loaded, and trans-shipment are given decadelly from 2005 till 2006 and annually there from till coastal traffic constituted a similar share (37 per cent) as now, but it fell to about 15 per cent until 2006, primarily due to the growth in overseas traffic. In the 2006, coastal traffic grew rapidly to regain about a 33 per cent share, which has declined marginally during the 2007. The compounded annual growth rate (CAGR) over 8 years was nearly 5.6 per cent. This was less than the growth in total port traffic, which was 6.5 per cent for the same period.

For minor and intermediate ports, coastal traffic constituted over 50 per cent of total traffic. The CAGR over 8 years was nearly 17.3 per cent. To that extent, the share of minor and intermediate ports (including GMB ports) of total coastal traffic has increased from 6.1 to 13.2 per cent.

The all-India traffic, the coastal tonnage that was unloaded was greater than what was loaded during both 2006 and 2007. The difference could arise because of time lag between loading and unloading, and other inaccuracies in the data. It is interesting to note that for major ports in 2000, the share of coastal cargo for unloading (26 per cent) was less than the share for loading (37 per cent), even though for absolute tonnage it is the reverse. This is simply due to the fact that our total cargo has a significantly greater overseas import component than export. For non-GMB minor and intermediate ports, the shares cannot be interpreted since the volumes are small. There was more passenger traffic at minor and intermediate ports than at major ports. It is further evident that most of the passengers were coastal. Passenger traffic is important for short hauls near ports and to and between the offshore islands of the Union Territories of Andaman & Nicobar and Lakshadweep. Tourism-based coastal passenger traffic could have potential. As such, for coastal movement the commercial potential of passenger traffic is not high compared to freight traffic at ports. The discussion here focuses on freight traffic. GMB ports and the non-GMB minor and intermediate ports reported nil trans-shipment, raising doubt as to whether it is a classification category. The total originating traffic during 2006.07 was 257.3 mt, subject to limitations of available data. Over 70 per cent consisted of thermal coal and POL (petroleum oil and lubricant), whose average coastal lead has been estimated as 1600 km. Assuming a lead of 1600 km for all coastal traffic, total km would be 65.6 billion. Total land

movement was thus 710 btkm and total domestic movement (including coastal) about 775.6 btkm. Thus coastal movement had a market share of 8.5 per cent of domestic movement. (Pipeline and inland water transport have not been considered here. While inland water transport is insignificant, the pipeline is a growing mode of freight movement.)

During the last fiscal year at Haldia 89 per cent of loaded cargo and only 3.2 per cent of unloaded cargo was coastal. At Chennai 7.6 per cent of loaded cargo and 67.9 per cent of its unloaded cargo was coastal. Thus the significance of coastal cargo as a business varies across ports and would be important in determining the interest of a port in servicing coastal traffic. The hinterland of the port, the volume of cargo, and multimodal and port infrastructure play significant roles in determining port traffic. It is widely felt both by the industry and policy makers that coastal shipping has been underexploited in India, especially since the country has over 6000 km of coastline catering to the direction of significant flows of traffic. Further, coastal shipping is more environment friendly, less expensive, and has the potential of relieving congestion in land transport. (The market share of coastal shipping and inland water transport in the United States is nearly 40 per cent of the tkm freight movement). Historical reasons for not exploiting coastal shipping have been many and varied, including that the Industrial Revolution missed India under the colonial yoke. Today the reasons are primarily infrastructural and regulatory. It is thus important to examine what can be done to increase coastal shipping by integrating it with the rest of the transportation system.

Portwise Cargo Traffic 2006-07 and the Share of Coastal Shipping

('000) tonne)

Year	Total				per cent of coastal to total			
	Unloaded	Loaded	Trans-shipment	Total	Unloaded	Loaded	Trans-shipment	Total
<i>Major ports*</i>								
Calcutta	4497	1141	3525	9163	47.1	19.4	0.5	25.7
Haldia	13,600	6624	0	20,224	3.2	89.0	0.0	31.3
Paradip	4507	8601	0	13,108	12.6	84.4	0.0	59.7
Vishakhapatnam	15,377	13,551	6725	35,653	19.1	52.7	45.4	36.9
Chennai	24,313	9333	1555	35,201	67.9	7.6	50.0	51.1
Tuticorin	8485	1665	0	10,150	60.6	2.2	0.0	51.0
Cochin	10,358	2307	0	12,665	36.7	66.7	0.0	42.2
New Mangalore	6894	7278	34	14,206	5.0	29.7	55.9	17.7
Mormugao	2536	15,460	24	18,020	30.8	0.8	0.0	5.0
Mumbai@	19,139	11786	45	30,970	8.5	57.1	0.0	27.0
JNPT	7347	4303	73	11,723	11.4	1.1	34.2	7.8
Kandla	33,727	4180	2730	40,637	14.3	3.8	0.0	12.3
All Major Ports	150,780	86,229	14,711	251,720	26.5	37.1	26.4	30.1
<i>GMB**</i>								
Magdalla	7596	1273	0	8869	40.6	55.1	0.0	42.7
Mul-Dwarka	414	1656	0	2070	0.0	73.5	0.0	58.8
Jafrabad	524	2347	0	2871	0.0	25.6	0.0	20.9
Other Ports of GMB	8393	2806	0	11,199	5.0	12.2	0.0	6.8
All Ports of GMB	16,927	8082	0	25,009	20.7	35.4	0.0	25.4
All Major Ports and GMB Ports	167,707	94,311	14,711	276,729	25.9	37.0	26.4	29.7
Non-GMB Minor and Intermediate Ports***	5076	5565	0	10,641	53.5	44.1	0.0	8.6
All India Traffic	172,783	99,876	14,711	287,370	26.7	37.4	26.4	30.4

Share of Coastal Cargo at Various Ports 2007

S. no.	Port	% share of cargo to total cargo of each port	Coastal cargo (mt)
<i>Major ports</i>			
1	Paradip	59.7	7.8
2	Chennai	51.1	18.0
3	Tuticorin	51.0	5.2
4	Cochin	42.2	5.3
5	Vishakhapatnam	36.9	13.1
6	Haldia	31.3	6.3
7	Mumbai	27.0	8.3
8	Calcutta	25.7	2.3
9	New Mangalore	17.7	2.5
10	Kandla	12.3	5.0
11	JNPT	7.8	0.9
12	Marmugao	5.0	0.9
	Total major ports	30.1	75.8
<i>GMB ports</i>			
1	Mul-Dwarka	58.8	1.2
2	Magdalla	42.7	3.8
3	Jafrabad	20.9	0.6
4	Other GMB ports	6.8	0.7
	Total GMB ports	25.4	6.4
	Non-GMB minor and intermediate ports	48.6	5.2
	All India traffic	30.4	87.4

COASTAL TRAFFIC PROFILE

Cargowise coastal movement data are available for 2005-06 from Basic Port Statistics of India. Out of 47.6 mt of originating coastal traffic during 2005, 14.2 mt was accounted for by thermal coal, 8.6 mt by POL crude, 8.4 mt by POL products, 2.9 mt by iron ore and pellets, 0.8 mt by cement, and 0.7 mt by clinker in 2005.

S. no. Commodity Quantity (mt)

1	Thermal coal	14.2
2	POL crude	8.6
3	POL product	8.4
4	Iron ore and pellets	2.9
5	Cement	0.8
6	Clinker	0.7
7	Others	2.0
	Total	37.6

Tables below give the details of various coastal cargoes loaded and unloaded at different ports. The major coastal cargo flows are as follows:

- Thermal coal (from Haldia, Paradip and Vishakhapatnam to Chennai and Tuticorin). This traffic is driven by the Tamil Nadu Electricity Board (TNEB).
- POL products (between major ports, with sources being Mumbai, New Mangalore, Cochin, and Haldia, where the refineries are situated. Jamnagar will become an important port for loading and unloading POL products, from 2000 01, with the Reliance Petroleum plant coming on stream. The key destinations are Calcutta and Marmugao. Chennai and Vishakhapatnam, which also have refineries, seem to be using their capacities for distribution by land); POL crude (from Mumbai (Bombay High) to Chennai and Cochin); Imported crude obviously moves directly to the refinery ports. This traffic is driven by the petroleum companies, that is, the Indian Oil Corporation Limited (IOCL), Bharat Petroleum Corporation Limited (BPCL), Hindustan Petroleum Corporation Limited (HPCL), and Reliance.

- Iron ore and pellets (Vishakhapatnam and New Mangalore to Magdalla). This traffic is driven by Essar. From the minor and intermediate ports the principal cargoes are:
- Cement (Mul-Dwarka to Magdalla and Maharashtra minor ports). This traffic is driven by GACL;
- Clinker (Jafrabad to Magdalla and Maharashtra minor ports). This traffic is driven by Gujarat Narmada Cement Limited (GNCL).

Cargoes Loaded at Major, GMB, and Minor Ports 2007

Port	Coal/ coke	POI- product	Iron ore/ pellets	POI- crude	Cement	Clinker	Others	Loaded	Total loaded	per cent of loaded to total loaded
(mt)										
<i>Major ports*</i>										
Haldia	4.1	1.9	-	-	-	-	-	6.1	6.6	92.4
Paradip	6.1	6.4	4.2	-	-	-	-	7.1	8.8	80.7
Cochin	-	1.5	-	-	-	-	-	1.5	2.5	60.0
Mumbai	-	0.9	-	6.7	-	-	-	7.6	12.7	59.8
Vishakhapatnam	4.0	0.1	1.9	-	-	-	1.4	7.4	14.2	52.1
New Mangalore	-	2.3	0.4	-	-	-	-	2.7	9.2	29.3
Calcutta	-	0.1	-	-	-	-	0.1	0.2	1.6	12.5
Chennai	-	1.0	-	-	-	-	-	1.0	10.9	9.2
Kandla	-	-	-	-	-	-	0.2	0.2	3.9	5.1
JNPT	-	-	-	-	-	-	0.1	0.1	3.4	2.9
Tuticorin	-	-	-	-	-	-	1.6	..
Marmugao	..	-	..	-	-	-	19.2	..
<i>GMB ports**</i>										
Mul-Dwarka	-	-	-	-	0.8	-	..	0.8	1.4	57.1
Jafrabad	-	-	-	-	-	0.7	-	0.7	1.8	38.9
Others	-	-	0.4	-	0.1	-	0.3	0.8	7.1	11.3
<i>Non-GMB minor and intermediate ports</i>										
	-	-	0.2	-	-	-	1.7	1.9	4.3	44.2
Total	14.2	14.2	7.1	6.7	0.9	0.7	3.8	38.1	109.2	34.9

Cargoes Unloaded at Major, GMB, and Minor Ports 2007

Port								(mt)		
	Coal/ coke	POL- crude	POL- product	Iron ore/ pellets	Clinker	Cement	Others	Unloaded	Total un- loaded	per cent of unloaded to total unloaded
<i>Major ports</i>										
Tuticorin	5.2	-	0.4	-	-	-	..	5.6	8.4	66.7
Calcutta	-	-	2.0	-	-	-	0.2	2.2	4.2	52.4
Chennai	8.6	2.6	..	-	-	-	..	11.3	24.3	48.3
Marmugao	..	-	0.8	-	-	-	..	0.9	2.0	45.0
Cochin	-	4.1	0.1	-	-	-	..	4.3	9.8	43.9
Vishakhapatnam	-	3.3	2.2	0.4	-	-	..	5.9	14.7	40.1
Kandla	-	3.7	1.5	-	-	-	..	5.3	31.5	16.8
Mumbai	-	-	1.7	-	-	-	..	1.7	19.0	8.9
Haldia	-	-	0.8	-	-	-	..	0.8	13.4	6.0
JNPT	-	-	-	0.3	-	-	..	0.3	5.3	5.7
New Mangalore	-	..	0.2	-	-	-	..	0.3	7.0	4.3
Paradip	-	0.1	-	-	-	-	-	0.1	4.5	2.2
<i>GMB Ports</i>										
Magdalla	-	-	-	2.6	0.4	0.3	0.1	3.4	7.3	46.6
Others	0.2	-	-	-	-	-	0.2	0.4	8.1	4.9
<i>Non-GMB minor and intermediate ports</i>										
-	-	-	-	0.1	-	-	1.3	1.4	8.6	16.3
Total	14.0	13.8	9.7	3.4	0.4	0.3	1.8	43.9	167.2	26.3

The profile of ports where coastal movement (loading

loading facilities are provided there. At Chennai and Tuticorin, similar unloading facilities are provided. At Chennai, coal moves by rail to two thermal power stations, one located just north of Chennai and the other at Mettur, about 250 km south-west. At Tuticorin, coal is unloaded and moves directly to the thermal power station by conveyor belt. Currently, a new port called Ennore, just north of Chennai is in the finishing stages of construction, both to serve the thermal power station located nearby. Ennore also removes the pollution in Chennai, due to coal handling that would have otherwise resulted. Ennore port will supply coal to the neighbouring Ennore Thermal Power station by conveyor belt and to Mettur by rail. This project is funded by the Asian Development Bank (ADB) and takes care of necessary integration with rail as well as the conveyor belt system for proper evacuation.

For POL, appropriate investments in railway sidings, tank farms, pump installations, jetties, buoys and pipelines are in place for integration with the land transport infrastructure. In future, due to investments in pipelines there is a possibility that this traffic might decrease, though the main target is road and rail movement. Almost all the pipelines, including those proposed, are hinterland pipelines from the ports, leading away from the sea. The only coastal pipeline is the one from Vishakhapatnam to Vijayawada, whose lead is, however, too small to be an alternative to coastal shipping. If a common carrier pipeline network of reasonable length and density comes into being, then some of the portbased refineries may be in a position to service hinterland areas directly by pipeline, rather than coastal shipping, rail, or road. Such a network is expected to be in place by 2010.

**Some Aspects of Cargo Handling at Major Ports that Have
Significant Coastal Traffic 2007**

Port	Cargo	Coastal loaded (million tonnes)	Average turnaround time (days)	Average berthing time days	Average parcel size (tonnes)
Hadia (L) (91.4)	Coal/coke	4.1	8.9	2.7	22,898
	POL (product)	1.9	4.2	2.6	17,531
Paradip (L) (83.4)	Coal/coke	6.1	4.8	0.8	27,766
	POL (product)	0.6	4.5	3.4	9935
	Iron ore (raw/pellets)	0.4	5.3	2.3	43,214
Cochin (L) (65.2)	POL (product)	1.5	4.3	2.1	29,661
Mumbai (L) (64.3)	POL (crude)	6.7	5.6	2.5	33,057
	POL (product)	0.9	5.6	2.5	33,057
Vishakhapatnam (54.4)	Iron ore (raw/pellets)	1.9	7.0	2.4	68,220
	Coal/coke	4.0	11.6	5.2	33,286
	POL (product)	0.1	2.3	0.6	23,320
	Other cargo	1.4	-	-	-
New Mangalore (L) (37.7)	POL (product)	2.3	2.7	1.3	22,839
	Iron ore (pellet)	0.4	3.0	1.4	45,062
Tuticorin (U) (66.3)	Coal/coke	5.2	5.1	1.1	120,000
	POL (product)	0.4	3.0	1.4	45,062
Calcutta (U) (47.7)	POL (product)	2.0	4.1	1.1	8837
	Other cargo	0.2	-	-	-
Chennai (U) (46.5)	Coal/coke	8.6	13.2	6.9	19,762
	POL (crude)	2.6	7.4	5.3	30,010
	POL (product)	NA	7.4	5.3	30,010
Cochin (U) (41.8)	POL (crude)	4.1	4.3	2.1	29,661
	POL (product)	0.1	4.3	2.1	29,661
Vishakhapatnam (U) (38.6)	POL (crude)	3.3	2.3	0.6	23,320
	POL (product)	2.2	2.3	0.6	23,320
	Iron ore (raw/pellet)	0.4	7.0	2.4	68,220
Marmugao	POL (product)	0.8	2.4	0.9	7277

Coastal Traffic in Certain Commodities
at GMB Ports 2006

Port	Commodity	Loaded coastal mMt
Mul-Dwaraka (L) (56.9)	Cement	0.8
Jaffrabad (L) (39.4)	Clinker	0.7
Magdalla (L) (37.3)	Iron ore	0.4
	Other cargo	0.6
Magdalla (U) (46.5)	Iron ore	2.6
	Clinker	0.4
	Cement	0.3
	Other cargo	0.1
Okha (U) (25.9)	Furnace oil	0.2
	Coal	0.1

ECONOMICS OF COASTAL MOVEMENT

Studies of iron ore, sponge iron, and cement movement show that, given the infrastructure at ports and mines for material unloading, the operating economics are in favour of coastal movement, whose transport cost per tonne km would be Re 0.25 or less (even for vessels of 3000 tonne capacity). Corresponding rail or road costs, depending on distance, would be Re 0.60. Rs 1.20.

As a proportion of total multimodal transportation cost (including transportation, related inventory, handling, and related losses), the transportation cost for low value bulk commodities to high value consumer goods ranged from 90 per cent to 40 per cent for road, 85 per cent to 30 per cent for rail, and 80 per cent to 20 per cent for shipping, for a 1000 km lead. Despite the fact that coastal shipping would in general require additional land leads, cost differentials favour it even for an east-west movement. In such cases, the sea distances would be 2500 to 4000 km and about twice the port to port direct land lead. More interior the origin/ destination, the less the advantage of coastal shipping.

Advantages of Coastal Shipping

The total multimodal transportation cost advantage for coastal shipping was over Rs 1 crore for the raw material from Daitari, as compared to rail whose total cost was Rs 3.25 crore. Similar advantages would accrue for other raw material sources. This analysis does not take into consideration the investment cost at the plant end for dealing with sea cargo. This was partly due to the fact that some investments in a jetty had already been made for importing plant machinery during the project stage. The additional investments in the jetty were less than the investments required for constructing a railway siding from the nearest rail access point. Another interesting dimension for this company was the choice of market based on logistical competitive advantage. The finished product (sponge iron) could use the returning empty vessels to the east coast at an additional transportation cost of Rs 140 per tonne (the inbound full cost of transportation including the empty return of the vessel was Rs 260 per tonne), while rail would have costed anywhere between Rs 382 and Rs 544 per tonne. In this instance, for coastal shipping, the costs due to inventory, handling, and losses would be significant since the inherent value of

sponge iron was Rs 4000 per tonne (as opposed to Rs 250 per tonne for iron ore). However, the total costs were still in favour of using the coastal route and servicing a market with competitive advantage over other suppliers who were located closer to the eastern markets. The same was true of markets near Mangalore. Appropriate infrastructure to integrate with the land movement was key both for raw material and finished goods at the ports which were at the non-plant end. These being major ports, such infrastructure was readily available, including appropriate dumping space. Rail/road connectivity was in place. At the plant end, the key infrastructure was floating cranes to augment the unloading/loading rates of the mother vessel at anchorage and barges to shuttle between anchorage and jetty. Handling and conveyor-based evacuation were required between the jetty and the port-based plant.

A professionally run company like the GACL prefers coastal movement, wherever possible, over land transportation. It has therefore made investments to integrate coastal movement with the land leads. While data on its costs for coastal movement are not available, its rail and road freight costs (not total multimodal transportation cost) from its plant at Kodinar (served by the port of Mul-Dwarka) to Surat are Rs 600 and Rs 558 per tonne, respectively. The rail cost by the shortest route would be Rs 545. However, since this route has restrictions due to the Gir sanctuary, the actual cost works out to be Rs 600, whereas the transportation cost from Kodinar to Surat using coastal movement would not exceed Rs 150 per tonne including the land leads. Part of the saving is also due to the shorter coastal lead across the Gulf of Khambat.

Here the specific case of raw material sourcing for Laxmi Transformers (LT) is taken up. LT is a company making sponge iron at Alibag. It sources iron ore in pellets and lumpy from Daitari. It has a total requirement of 0.6 mt tonnes of pellets and 0.155 of lumpy ores. One tonne of steel by the direct reduction process than LT uses, requires 1.24 mt of pellets and 0.31 mt of lumpy ore. Daitari is in Orissa. If the pellets and ore were to be routed by rail from Daitari up to Penn and then by road from Penn to Alibag the transport cost per tonne would be Rs 524 per mt (consisting of Rs 5175 for the rail segment and Rs 7.5 for the road segment). The total transport cost would be Rs 3.25 crore. For a 35,000 DWT ship picking up the ore at Paradip, brought there by rail, the transport cost would be Rs 1.99 crore.

In summary the total transport costs are as follows:

	Rs crore
1. From Daitari to Penn by rail and then by road to Alibag	3.2
2. From Daitari to Alibag by road	5.52
3. From Daitari to Paradip by rail and then by 35,000 DWT ship to Alibag	1.99
4. Same as above but with a 65,000 DWT ship	1.84
5. By rail to Penn and then to Alibag	3.25

The total mode cost per tonne for three of the modes above is as follows:

Mode	Transport cost (Rs crore)	Inventory cost (Rs crore)	Cost/ tonne (Rs/mt)
(3) Rail + 35000 DWT ship	1.99	0.22	356+extra handling+buffer stock cost
(4) Rail + 65000 DWT ship	1.84	0/39	359+extra handling+buffer stock cost
(5) All the way by rail upto Penn and road to Alibag	3.25	Negligible	5221+extra handling+buffer stock

This analysis uses the given rail freight charges as reflecting the true cost of rail. I know that railways overprice freight to cross-subsidize passenger traffic. Unfortunately, there are no accurate estimates of freight costs by rail either. Similarly, coastal shipping is itself subject to large distortions arising out of the sabotage laws of the country.

TRAFFIC POTENTIAL

Given such advantages for bulk movement as in the case of GACL and Laxmi Transformers, the scope for increased use of coastal shipping, with appropriate infrastructure to integrate with the rest of the transport network, is quite large. It would be difficult to quantify the traffic potential for coastal movement, since much of it would depend on the port and multimodal infrastructure and industrial and distribution centre location strategies. Of the domestic originating tonnes, the railways handled about 420 mt. Assuming that traffic using road as the primary movement had similar leads as rail and given that road share in tkm is one and a half times the rail share, the originating traffic for primary road movement would be about 630 mt. (.Primary. is emphasized since almost every unit of traffic starts its journey by road, but then could be serviced by rail or sea, both coastal and overseas, with very short leads. A primary movement would not include such movements.)

Out of the resultant total of over 1 billion tonnes of domestic originating traffic, a 5 per cent share captured by coastal shipping would amount to 50 mt. This would be in addition to the 41 mt of originating coastal traffic for 2007. With a five-year horizon it ought to be possible for coastal shipping to capture 50 mt of traffic. In fact, this figure would be less than the annual growth in originating tonnes in India. This would amount to a 14 per cent annual growth rate compared with the figure of 41 mt in 2001 to reach about 90 mt in 2007. At a macro level, the transport demand effort multiplier for India has been estimated at 1.5, which means the total tkm of traffic would grow at 1.5 times the gross domestic product (GDP) growth rate. Over the next few years, with an estimated 6.7 per cent gross domestic product (GDP) growth rate, transportation demand would grow at 10 per cent per year. The expectation for coastal movement growth is thus higher. The scope for increasing coastal traffic would be the movement of coal (along the east coast and from east to west, with port-based distribution centres), iron ore (east to west and along the west coast), fertilizers, and cement (port-based plant to port-based distribution centres), salt (along the west coast and west to east), foodgrains (north to south, partly by land and coast), and plantation produce (south to north, partly by coast and partly by land).

Projection of additional coal movement from Paradip for power plants in Tamil Nadu by 2004-05 is 13 mt, out of which 8 mt would be to the new port at Ennore,

3.5 mt to Cuddalore, and 1.5 mt to Tuticorin. Another forecast for 2007-08 suggests a total that ranges from 16 mt to 30 mt, covering the thermal coal requirements through Chennai and Ennore. This compares with the current thermal coal unloading of about 10 mt at Chennai. Much of the increased tonnage on coastal shipping would be driven by corporates and investments depending on the nature of the cargo.

There is also scope of moving higher value manufactured goods in a containerized manner from industrial concentrations to redistribution centres. The Mumbai area is one possible source; industrial zones which could be developed near port locations are others. There is also the possibility of moving tea from Assam to the west coast consumption points of Gujarat and Maharashtra. The government of Gujarat has done some work on this issue of joint development of industry and ports (ex: Dahej) and has come out with a vision document. A study was made of the use of the Konkan Railway Corporation (KRC) to assess the traffic potential along the west coast. Thirteen companies were studied and their inputs closely considered. The study did not quantify the likely market realization but concluded that the KRC should focus on marketing service concepts since customers' willingness to shift modes was a function of the desired services being offered. A study by RITES, provided a list of commodities and the quantity estimates moving to and from Kerala on the western north-south axis. For the year 2005-06 the south to north and north to south traffic for Kerala was estimated at 67,000 and 131,000 tonnes per day respectively, amounting to about 25 mt (south to north) and 50 mt (north to south) per year. Coastal shipping could compete for such large and significant movements.

UTILIZATION OF SHIPS

In terms of number of vessels, there has been a gradual increase in the coastal share, while in terms of gross registered tonnage (GRT) the share has remained steady. The average GRT of a coastal vessel is 2500 while that of an overseas vessel is 26,400. Coastal vessels also 186 India Infrastructure Report 2001 include non-cargo-carrying vessels like tugs, dredgers, and offshore supply and service vessels. Coastal tonnage is on average older than overseas tonnage. While coastal is reserved for Indian vessels, it should be noted that non-Indian flag vessels leased to Indian operators are also pressed into service for meeting coastal traffic requirements.

A Relative Success Story

In the recent past, the GMB can be viewed as a success story in facilitating coastal traffic through faster responses to customer requirements and proactive marketing to traffic. For example, between 2005 and 2006, coastal traffic at the GMB ports grew from 2.3 to 6.4 mt at a CAGR of 13 per cent. During the same period, the major port coastal traffic grew from 49.0 to 75.8 mt at a rate of 5.6 per cent. While the GMB has 40 registered minor and intermediate ports, the top six ports account for nearly 72 per cent of its traffic. Of these six ports, five are direct berthing. Two do not have rail connection, but are really ports serving cement plants located closely. Among the remaining four having rail connection, Magdalla (the port with the highest traffic) is least dependent on rail, since most of its traffic either terminates or originates at plants near the port. While traffic in and out of Bedi, Okha, and Sikka uses railways, rail access is not right up to the jetty, thereby requiring extra handling by road. The relative success of the GMB is attributable both to a strategic vision driven by political will and operational autonomy. The GMB has been successful in facilitating captive jetties and ports and more recently joint venture ports (the Gujarat Pipavav Port Limited (GPPL) at Pipavav and the Gujarat Adani Port Limited (GAPL) at Mundra) which are among the biggest earners today.

Parcel Sizes

It can be seen that the average parcel size for thermal coal is about 30,000 tonnes, for POL products between 8000 and 30,000 tonnes, POL crude about 29,000 tonnes, and iron ore and pellets between 47,000 and 67,000 tonnes. All this cargo is handled at the major ports both for loading and unloading, except iron ore and pellets which are unloaded at Magdalla with a floating crane for lighterage. Cement and clinker movement takes place in vessels and barges with parcel sizes between 3000 to 5000 tonnes. Other commodities which could potentially use coastal shipping would move in parcel sizes at the smaller end of the range, that is 3000 to 5000 tonnes. This would also be applicable for containerized general cargo, to that extent requiring lesser consolidation efforts. Such vessels would typically run with 150 to 250 twenty feet equivalent units (TEUs). The smaller parcel sizes are in line with the just-in-time concept of supply chain management. Even though the economies of scale for ship movement would not be fully exploited, the cost advantage over land transport is still significant. Another major advantage is that draft requirements (about 4 m) for such vessels would be low, thereby offering flexibility in locating new ports for

coastal traffic. It is important to think small. (3000 to 5000 tonnes parcel size), while considering infrastructure for coastal movement, especially in terms of handling equipment, jetties, and shipping capacity. The draft requirement for jetties/ports handling such parcel sizes would be about 4 m. This is especially so the non-captive coastal shipping. Coastal shipping by captive users could think of parcel sizes most economical to their operations (for example TNEB coal, POL oil companies, and ESSAR iron ore).

Evacuation infrastructure at each of the port sites, both road and rail access, needs to be provided. While thinking of rail and coastal shipping integration, the parcel sizes should be multiples of rake sizes. This will enable quick evacuation, without having to consolidate cargo across vessels.

Even though ports with low draft are being proposed here, in view of the small parcel size approach, the ports need to be geared well to permit quick loading and unloading. The emphasis on gearing is all the more critical since

- (i) ports are usually not well equipped and
- (ii) the small parcel size low draft vessels would be more economical with no gear. The ports also need to permit round-the-clock and round-the-year operations. Only then would the desired flexibility and service levels be achieved to ensure a growing market for coastal shipping. This yields that for a given level of non-bulk originating coastal traffic (say 50 mt), 667 ships of 3000 dwt and 140 jetties are needed. For the same loading/unloading effectiveness, a crane on a ship is more expensive not only in terms of investment, but also in terms of operating costs. Moreover, the numbers of shipboard gearing requirement alone would be more than four times those for port gearing. Thus port-based gearing would be more economical than ship-based gearing and also easier to implement since private sector shipowners would want to keep their investments low.

In Europe and the United States, coastal shipping is also integrated well with inland water transportation for through movement and evacuation. Unfortunately, our potential inland waterways have not been properly maintained and thus cannot really be integrated with the coastal system. If at all, the options are the three national waterways, namely Hooghly, Ganga, Brahmaputra, Kerala coastal waterway, and also the Godavari. Currently, it would be difficult to envisage parcel sizes even as small as 300 tonnes moving in a reliable manner!

Why is There This 'Transport Myopia'?

The transport myopia outlined above debilitates the economy. A variety of problems underlie this myopia. There are problems that arise because of the cadrebased and bureaucratic mindset in the management of organizations which have to create, maintain, or deliver infrastructure. Apart from the deep-rooted hierarchy orientation (which is a complete antithesis to the much required customer orientation), there are additional tensions due to administrative cadres often occupying senior positions in competition with the technical cadres. Examples of such dysfunctional organizations are ports and road transport corporations. Abdication of authority, or lack of authority at the top, significantly inhibit infrastructure organizations from being responsive to market opportunities, formulating projects appropriately, or managing projects in time and delivering the service effectively. Archetypical of such organizations is the Indian Railways. Parliamentarians too consider many of the public enterprises providing infrastructure as their fiefdom. For example, the Times of India of 8 August 2000 reported that the civil aviation minister was pulled up by the Lok Sabha for the delay of a flight in which the speaker and a few other Members of Parliament from Andhra Pradesh were travelling. The minister assured the Chair that he would take steps to see that no such inconveniences would in future have to be suffered by VIPs (very important persons). This incident brings into focus once again the feudal outlook of governance, which is an anathema to a citizen-oriented infrastructure. It is unfortunate that the plight of lesser mortals, the common consumer, did not figure in the discussions. Those affected by VIPs movements better suffer in silence is the message. The minister himself thought his first responsibility was to serve the VIPs, even to the neglect of the consumer.

What Next?

Systems of public management (and governance) in India, though employing some of the best minds and brains in the country, unfortunately do not have the right kind of stakeholding and accountability, nor even the requisite autonomy. There is mismatch between task performance and the criteria for evaluation of managers and officers. There are almost no incentives for performance, or task orientation, or innovations at any level of management. Even the incentives for workers are related merely to hours of work, and never to efficiency or output. A market-based and customer-oriented approach could change transport infrastructure services and development, removing the transport myopia to result in better service. The crucial challenge then is how to develop structures and systems that would ensure this.

The three dimensions of performance are:

- (1) Asset creation efficiency:-nobody wants an expressway that was supposed to have opened in 1988 and is still languishing;
- (2) asset-management efficiency:-an asset, once created, needs to be maintained, but without proper maintenance, roads and most transport infrastructure would deteriorate very rapidly;
- (3) Service delivery effectiveness and efficiency:- should an accident on a road hold up traffic for half a day, only because the police is not at the site on time, or the cranes to remove the vehicles are not available?

CHALLENGES FACED BY MULTIMODAL INDUSTRY

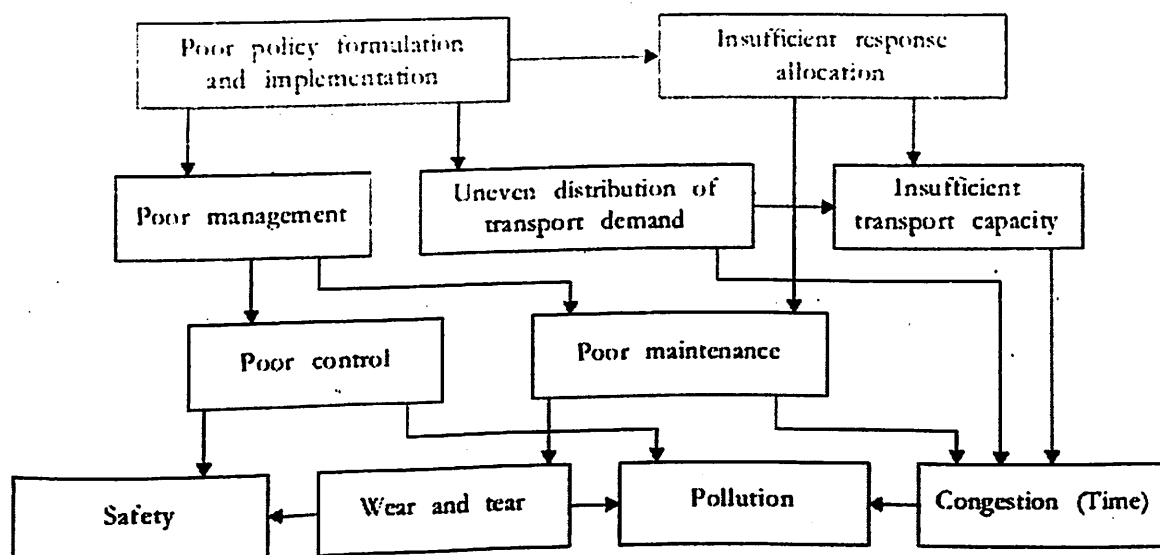
While the progress made in the transport sector has been significant, it has not been able to meet the growing demand, particularly in the last decade when the economic reforms triggered an unprecedented growth of Gross Domestic Product (GDP) by 6 - 6.5 percent. The coming years may have higher growth rates of 8 to 10 percent and with it the consequent increase in transport demand. The tackling of the existing deficiencies coupled with those coming with a higher economic growth rate, will bring a new dimension.

The existing issues and concerns, the unfinished tasks, the congestion and constraints in movement leading to higher transport costs will be some of the challenges to face as we look at transport requirements by 2020.

That the volumes of demand will be very high with a increase for both railways and road transport requiring not only massive investments but other actions, covering pricing policies, customer focus, terminal management, safety, transit times, organizational and other changes to provide adequate and efficient services for meeting the demand will be a main concern.

SAFETY

Safety is adversely affected by the transport myopia. Table below gives a picture of the road deaths in India as compared to developed countries. India is at least six times worse than the worst of the European countries. The true picture of safety on Indian roads may be much worse than what the comparison in Table would seem to indicate! This is because: (i) many accidents go unreported in India; (ii) nearly 69 per cent of the vehicle population is motorized two wheelers (MTWs), with relatively lower passenger occupancy; and (iii) Indian roads have among the lowest ratio of vehicles to kilometres of roads!



Country	Vehicles/km of road	Road deaths/10,000 vehicles each year
Britain	67	1.5
Netherlands	65	1.7
Germany	62	2.1
France	36	3.2
Belgium	32	3.2
India	10	20.8

The effect of the vehicle profile and increasing indiscipline comes through dramatically if we compare road deaths per bpkm between 2000 and 2005. The figure for road deaths per 10,000 vehicles was 83.5 in 2000, when the MTW population was 13 per cent, coming down to 20.8 in 2005. This does not mean improved safety on the road. On the contrary, road deaths per bpkm have increased over the same period from 30.6 to 51.0.

WEAR AND TEAR

The wear and tear on vehicles and goods is particularly acute in the road sector. The expert group on commercialization of infrastructure projects estimated the economic losses due to the bad condition of main roads as being of the order of Rs 200 to 300 billion per annum during the late 1990s. This is nearly 2 per cent of the GDP! Another way of looking at it is that it is at least about Rs 7000 per road using vehicle per year. Such high wear and tear is also a major cause of pollution and poor safety.

Below provides two examples of how poor roads affect vehicle operating costs. One is based on interviews of truckers in Zambia and the other is a more recent statement on Bombay (now Brihanmumbai) Electric Supply and Transport Undertaking (BEST).

How Potholes Affect Vehicle Operating Costs

Potholes cause immense damage to vehicles. To better understand the additional costs associated with potholes, the Federation of Zambian Road Hauliers interviewed truckers to compare the running costs of a truck and trailer combination on a road with potholes with those on a road without potholes. The vehicle considered was a lorry and trailer with twenty-two wheels, weighing between 44 and 50 tonnes. The costs estimated are those over and above normal running costs. This excess is equivalent to \$ 0.20 per vehicle km. On a road with bad potholes a driver can either pursue a defensive strategy or ignore the potholes and carry on as usual. If he follows a defensive strategy, he first slows down and changes gears. He then has to negotiate the vehicle through the potholes. This causes extra stress on the tyres, wheel bearings, spring assemblies, spring hangers, chassis, cross members, engine mountings, gear box mountings, brakes, steering assemblies, and shock absorbers. Having negotiated the potholes, he will drive through them at his regular speed, resulting in more damage to the vehicle and tyres and increasing the risk of accidents. The axle pressure on the road now increases by at least three times. The survey resulted in the following annual expenditures. It ignores extra fuel consumption, damage to goods, down time of trucks under repair, and accidents caused by potholes and sharp pavement edges.

Quantity	Item	Unit Price	Annual Cost
		(₹)	(₹)
		595	5952
10	Extra tyre and tubes	1071	1071
1	Extra clutch and pressure plate	201	803
4	Extra wheel bearing	1050	1050
1	Extra set of brake shoes	1667	1667
1	Extra set of springs	113	452
4	Extra spring hangers and bushes		
-	Welding electrodes/oxyacetylene: for body chassis and cross member damage, engine and cabin mountings (repair cost)	952	952
		1874	1874
1	Extra steering assembly	128	510
4	Extra shock absorbers		14,331
	Total annual costs attributable to potholes		

Pollution and Environmental Impact

Pollution is significant on Indian roads, especially in urban areas. Similarly, land acquisition is a problem during, or prior to, construction of transport projects. Poor systems and engineering tax pedestrians and vehicles users alike, increasing the probability of an accident when attention lapses for even a moment. Improper systems, when in place for long, result in a culture of aggressive behaviour. Equally importantly it is systems and engineering that can be improved and leveraged upon. Road traffic causes air pollution, which is high by international standards, especially in urban areas. The annual premature deaths, due to ambient air pollution levels exceeding the World Health Organization (WHO) standards, are as high as 7491 in Delhi and 2979 in Ahmedabad. The number of workdays lost per capita annually on account of air pollution is five. MTWs are responsible for 46 per cent of air pollution near the roads.

CONGESTION

Average vehicular speeds on Indian roads are amongst the lowest in the world. This is relatively more acute on the highways than in urban areas. A truck in India averages 250 km per day, while in the developed countries the average is closer to 600 kms per day. For the railways, during 2004-2005, the average turnaround was 8.2 days, of which only 28 hours was the revenue-earning run over an average lead of 669 km. This reflects congestion and lack of coordination at terminals for multimodal handling. While the maximum speeds for mail/express and freight trains are 100 kmph and 75 kmph respectively, the average speeds achieved are typically 50 kmph and 24 kmph. The average is significantly lower than the maximum, which is indicative of route congestion. The principal problem with ports is the very large average turnaround time of 5.9 days (MoST Basic Port Statistic). The average comparable turnaround time in ports inter-nationally is only two days. Given the 14,676 port calls during 2002 (Indian Ports Association 2002) in major ports in India, at an average ship standing charge of \$ 8000 per day, the net cost of the additional 3.9 days spent at ports by ships works out to \$ 457.9 million, that is Rs 1623 crore.

The Neglect of R&D

One of the important determinants of efficient transport infrastructure is technology, especially that of the 'rolling Stock' or vehicle. India suffers from poor technology. The net weight of commodity carried to the weight of the vehicle is among the lowest in the world. The standard truck has a ratio of 1:1 (multi-axle trucks can go up to 3:1 internationally, while in India the best multi-axle trucks have achieved 2.5:1). The best railway wagons in India have a ratio which is slightly higher than 2:1. Ratios greater than 4:1 have been achieved in container flats internationally. As far as ships are concerned, the ratio is typically 1.6:1, both in India and abroad.

The typical bus in India, which does not have to carry more than 4 tonnes, uses the same chassis as a truck, which is designed to carry 10 tonnes. This has been the result of a market oligopoly and a distorted view of economies of scale. Due to

these inefficiencies, especially on roads, the nation suffers fuel wastage and road wear and tear. It is important to have a focused effort on appropriate R&D. National-level projects funded by government with contributions from industry to find solutions to such problems, especially those where the social benefits are larger than the private benefits, are required.

REGULATORY ISSUES

Customs is viewed as a significant bottleneck, leading to extra paperwork, consequential delays, and corruption. The government thus constituted the Working Group on Coastal Shipping (1993) which recommended that coastal traffic should be removed from the purview of strict day-to-day control of the Customs Act. However, as to whether customs should be completely off coastal traffic, some shipowners said that this would not be appropriate and customs must have the right to inspect any vessel/cargo. Regarding customs control, the paradigm needs to change from prove that you are not at fault to beware of the consequences of illegal doings. To ease customs inspections, streamline coastal cargo flow, and reduce the possibilities of illegal doings, it is suggested that: (i) there be specific ports or jetties earmarked for coastal traffic, and (ii) coast guard monitoring be improved. Indonesia is an example of a country with significant coastal shipping where separate ports and jetties are earmarked for coastal movement. Ports with bureaucratic orientation are also a major bottleneck especially in turnaround times. This is because they are not stakeholders in this process even though they have a business interest in coastal shipping. Given their present structures and relationship with the government, public sector ports continue to be rule bound. Shipowners have also pointed out that definitions of 'overseas' and 'coastal' vary between customs and ports, causing extra documentation and complexity. This needs to be standardized. The right direction for ports would be corporatization and increased autonomy.

The story below shows how GMB ports are moving in the right direction. The lesson from the GMB is that port development could be more effective if it were market driven, if it leveraged initiatives by major users (captive jetties and ports), and if it were carried out with private participation. Even in the GMB context, one does get the feeling that a lot more can be achieved if the role of the GMB became more and more that of a facilitator, rather than executor. Cabotage is an international issue, supposedly driven by security, protectionist, and others are doing it, why not me. concerns. Cabotage rules in India are relatively liberal

compared to many other countries like the United States, Japan, and the EC (European Community) countries. All that is required is 75 per cent Indian ownership in a company providing coastal shipping services.

It is important for coastal shipping that the sabotage regulations stay at the current liberal level which will help bring in the most appropriate shipping capacity and commercial management. An important step, however, would be to change the Indian ownership requirement to 74 per cent, which would permit a foreign partner to seek a board position with 26 per cent equity. A draft Coastal Shipping Act is under consideration, to put coastal shipping outside the purview of the existing Merchant Shipping Act, 1958 (Gill 1990), with a view to providing less stringent mandatory requirements in respect of design, construction, equipment, manning, and liability without, however, compromising on safety (MoST 1999). The expert committee which drafted this felt that the Act would facilitate the development of coastal shipping.

In my view, however, lack of such an Act has not been a deterrent for the development of coastal shipping. While the proposed Coastal Shipping Act could lend focus to this transport mode, it should in no way bring in greater controls or bureaucracy in decision making.

RECOMMENDATIONS

IMPROVEMENT AND EXPANSION OF SERVICES

The present emphasis on increasing freight rates to generate additional revenues has boomeranged, leading to a decrease of market share even in bulk commodities. To improve traffic revenues, the IR should concentrate on attracting traffic through service quality improvement, and possibly even reduce the freight tariffs. Multimodal transport efforts should also be taken up seriously which could divert freight traffic from road to rail. Focus on value-added services (both in passenger and freight) at premium prices could also generate additional revenues. Recent studies have shown that increased capacity in upper class passenger services would be viable. Reservation for journeys from stations other than from where booking is being made, reservation related inquiries, tourist train circuits, etc. are services for which customers would be willing to pay premium charges. Similarly, in the case of freight, time guarantees both for wagon allotment and transit time, transit and handling insurance, etc. are services for which customers would be willing to pay, especially since there would be savings for them on inventories and avoidance of losses in transit. The IR can expand its customer base to include advertisers, telecom operators, and real estate developers. For these parties, the IR infrastructure and service operations offer valuable inputs to leverage their own businesses. The potential remains underexploited. The IR needs to put up such projects, and possibly even nurture them

REDUCING COSTS

The IR has made some efforts to cut down costs. The main element of railway costs, which can be brought down in the future, is manpower costs which now account for over half the total working expenses. Wage rates are low, but the numbers employed are far in excess of the requirement, given current technology. Some of the steps taken to reduce manpower are abolishing of posts on retirement, privatization of maintenance activities, and increasing use of contractors for execution of works. But reduction of manpower has not been seriously pursued. An earlier minister of Railways was committed to creating six additional railway zones to 'develop' backward regions and provide employment! Another minister

set the clock back on privatization of maintenance services by going back to increased inhouse employment merely to create government jobs.

Similarly, asset utilization has much potential to reduce the overall unit cost of output. This is especially so with regard to rolling stock and track, the principal assets of any railway systems. In 2004-05 a broad gauge wagon moved 158 km in a day. With the average goods train speed being 23 kmph, a wagon was effectively running for seven hours a day. Similarly, broad gauge electric and diesel locomotives moved an average of just over 400 km in a day, giving an average utilization of just about 16 hours in a day. Passenger coaches for broad gauge mail/express services achieved a utilization of over 500 km per day, giving an average of ten hours a day at an average speed of 50 kmph. Even if one accounts, for time spent at yards and terminals, and for maintenance, the scope for improving rolling stock utilization is very high. Track utilization can improve on the golden quadrilateral to great advantage. Even though these are high density tracks that presently carry over 70 trains each way on double track sections, the potential to carry at least 100 trains each way can be immediately exploited through improved signalling and information systems! Since the quadrilateral accounts for over 60 per cent of traffic, and there is no shortage of demand (with the right prices), such improvement in asset utilization could result in an increase of at around 30 per cent in turnover!

MARKET BORROWINGS

Domestic market borrowings are expensive, with interest rates being over 15 per cent. The average return (revenues less expenses, but before dividend payment) on equity (budgetary support) has been 14.9 per cent and 11.7 per cent during 2003 and 2004, respectively. The average return on total investment has been 10.4 per cent and 8.1 per cent during these years. A study in 2007 by McKinsey Consultants on behalf of the Asian Development Bank thought railways in India to be a sunrise sector for investments. However, customer and commercial orientation within the IR and the internal organizational structure would have to undergo dramatic changes for the IR to be able to attract large investments.

BOT

The only experience to date under a BOT (build, operate, and transfer) scheme in the IR is the Konkan Railway Corporation (KRC). While the Special Purpose Vehicle (SPV) set up for this gained from reduced project financing and completion risks, it was a victim of perverse contracts that enhanced market risk and denied it market access. With no direct access to major traffic originating/terminating points, the KRC is dependent on neighboring railway zones for traffic. The existing railway zones would like to hold on to their traffic to post better financial results at a time when overall freight market growth for rail traffic is uncertain or falling. The KRC would certainly have been better off with direct access into the Mumbai area, as also other areas in the south. A vanilla BOT model can hardly be applied without substantial modification for a part of a large interconnected network. Specific clauses to share revenues, as in originating and distributing demand and interconnect aspects, have to be part of an enhanced BOT. The BOT concept though would have ready application in value-added services like tourist circuits, catering services, terminal operations, multimodal operations, freight forwarding, and consolidation services. In such areas the market can be directly accessed by the BOT operator. In some of these where the life of the assets is not substantially longer than the term of the debt, the projects need not be BOT. BOO (build, own and operate) would be better.

BOLT

The BOLT (build, operate, lease, and transfer) scheme has not been successful since projects under it are being treated conventionally in awarding and finalizing contracts. The potential of the scheme is difficult to assess since sufficient experience has not yet been built up. To make BOLT schemes successful, the IR needs to appreciate the fact that the risks faced by the BOLT operator are quite high and different from small contracts. The BOLT operator should also be capable of absorbing the expected down swing in business. The operator should have a long-term interest in the project. The IR should attempt to build long-term relationships with potential BOLT operators based on mutual interest. Case by case approach is best avoided. To offer economies of scale to the operator, especially for his supply contracts, equipment purchase and deployment, either large projects

or bundling of smaller projects may be necessary. The present procedures for obtaining clearances and clarifications from ministries like finance and environment do not, in all cases, explicitly recognize the BOLT operator as a body different from the IR! Matters that could be taken for granted or even dealt with during the project execution stage between ministries would have to be consciously considered prior to the project award stage. Similarly, hidden costs such as use of rolling stock, transport of material and men, and use of captive communication facilities need to be explicitly considered. These could significantly affect project viability.

REGULATORY FRAMEWORK IS NECESSARY

Since pipelines create natural monopolies, a comprehensive regulatory framework is required. The role of the regulatory authority would include ensuring adherence to stipulated safety and quality norms, ensuring that facilities are not needlessly duplicated, and determining the tariff that is attractive to investors and yet does not exploit consumers. The issue that would require resolution is the demand by financial institutions that the projects should enter into long-term take or pay contracts. Acceding to this demand would largely violate the common carrier principle that attempts to ensure equitable access to all users. If, take or pay contracts are to be permitted to a limited extent, then should the tariff be different for those who sign such contracts and those who do not? How should this difference, if any, be determined?

The principles governing the tariff structure should ensure adequate competition among various mode combinations, fair return to investors, that is returns commensurate with the risks assumed, equitable access to all users, and equitable costs to consumers. While it is easy to enunciate the broad principles, implementing them would be an extremely complex task given the peculiarities of the situation. Since the pipelines would essentially be links in a multimodal network of paths for transportation of oil products, a change in the tariff of any one pipeline or segment would change the flow pattern in the entire network with sometimes significant consequences for the other links (pipelines) in the network. For example, reducing the tariff for one pipeline could make several other pipelines financially unviable. The authors have experimented with a comprehensive optimization model for production, import, and distribution of oil

products and found that the tariff structure creates significant interdependencies in the financial performance of various pipelines and modes. In addition, as was discussed earlier, setting up of a new refinery (source) also significantly impacts the fortunes of pipeline segments. The regulatory authority would have to be given a say in the establishment of supply points to ensure that pipelines assessed as financially viable do not become unviable due to unexpected change in the source structure.

It is thus clear that if the government is serious about creation of pipeline infrastructure, it must without delay set up a regulatory authority to frame the tariff structure and norms for operation of the pipeline companies. Such a move would remove the regulatory uncertainty and encourage investments in pipelines. Given the complexities involved, the tariff structure would have to be decided based on supply and demand of products for the entire country. Such simultaneous determination of the tariff structure for different pipelines and pipeline segments would require use of a comprehensive mathematical model which would be able to faithfully capture the actual behaviour of users in response to tariff rates fixed.

INFRASTRUCTURE FOCUS AREAS

Turnaround Times

One of the key, if not the most important, concerns of coastal movement is turnaround times at ports. Given that coastal movements would by definition be of short duration (in Europe, similar services are called short sea shipping.), the port turnaround times should also be small. With a speed of 10 knots per hour (25 km per hour), distances of 1000, 2000, and 3000 km would be completed in 40 (1.66), 80 (2.33), and 120 (5) hours (days) respectively. The average turnaround times range from 3 to 5 days at most ports and up to 8 days at Chennai and Visakhapatnam for coastal cargo. At Magdalla, due to lighterage operations, the turnaround time for iron ore and pellets could be as high as 15 days. The pre-berthing detentions range from 0.5 to 2 days at most ports and up to 6 days at Chennai. Greater attention is, therefore, called for in reducing the pre-berthing detention and turnaround times. Priority for coastal vessels including dedicated jetties, direct berthing, and better loading, unloading, and evacuation systems would be essential.

Private Investment

All this additional investment should take place with private investment of appropriate stakeholders (high intensity users, shipping companies, and other organizations with significant multimodal/maritime experience). Tying up investments for industry and/or distribution centres near ports, along with easy integration with land transport would be key requirements for success. What is really important is coordinated development.

Shipping Capacity and Manning

Shipping capacity as such is not a problem, since vessels required for coastal operations can either be manufactured in India or sourced in through a bare boat charter or even, as per latest relaxations, chartering in of a foreign flag vessel. Further, depending on the economics of the market, Indian owners can easily change the registration of vessels between coastal and overseas. The manning requirements of coastal vessels are less stringent than overseas vessels, thereby offering scope for economy. Some ship owners state that there is further room to reduce manning requirements. However, the crucial issue in manning is the quality of manpower, since better take home salaries are available in overseas shipping. In the words of one coastal shipowner, coastal vessels are manned by 'grandfathers'. There does not seem to be any solution to this 'problem' other than being able to pay higher salaries, which would only happen with better market conditions and utilization of vessels.

Port Locations

To facilitate coastal movement and reduce land leads, ports would need to be spaced all along the coastline, with a gap of no more than say 300 km. This would require about 20 port locations along India's 6400 km coastline, of which 10 could be at or adjacent to the existing major ports. Locations should be easily accessible from sea and have good land evacuation facilities. Some locations may be captive to industries. Others would serve the purpose of decongesting existing major ports, both in terms of berthing capacity and evacuation access. Chennai and Calcutta

would need to be bypassed on account of these criteria. Visakhapatnam and Ennore could be alternatives for Chennai and Haldia for Calcutta. Haldia could be an alternate for Calcutta and Ennore for Chennai. Similarly, alternatives to Mumbai need to be considered.

SEGMENTING THE MARKET

While it is usual to study the transport sector on the basis of administrative categories, it is more fruitful to look at it from a market segment perspective. One obvious split, which is already recognized, is between freight and passenger. Within each of these divisions, the key geographic segments would be intra-urban, intra-rural and rural to urban, and inter-urban. Urban transportation as well as intra-rural and rural to urban is typically short haul. Inter-urban is typically long haul. Another dimension for segmentation would be the time value of the freight unit or passenger, which could be categorized into low and high. For freight transportation, the segmentation is also influenced by the nature of the user, since freight transportation is part of the supply chain multimodal transportation of the user outlines a framework to segment the users as bulk, industrial, and consumer durables and consumer goods manufacturers.

	Bulk	Industrial durable	Consumer	Consumer goods
Value addition (VA)	Low	←————→		High
Consumer type	Intermediary	←————→		Final consumer
Per cent of logistics costs as proportion of VA	High	←————→		Low
Customer sensitivity to availability	Low	←————→		High

Bulk goods are typically transported in large shipment sizes. Therefore dedicated vehicles, specialized modes of transport, and handling are important. Industrial goods have high value and are often critical. Therefore the need is for speedier transport. Some items require specialized transportation and handling. For consumer durable goods, inventory costs are significant. Appropriate distribution networks that minimize in transit inventory costs play an important role for such goods. For consumer goods, availability is an important factor. Logistics choices here are governed by better service levels as much as by costs. Appropriate distribution networks and warehouse locations play an important role in both improving service levels and reducing costs, direct and indirect. The users are often willing to pay a premium for superior service. I consider four key attributes by which these segments can be distinguished. They are value addition (VA), consumer type, percentage of multimodal transportation costs as proportion to VA, and customer sensitivity to availability. The percentage of multimodal transportation cost to the total value added signifies the importance of multimodal transportation-related activities in the cost of production and sales. It is high for bulk goods manufacturers, while it is low for consumer goods manufacturers. For bulk goods, total multimodal transportation cost as a proportion of value addition is about 70 per cent, out of which transportation costs constitute nearly two-third. Such customers are very sensitive to the price of transportation. For consumer goods and durables, total multimodal transportation costs as a proportion of value addition do not exceed 10 per cent, out of which transportation costs constitute less than a third. Such customers tend to be sensitive to service. Customer sensitivity to availability would determine the propensity to switching. Such attributes of market segments are most useful and need to be brought into the management of public transportation systems. Policy making too greatly benefits from the multimodal transportation orientation, since that should immediately lead to an integrated perspective with regard to transportation modes and support facilities. And an integrated perspective is the need of the hour. Thus perishable commodities or hazardous commodities require specialized infrastructure support. Understanding geographic (origin, destination) requirements would enable a focus on appropriate infrastructure investments, especially from the perspective of economies of scale. Segmentation by use would enable an assessment of value addition provided to the customer and the consequent requirements of infrastructural services. Transportation of hazardous goods assumes great importance for a variety of industries such as petrochemicals, textiles, and dyes and chemicals. Logistics problems arise due to handling requirements and safety aspects. Under regulation, especially with regard to safety and implementation of standard, often leads to accidents with consequential damages and inadequate post accident measures. On

the other hand overregulation, and adherence merely to the letter of regulations, leads to delays and high costs of transportation. Similarly segmentation is possible for passenger transportation. The purpose of travel would be a key attribute in the segmentation. The choice of mode, willingness to pay, and service expectations are governed by the segments. Consequently, transport infrastructure and services need to recognize these parameters while planning service concepts, routing, and scheduling, determining capacity, and in pricing. De-bottlenecking, reducing consumer side costs, increasing capacity from a multimodal optimality are all constrained today by a lack of the multimodal perspective in transport policy making.

Role of Citizens in Monitoring Roads Preamble

Excepting some minor routine maintenance, most road works are contracted out to the private sector with a tendering process. Quality control cells do exist in many public agencies responsible for roads. Maintenance is an ongoing process and is not given enough attention because it may be politically more exciting to build something new and take credit for it than to fix or maintain an existing system. Lack of proper planning and coordination between the various government agencies and illegal overloading of trucks are two other major constraints that plague road maintenance management in India. All these have contributed to the vicious circle of construction and reconstruction without proper maintenance and management. Other factors are:

- Lack of supervision/poor supervision, ignorance, and unethical work practices.
- The funds allocated for routine and periodic maintenance are not sufficient, in which case it is all the more necessary to be quality conscious.
- Lack of transparency in tendering and contracting process, resulting in collusion and corruption.
- Flaws and loopholes in rules and regulations.

- Absence of records pertaining to construction and maintenance details of each stretch of road.

Coordinated Inter-sectoral Development and Centre.State Issues

Another crucial challenge is to channelize investments to realize multimodal benefits in an environment which has long settled down to a sub-sectoral outlook.

There was an attempt in the mid-1980s to make a unified Ministry of Transport. The experiment failed since in itself it did not lead to any improvement in coordination between the departments. A major opportunity like coastal shipping is underexploited primarily because nobody has taken the onus of coordinated development at ports between various modes. The type of coastal shipping that has taken off is that initiated by large corporate who have invested in the required multimodal transportation of their cargo movement. If an initiative with coordinated development can take place, private investment in various aspects of coastal shipping would naturally flow.

Even if the ministries cannot be integrated, task forces or boards that would look at specific areas of multimodal development would be essential. In the context of roads and ports, which come under both central and state governments, there have not only been situations of conflict, especially with regard to financing, but also competitive situations to gain control over the activity. An example of the latter is the development of minor and intermediate ports in Gujarat and Orissa. This has no doubt served the purpose of a better Industrialization in the states. It could also however, lead to expensive excess capacity creation. Common Carrier versus Captive Infrastructure If coordinated development does not take place, then more captive infrastructure than required would come about, leading to systematic inefficiencies. This is especially true of ports and pipelines. While the benefit of captive infrastructure in offering better control and customization for the supply chain cannot be denied (for example the port of Mul- Dwarka for Gujarat Ambuja Cement Limited), the trade-off in terms of better utilization of infrastructure could very well lie in open access and public infrastructure. In the case of pipelines, two organizations have been set up, namely Petronet and Petronet.LNG, to promote

common carrier pipelines for the hydrocarbon sector. Currently, there is debate as to whether the captive pipelines of the petroleum companies should be handed over to Petronet for use in a common carrier mode.

In the case of project roads developed by specific industrial projects as a primary user, the government has ensured public use by providing land at subsidized rates or even at no cost. It is thus important that as far as possible, infrastructure development be carried out under the common carrier principle, and preferably with stake holding by the primary user who would also commercially gain by the public use.

Low Investment Strategies to De-bottleneck Road Systems

A section of roadway to which more demand is delivered than can be processed is referred to as a "bottleneck" When a narrow road section exists on a roadway, then accumulation of vehicles takes place upstream of this section. Capacity analysis indicates that the best speed and the lowest density is downstream of the bottleneck; the worst speed and the highest density is just upstream of the bottleneck. Thus an assumption that the section with the poorest speed is actually the bottleneck is wrong and would lead to erroneous identification of the problem, when it is caused by a "bottleneck". Bottlenecks may occur because of some permanent geometric feature, some construction activity, or as a consequence of some incident. Some bottleneck situations are too trivial to identify. However in many cases, it is necessary to identify both the bottleneck situation and the true demand. A bottleneck situation affects the vehicle-operating cost due to delays and discomforts, and adversely affects safety. Useful descriptive statistics below could be used to estimate the costs imposed by the bottleneck:

- Number of vehicles affected
- Total duration of time
- Maximum number of vehicles queued
- Maximum queue length
- Total vehicle-hours of delay
- Average delay per affected vehicle.

The estimation of the above statistics would be necessary to identify the non-obvious bottlenecks. An understanding of safety implications will also help in benefit. Cost analysis of any proposed improvement of the bottleneck.

The following strategies can be adopted to relax the bottlenecks and improve safety:

- realignment of road sections with sharp curves and steep grades, especially where these are below the standard
- of adjacent road sections
- reducing road roughness
- realignment to improve passing sight distance
- improving intersection geometry
- increasing lane width
- adding auxiliary lanes, especially where traffic demand is higher for a short stretch
- introducing passing lanes at intervals
- Providing gentle slopes and removing fixed objects from the sides of the roads
- use of paved shoulders
- Installing guard fence to protect hazards
- Providing special facilities for runaway trucks on steep downgrades
- Improving and controlling roadside development and activity.

TARIFF

The tariff regime prevailing under the administered pricing mechanism (APM) for the petroleum sector essentially guarantees a 12 per cent return on net worth. Operating costs are reimbursed under a predetermined formula. The compensation paid by the Oil Co-ordination Committee (OCC) today for investment in pipelines is quite inadequate:

- The return provided is less than 1 per cent based on the replacement cost of the assets; as a result, the margins are inadequate to plan replacement of existing pipelines.
- The norms for cost computations are unrealistic. There is no compensation for escalation in the costs of chemicals and power tariff. The actual working capital required is much higher than the normative working capital used for reimbursement of expenses.
- The compensation is based on quantity delivered and not received; transit losses, if any are borne by the pipeline operators.
- There is no compensation if pipeline usage decreases because of non-availability of products.

It is absolutely imperative to evolve a new sensible tariff structure to ensure that requisite investments are made in the creation of pipeline infrastructure. The tariff structure will have to balance the requirements of different constituencies. Users would prefer a competitive tariff structure that is transparent and devoid of intractable cross-subsidization. They would be reluctant to sign long-term take or pay contracts as that would constrain both their distribution and marketing activities. Lenders would look for stable and guaranteed cash inflows to ensure repayment of debt. They would obviously prefer long-term take or pay contracts with credible parties. Shareholders would look for returns that justify the various risks to which they are exposed. They would obviously prefer pipeline companies to charge rates based on the market capacity to pay. Regulators would be interested in ensuring that monopoly gains do not accrue to the owners of pipelines. They would also like to ensure that equitable rates are charged so that the customers do not suffer.

TARIFF DETERMINATION IN THE US AND UK

In the United States, no approval is required for construction of pipelines. Pipelines have to be operated under the 'common carrier' principle. Tariff is fixed by the pipeline company every year through negotiations with users. It is subject to a ceiling based on the oil price index. The Federal Energy Regulatory Commission regulates the tariff and practices of oil pipeline companies. In the UK, pipeline companies are assured a fixed return by the government. In France and Spain, pipeline companies require government approval for operation. A two-part tariff structure is followed for compensation of fixed and variable expenses.

CONCLUSION

The three most important criterions for success in international trade are price, quality and in time delivery. It is not possible to meet these criterions without having a proper multimodal system. Multimodal transportation forms an integral part of any logistics and supply chain. Every day new and innovative methods are discovered and improvisations made in improving the quality of the products while simultaneously lowering the cost. One the important methods of lowering the cost is lowering the inventory levels and introducing just in the time concept. Thus Indian merchandize can't become competitive with the multimodal transport. As stated in the project, the Indian policy makers have realize the importance of multimodal transportation but the face two major constraints while attempting to realize the full potential of multimodal transport.

- 1. Inability to develop the necessary infrastructure due to lack of financial resources.*
- 2. Inadequate institutional and legal environment which doesn't encourage growth.*

Hence unless awareness is created on the importance of developing seamless infrastructure for multimodal transport, the potential of the Indian foreign trade can't be realized. In this regards the international organization like IMO, UNCTAD and WTO have a major role to play in disseminating information and sharing experience and knowledge. by developing multimodal transport in line with global level India can transport its goods cheaply and efficiently and dovetail itself with the global supply chain.

India also needs to develop a suitable logistics system for economical and efficient transportation of goods from the manufacturing centers to the destination points. It has been estimated that the logistics cost of the products and any documentation aggregate to 20% of the final cost of the product and any inefficiency and inadequacy have the negative impact on export competitiveness.

It should be realized that the infrastructure has to be properly priced to enable it to sustain itself to one hand and also to generate the reasonable profit on the capital deployed in constructing it. At the same time infrastructure pricing should be affordable to the end user. The investment in such products can only be long term basis and the cost of capital will have to be well below the market rate. It should

also be acknowledged that the needs and requirements of such infrastructure will vary greatly in different regions of country. Hence the capacity of infrastructure projects should vary in different regions depending on reliable forecast and feasibility studies by experienced organizations.

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