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PROBLEMS, CHALLENGES & OPPORTUNITIES OF LOGISTICS WITH SPECIAL REFERENCE TO INDIAN ECONOMY

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ABSTRACT

The logistics 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 logistics 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 roadblock for multi modal transport in India. At the firm level, the logistics 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 logistics.

Keywords: Logistics, Indian economy,

Introduction

The Indian economy has been growing at an average rate of more than 8 per cent over the last four years 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 logistics – 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 logistics sector in India, innovations therein through interesting business models and the challenges that it faces in years to come. 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. Goods are transported predominantly by road and rail in India. Whereas private players control road transport, rail transport is handled by the central government. With the second largest network in the world, road contributes to 65 per cent of

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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 complementary mode of transport. Ninety five per cent of India's foreign trade happens through sea (Deccan Herald, 2006). India has 12 major ports, six each on the West and East coasts and 185 minor ports.

Table 1

	Rail	Road	Sea
Number (wagons, trucks, ships)	214760	3487538*	806
Freight Capacity(mn ton)	10.66	5.12*	7.9
Route Length (mn km) /Number of major ports	0.11	3.34	12
Freight Revenue (US $ bn)	7.00	38.64	4304
Major Products	coal, steel, petroleum, primary metals	automobile, electronic items, garments etc.	iron ore, coal, petroleum (and industrial and consumer products on the outbound export)

Source: IAEIS, 2005-2006, Financial Express, 2006a
**This figure is for 2002-03*
1 US$ = Rs 44

In keeping with the increasing demand for road transportation, the National Highway Authority of Indian (NHAI) has been strengthening and widening national highways in multiple phases. As part of the National Highways Development Project, the work on the development of golden quadrilateral (connecting Delhi, Mumbai, Chennai and Kolkata) and the North-South and East-West links were started in 1998. It will build 13000 km expressways that would connect the nation. NHAI is investing about $650mn towards the development of an Intelligent Transportation System (ITS) which will make transport services on the highways (like reducing congestion, advance signaling, medical assistance, accident management, etc.) efficient and automating many processes like toll collection etc. Because of the growing opportunity and potential for high revenue, the Ministry of Railways has been taking measures to expand the rail connectivity and recapture the market share of freight business. By focusing on improving wagon utilization, the Railways have managed to reduce the freight cost from 61 paise2 per net tonne km (ntkm) in 2001 to 56 paise per ntkm in 2005. At present, goods train run on same railway tracks as passenger trains at an average speed of around 25 kmph (Gill, 2006). With the proposed dedicated west and east freight corridors, the goods trains are expected to run at 100kmph. Indian Railways has also decided to collaborate with bulk users of freight transport to build the rail network in a Public Private Partnership (PPP) mode. The first project on this line comprises nine public and private sector companies that are building a 82-km rail line between Haridarpur and Paradip at a cost of $ 120mn (Telegraph, 2006). Recently several steel companies have also shown interest in linking iron and coal mines in Orissa with a 98-km rail line (Business Standard, 2006).

Multi-modal transport in India was a monopoly of the Container Corporation of India till 2005. With licenses being given to 13 new private players, rail trade should improve considerably. In order to encourage trade by small-scale industries, Indian Railways has started a "road-

railer"system where container vehicles are capable of running both on highways hauled by trucks and on rail (Guha and Sinha, 2006). In 1998-99, the Konkan Railway (one of the railway zones in South-Western India) pioneered the 'roll-on, roll-off' ('RO-RO') concept between Mumbai (Kolad) and Goa (Verna). Privately owned trucks are loaded with their goods which are driven on to a rake of flat cars and are carried (trucks and their cargo) to the destination.

India at a Glance

Economy

India's GDP has grown at an average of 5.6 percent per year since 1990.

India's exports have almost doubled since 1990, and its share of world exports has risen from 0.6 percent in the mid 1990s to 0.9 percent in 2004.

Another 80 million people will enter the country's workforce by 2010.

Agriculture in India absorbs 62 percent of the working population, but accounts for only 21 percent of GDP.

Infrastructure

China's recent investment in infrastructure has been eight times that of India in absolute terms.

The lead times for Indian exports to China averages six to 12 weeks, compared with a two- to three-week average for exports from China to USA.

The costs associated with moving cargo in India are some of the highest in the world at 11 percent of landed cost, compared with a global average of 6 percent.

Ports and shipping

Indian container traffic has increased at an average annual rate of 13.4 percent over the last decade, reaching 4.39 million TEUs in 2004, and is projected to reach between 8.4 million TEUs and 10.8 million TEUs in 2012.

India's container terminal capacity has the potential to more than double from 6 million TEUs in 2004 to 15.2 million TEUs in 2012.

India's West Coast ports handled almost 68 percent of traffic in 2004.

Thanks to increased volume with China, India's westbound trade grew by around 30 percent in each of the past two years, compared with eastbound (export) growth of only six to eight percent.

An estimated 45 percent to 50 percent of India's imports and exports are carried on direct call, main line vessels.

Road, Rail, and Air

India will soon allow full ownership by foreign private entities in the trucking and warehousing sectors, and this will help generate both operating and cost efficiencies.

The provision of rail services is being liberalized, with the Indian government ending Concor's monopoly on moving containers by rail in 2005.Only four airports, Mumbai, Delhi, Chennai and Kolkata, are licensed to handle international airfreight.

Determinants of Growth in India

The Indian logistics business is valued at US$ 14bn and has been growing at a CAGR of 7-8 per cent. As mentioned earlier, the logistics cost represents 13-14 per cent of the country's GDP. The market is fragmented with thousands of players offering partial services in logistics; 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 logistics industry beyond recognition.

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. 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.

The entry of large third party logistics (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. The following table 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 logistics player. Mergers & Acquisitions amongst Indian and MNC logistics firms is starting to increase the reach of MNC 3PLs in the domestic

Table 2: Investment Plans of Major 3PL Service Providers

Firms	Investment Details/ Plans (2007-08) (in US $ mn)
DHL	260
TNT	115
Gati200	
*Shreyas Shipping and Logistics	350

Challenges Ahead

Several challenges remain before the Indian logistics 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 logistics 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.

While the use of IT for logistics 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 turn out to be a giant step for overcome the logistics challenges.

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 (Bhatt, 2006). 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 logistics 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. Truck manufacturers could integrate the tracking technology in its products and IT servicing firms could provide information service on highways tracking movement of vehicles. 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 logistics 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.

Some Peculiarities of the Indian Supply Chains

The Indian logistics sector has typically been driven by the objective of reducing transportation costs that were (and often continue to be) inordinately high due to regional concentration of manufacturing and geographically diversified distribution activities as well as inefficiencies in infrastructure and accompanying technology. Freight movement has slowly been shifting from rail to road with implications on quality of transfer, timeliness of delivery and consequently costs except for commodities, which over long distances, predominantly, move through the extensive rail network. More on the infrastructure issues later.

Warehousing has also been typically dominated by small players with small capacities and poor deployment of handling, stacking and monitoring technologies. While it has had detrimental effect on almost all sectors, the food sector has been the one that has suffered the most due to low investment in cold chains and allied machinery. Erratic power outages have also meant low dependence on technology and a more manual operation. Another fact that has affected both the location as well cost of operating a warehouse has been the "octroi tax." Firms have been locating warehouses outside city limits.

It is in the distribution activities or within plants. Many firms try to compete through the factor advantage of low wages, which have necessitated hiring low, or no skill personnel.

The logistics challenge in such an environment is immense – build the infrastructure, manage the requirements of a changing structure of various sectoral supply chain, change industrial policies to facilitate efficient production and movement of goods and services, deploy effective managerial practices and technology to enhance the competitiveness through better management of logistics networks, and develop new models for new sectors especially in the service sectors as well as traditional areas like agro-business etc. It must be mentioned that the logistics industry in India is transforming itself very interestingly despite its peculiarities by developing innovative business models and by chipping away at the structural and policy based rigidities. In a later section, we discuss some of these innovative initiatives that are leading the renewal of the logistics industry in India.

The Changing Logistics 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. In this section we provide a quick overview of the status of the logistics infrastructure in India and the current initiatives, both private and public, in that 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 (Rastogi, 2006). 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 complementary mode of transport. Ninety five per cent of India's foreign trade happens through sea (Deccan Herald, 2006). India has 12 major ports, six each on the West and East coasts and 185 minor ports. Table 2 maps the various modes on different performance indicators, clearly indicating the vitality and importance of road transport in Indian economy. There is also evidence of an, across the board, increase in freight traffic for all modes indicating an increased logistics activity. For instance, the percent change in road, rail, air and sea cargo traffic has increased, between 2001 and 2005, from 5 to 14 per cent, 4 to 7.5 per cent, 6 to 20 per cent and 3.5 to 11 per cent respectively (CMIE Database, 2006).

Table 3: Comparison Chart for Various modes

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In 2005-06, the ports handled 456.20 million tonnes of cargo traffic. This is expected to increase to 700 million tonnes by 2011-12. In keeping pace with the growing demand, the government plans to increase port capacities to around 1 billion tonnes per annum in the next six years (Raja, 2006). Under the National Maritime Development Programme (NMDP), the government is encouraging public-private partnership to build and maintain ports. This scheme will cover 276 port related projects at an investment of $12.40 bn (Raja, 2006). With rising congestion levels at major ports and with high average turnaround time, the government has decided to develop minor ports in seven states to ease the traffic of major ports (Financial Express, 20006b). The following table explain the operational performance of various ports in India – while there is an improvement in performance, the pace is slow. The estimated cost of this development is expected to be around $350 mn. Further, private sector is likely to invest $ 7.67 billion over the next six years.

Table 4: Average Turnaround Time At Ports (in Days)

Port	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	CAGR
Chennai	6.40	5.80	5.30	3.70	4.60	3.80	(9.90)
Cochin	3.23	3.10	2.37	2.19	2.22	2.33	(6.32)
Haldia	5.21	3.96	4.01	3.02	2.87	3.00	(10.45)
Jawaharlal Nehru	1.72	2.48	2.34	2.28	2.04	1.84	1.36
Kandla	6.15	4.72	6.55	5.94	5.06	4.62	(5.56)
Kolkata	6.59	5.50	4.71	4.47	4.29	4.17	(8.75)
Marmugao	4.30	4.25	2.04	3.86	4.47	4.35	0.23
Mumbai	5.60	5.20	5.47	5.06	4.10	4.21	(5.55)
New Mangalore	3.80	2.89	2.73	1.90	2.35	2.96	(4.87)
Paradip	3.89	4.16	3.99	3.37	3.42	3.41	(2.60)
Tuticorin	6.39	4.10	4.11	3.59	2.59	2.66	(16.08)
Vishakhapatnam	4.75	3.71	3.51	3.72	3.33	3.20	(7.60)
Average	4.84	4.16	3.93	3.59	3.45	3.38	(6.92)

Source: IAEIS

Currently, fifteen private sector projects are operational at various major ports and four more projects are under implementation (Raja, 2006). One of them aims to build the deepest port in the world at an investment of $ 1bn (Financial Express, 2006c). This project is handled by a three-firm Chinese consortium with a Mumbai-based partner, Zoom Developers. Interestingly, firms like Ambuja Cement have been using barges for transport of clinkers from their factories to crushing and packaging plants all over the coast, thereby, reducing transport costs considerably. It can be seen that there is a fury of activity in enhancing the infrastructure

capacities in the country.

Determinants of Logistics Growth in India

The Indian logistics business is valued at US$ 14bn and has been growing at a CAGR of 7-8 per cent. As mentioned earlier, the logistics cost represents 13-14 per cent of the country's GDP. The market is fragmented with thousands of players offering partial services in logistics; it is estimated that there are about 400 firms capable of providing some level of integrated service (Mahalaksmi, 2006). 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 logistics industry beyond recognition.

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. Similarly, regional food & grocery retail leaders like 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 logistics 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 logistics (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.

The above table 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 logistics player. Mergers & Acquisitions amongst Indian and MNC logistics firms are starting to increase the reach of MNC 3PLs in the domestic market while consolidating the business (e.g., DHL acquired Blue Dart, TNT acquired Sppedage 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 logistics market growing we should see a shift in this trend. Introduction of more efficient transport technology and mobile communication has the potential of changing the logistics practices in the industry. Increasing competition and the low penetration of IT also implies that the scope for change is immense and imminent.

Table 5: Investment Plans of Major 3PL Service Providers

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DHL	260
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Source: Baxi (2006), Sanjai (2006a)

Domestic Outbound logistics

The implication of the emergence of a strong service industry on logistics 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 un-coordinated 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 logistics 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 logistics 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 caselets highlighting their innovative contribution. They also represent the renewal process that is transforming the logistics sector and the distribution strategy of firms.

GATI

Established at a time (in 1989) when firms in India hardly outsourced their logistics requirements, Gati has transformed itself from a cargo movement company to become one of the leading end-to-end logistics 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 staring 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.

The Dabbawallahs of Mumbai

The "dabbawallah's" or the 'lunch box delivery people' of Mumbai pickup and deliver lunch boxes from homes or restaurants and deliver it to the customer's office – all within a specified time frame – and then deliver the empty box back to the place of pickup. It is an example of how processes can play an important role in coordinating logistics of an important service industry in India. The Nutan Mumbai Tiffin Box Charity Trust of Mumbai was established in 1891 to provide pick-up and delivery of lunch for Britishers working in Mumbai. Since then it has become the leading lunch delivery cooperative in the city. It picks-up and delivers 200,000 lunch boxes in a standard container every day and returns the same to the place of pickup. The firm has an annual turnover of about $12 mn and employs 5000 people for pickup and delivery – almost all of them are uneducated. However, there are less than 10 boxes mis-delivered or un-picked in a month! We discuss, briefly, the processes that help make this logistics network error-proof and deliver such an astonishing performance. The operations of the group has attracted global attention and won them many awards. They represent a growing group of service providers that exist as an element of the logistics network, provide niche service and generate value in return for the customer.

The Trust, which is organized as a cooperative is operationally, organized in hierarchical teams – pick-up teams, consolidation teams, and delivery teams (and then the reverse logistics for empty boxes with reversing of the functions for the teams). Typically, each dabba or the lunch box passes through more than four pair of hands and may be transported up to 60 km each way. Pickup is done between 7.30am-9.00am, delivery between 12.00 and 1.00pm and return between 2.00-5.00pm. These represent tight time-windows where a team of 20-25 members (and supervised by a team leader who also fills in as a pickup person in case of any absence) pick-up lunch boxes from homes – about 30 per pick-ups person. The boxes are carried in a specialized fixture on a bicycle to the nearest train station where the boxes are consolidated by destination. A consolidation team performs this task and carries the boxes (which may have been picked by members of different teams but need to travel to the same destination geography) into the train. Often tiffin or lunch boxes are un-loaded at intermediate train stations – re-consolidated with boxes coming from other locations (i.e., cross-docked) and carried on a third train to its destination station. At the destination station, the building once again segregates the lunch boxes coming from various origins/cross-docking destinations where the delivery is made. Finally, a delivery team picks up their boxes, i.e., boxes that they will deliver to specific owners in specific buildings, carry them on their bicycles and deliver them in the office of the owner of the box. Later in the afternoon, the same person picks-up the empty box and pursues the reverse logistics and the box is ultimately delivered at its point of origin – either a home or a restaurant. With this as the complexity, what may be plausible reasons for such low errors?

The designed process is simple and easy to understand for each operator. More important, each operator has a limited yet definite role. This role is one of pickup, consolidation & transfer and delivery (and the similarly for reverse logistics). Each pickup operator does not pickup more than 25-30 boxes, as that is the number of addresses etc. that he can remember

accurately which helps in avoiding mistakes. The lunch box is enclosed in a standard container, which carries a unique code for the destination station, the building where the box is to be delivered and the floor number in that building where the office of the customer is located. Each operator recognizes a limited set of codes that are relevant to him (and does not have to learn the entire coding scheme). And finally, repetition of the task (i.e., same pickup location, same place for cross docking, same delivery location etc.) helps in making the task foolproof. Of course, what helps is the linear geography of Mumbai, the punctuality of trains, relatively stable demand and strong inter-dependence between operators. It is an example of how manual logistics systems can be organized to effectively deliver value to the customer.

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 (Figure 4b). The latter were smaller versions of the former and locally oriented.

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. 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.

Another area that will see tremendous growth is outsourcing of logistics service. While logistics 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.

Conclusion

The logistics 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 logistics costs and provide effective service. Changing government policies on taxation and regulation of service providers will also play an important role in this process. At the firm level, the logistics 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 logistics industry can boom significantly in India.

Effective and efficient global supply chain logistics require consideration of the five “V” elements to provide consumer value while minimizing the cost and threat vulnerability related to reduced visibility, variability, and velocity. This balancing must incorporate the multiple perspectives of consumers, firms, government, and the public. From an institutional perspective, these include producers, material suppliers, manufacturers, wholesalers, distributors, retailers, and carriers. The larger concern is the physical infrastructure and the need to meet the necessary capacity demands within the physical and organizational capabilities of existing relationships and capabilities. While increased physical infrastructure capacity is receiving increased focus, the difficulty in coordinating multiple public-private partnerships and relationships still results in many challenges.

While the principles of supply chain logistics still apply in a global environment, the

challenges are significantly magnified and the risks are increased. As many firms attempt to take advantage of global sourcing and marketing, there is a growing need for awareness regarding the challenges and infrastructure changes.

However, the Indian logistics story is one with islands of excellence though there has been a general improvement on almost all parameters. 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.

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