



Marketing Strategies for Freight Traffic on Indian Railways: A Systems Perspective

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Marketing Strategies for Freight Traffic on Indian Railways: A Systems Perspective

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Abstract

Indian Railways (IR) had lost its market share in high rated freight commodities especially cement, POL, and iron and steel. IR was missing an overall strategy for freight business, which was overcharged without sensitivity to competition. Over time, other transport modes, especially road (and pipeline in the case of POL) captured a very significant share of freight due to their faster and door-to-door deliveries.

Several initiatives have been taken in the recent past to make IRs' strategies market oriented like increased axle loading, better pricing strategy, and improved services. In 2005-06, IR loaded 667 mt of revenue earning freight traffic, marking an increase of 110 mt over 2003-04. Additional freight revenue was Rs 9172 crore during the same period.

IR still has a tremendous potential in the freight business, but it needs to be examined with an appropriate framework for segmentation of the market. Like in any other transport business, an origin-destination (OD) based systems perspective could be used. The primary categorization of origins would be industry/collection centre, mine and port. The primary categorization of destinations would be industry, port and distribution center. An attempt was made by the authors to do an OD analysis on the 666.5mt (602.1 mt) of freight traffic of 2005-06 (2004-05).

The above analysis has implications for leveraging the four Ps of marketing; product (service attributes), price, promotion, and place (logistics). This paper attempts to evolve marketing strategies for freight traffic, based on the OD market analysis specified above.

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1. Introduction

Indian Railways (IR) is Asia's largest and the world's second largest network under one management, with a separate Ministry and its own annual budget. The key activities of IR are transportation of freight and passengers. The network carried about 15.7 (14.7^{*}) million passengers and 1.8 (1.6) mt freight every day on the network of 63,332 (63,465) km in 2005-06 (2004-05). Broad Gauge (BG) is the primary gauge for the freight movement. Meter Gauge (MG), which was far more significant earlier, is being increasingly converted to BG. Exhibit 1 provides key statistics of IR for the years 2005-06 and 2004-05.

Exhibit 1: Key Statistics of IR (2005-06 and 2004-05)

	Unit	2005-06	2004-05
Running track	km	84,370	84,260
Broad gauge (1676 mm)	km	69,016	67,932
Meter gauge (1000 mm)	km	12,429	13,271
Narrow gauge (762 mm/610 mm)	km	2,925	3,057
Route	km	63,332	63,465
Electrified route	km	17,907	17,495
Locomotives		8,025	7,930
Diesel		4,793	4,801
Electric		3,188	3,085
Steam		44	44
Wagons		207,176	222,379
Coaches		50,080	48,313
BG wagon turn-round	days	6.1	6.4
Stations		6,974	7,131
Employees	thousand	1,412	1,422
Passenger traffic	m	5,725	5,378
Passenger traffic	m kms	615,634	575,702
Passenger earnings	Rs crore	15,081	14,071
Freight traffic	mt	667	602
Freight traffic	m NTKM	439,596	407,398
Freight earnings	Rs crore	35,535	30,489

[MOR, Various Years]

2. Market Share

IR's overall share of freight has come down from 89 percent in 1950-51 to 40 percent in 2000-01. The road sector has captured the largest share of it. In the recent years, pipeline

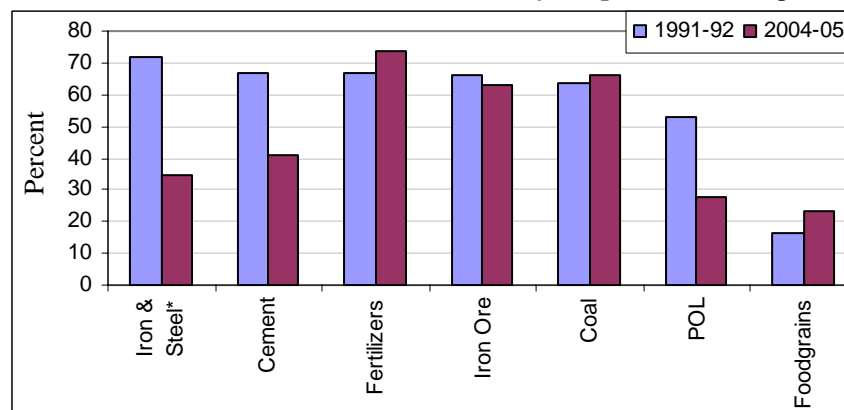
* The paper presents the data and analysis for the years 2005-06 and 2004-05. The respective 2004-05 figures are given in brackets.

has captured some share through POL movement. Coastal shipping has emerged as a potential threat for IR. Due to lower prices, some bulk traffic like coal, iron ore, POL and even cement is now moved by coastal shipping. Inland waterway transport is a potential competitive mode, though it needs a lot more investment to make it effective.

IR's own freight policy had many shortcomings. The freight segment was overcharged without being sensitive to the competition. To deal with increasing costs, it was politically expedient to increase freight fares rather than passenger fares. Fares are but one element of the total logistics costs faced by the customers. The other costs elements are an outcome of shipment volume, first mile and last mile inter-modal access, reliability in transit times, and availability of wagons as per requirement. The total logistics cost influences the customer's mode choice.

It can be seen from Exhibit 2 that the loss of market share is in high rated commodities ie iron & steel, cement and POL. Iron & steel and cement shares have been taken by road. POL share has mainly gone to pipelines.

Exhibit 2: IR Market Share of Bulk Commodity Output (Production plus Imports)



*Iron & Steel data is from 1991-92 and 2000-01
[MOR, Various Years; *MOR, 2002]

Exhibit 3 gives the production growth vs IR's loading growth between 1991-92 and 2003-04 for five bulk commodities. IR's loading growth for coal and foodgrains has been higher than the production growth. In the case of high rated commodities, IR's loading growth has been lower than the production growth.

Exhibit 3: Production and IR's Loading Growth

Bulk Commodity	Production Growth (%) (1991-92 to 2003-04)	IR's Loading Growth (%) (1991-92 to 2003-04)
Low Rated Commodities		
Coal	3.61	4.25
Foodgrains	1.22	4.24
High Rated Commodities		
Iron & steel	8.28	1.09
Cement	7.86	4.37
POL	8.02	2.88

[CRISIL, 2005]

3. Freight Traffic

Freight traffic accounts for nearly two third of IR's revenues. The freight traffic broadly consists of two groups, 'bulk' comprising of seven commodities and, 'other goods,' consisting by and large of 42 commodities. Exhibit 4 provides an overview of the commoditywise traffic shares in 2005-06 and 2004-05. The bulk traffic constitutes about 90 percent of freight traffic in tons and in earnings, while it constitutes 86 percent in NTKM. Coal occupies the dominant position due to transport linkages to thermal power plants and steel plants.

Exhibit 4: Commoditywise Traffic Share

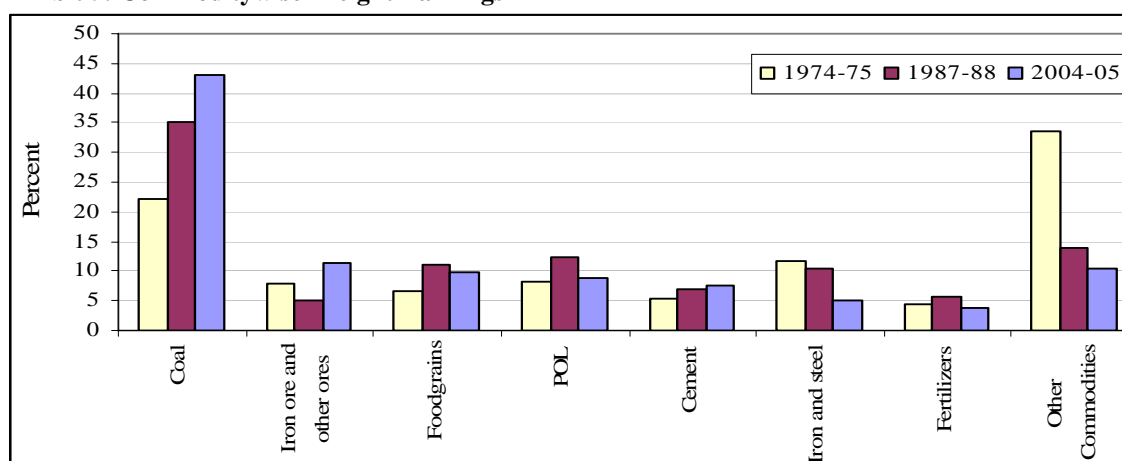
	Commodity	Tons (%)	NTKM (%)	Earnings (%)	Average Lead (km)
2005-06					
1	Coal	44.15	38.77	40.62	579
2	Iron ore and other ores	17.02	10.76	13.60	417
3	Foodgrains	6.25	12.53	8.46	1323
4	POL	5.02	5.52	8.64	726
5	Cement	9.18	7.47	7.95	536
6	Iron & steel	3.27	4.96	5.67	1002
7	Fertilizers	4.90	6.07	4.42	818
	Other commodities	10.22	13.91	10.65	898
	Total	100.00	100.00	100.00	660
2004-05					
1	Coal	45.07	39.74	43.08	599
2	Iron ore and other ores	15.99	10.18	11.34	431
3	Foodgrains	7.73	15.36	9.73	1346
4	POL	5.31	5.16	8.80	657
5	Cement	8.93	7.09	7.66	537
6	Iron & steel	3.05	3.85	5.05	853
7	Fertilizers	4.78	5.33	3.91	755
	Other commodities	9.14	13.29	10.43	966
	Total	100.00	100.00	100.00	677

[MOR, 2007; MOR, 2006a]

The commoditywise earnings (in percentage) of IR over three decades (1974-75 to 2004-05) are given in Exhibit 5. IR's share in 'other commodities,' which was nearly 35 percent in 1974-75, had reduced to just 11 (10) percent by 2005-06 (2004-05). Other commodities are all 'non bulk' and high value items.

In the early 80's, IR changed their policy of 'yard to yard' movement of rakes to 'end to end' movement of rakes. While this policy provided significant operational gains for bulk commodities, which could offer rake load traffic, it resulted in loss of share in other commodities due to their inability to offer rake load traffic. Road transport offered a competitive choice to these customers, even at a higher price due to the flexibility, frequency and door to door delivery. IR was unable to offer feasible options to these customers, if the volumes were insufficient for rake load movement. However, these commodities have potential for the future, especially due to growth in containerization.

Exhibit 5: Commoditywise Freight Earnings



[MOR, Various Years]

4. Initiatives by IR

During 1999-00 and 2000-01, IR's financial situation was very critical. Surplus and fund balance had reached a record low and the operating ratio (ratio of total working expenses to total earnings) had reached a record high. Poor infrastructure imposed many safety concerns. In 2001, The Expert Group on IR submitted their report stating that the IR was heading towards bankruptcy [NCAER, 2001].

A number of steps had been taken during the tenth plan period (2002-07). A Special Railway Safety Fund (SRSF) of Rs 17,000 crores was created in 2001 to replace and renew over-aged tracks, bridges signaling systems and rolling stock. Some of the major steps taken in improving the IR's share in freight traffic were [MOCI, 2003]:

- Rationalization of freight tariff structure to leverage price elasticity of demand
- Incentives to premier customers generating freight earnings of more than Rs 25 crores per annum for traffic originating from the sidings
- Policy to attract short lead traffic through higher freight concessions

- Computerization of freight movement through Freight Operations Information System (FOIS)
- Providing warehousing facilities through CWC and private freight terminals. MOU has been signed for providing integrated freight terminals at 22 locations in the country
- Focus on improving port connectivity and inter-modal transport
- Privatization of container movement on IR

FOIS

FOIS enabled freight customers to have instant access to information regarding the current status of their consignments in transit, for just in time inventory. It is a system for management and control of freight movement that also assists managers to optimise asset utilisation. FOIS comprises the Rake Management System (RMS) for handling the operating portion and Terminal Management System (TMS) pertaining to the commercial transactions [CMC Ltd, 2007]. FOIS has been designed to give strategic advantages to both IR and its customers. The implementation of the system is envisaged to eventually achieve the following:

- Extension of the current business practice of bulk movement in train load formation to piecemeal traffic to increase the market share by clubbing and moving together similar type of stock in a "hub & spoke" arrangement.
- Global tracking of consignments in real time, whether in rakes or in individual wagons, to enable timely planning and just in time inventory management.
- Facilitate acceptance of customer's orders, billing and cash accountal from identified nodal customer centres which may not necessarily be the handling terminals. These facilities could even get extended to customers' premises and alongwith introduction of e-commerce help in reducing the burden of logistics management.

Many freight incentive schemes have also been announced over the past two years to attract new customers and to regain the lost market share. IR's Rates Circular 25 of 2006 provides detailed information on these schemes [MOR, 2006b]. Some of these schemes are described below. Apart from these, Engine on Load (EOL), Wagon Investment Scheme (WIS) and Liberalized Siding Rules are some other initiatives taken in the recent past.

Volume Growth Incentive Schemes

These schemes are aimed at promoting higher volumes of traffic particularly during the lean season. Customers may avail discounted freight rates for incremental traffic, lean season, empty flow directions and for premier customers. Specific schemes under this category are (i) Incremental Traffic (ii) Loyalty Scheme (iii) Traditional Empty Flow Direction (iv) Long Term Special Incentive Schemes

Cargo Aggregation Schemes

With the objective of promoting rail, road and warehousing integration and coordination, IR have already launched Rail Side Warehousing Scheme for private participation. In order to take the process forward, Cargo Aggregation Schemes are offered to freight forwarders.

Special composite freight rates may be availed by cargo aggregators/customers offering two-leg traffic in covered wagons subject to certain stipulations. Specific schemes are (i) Freight Forwarder Scheme (ii) Freight Forwarder in Empty Flow direction (iii) Two Leg Scheme

Consignment Volume Based Schemes

IR offer several transportation options differentiated by the volume of consignment booked to a destination terminal. These products have varying tariff rates. Options are offered to rail users are (i) Block Rakes (ii) Mini Rakes (iii) Two Point Rake (Covered Wagons) (iv) Multi Point Rake (Covered Wagons) (v) Two Point Rake (Other than Covered Wagons) (vi) Multi Point Rake (Other than Covered Wagons) (vii) Rakes from Two Originating Terminals (Other than Covered Wagons)

IR's market share is improving as a result of initiatives taken in the recent past. Exhibit 6 (as a build up on Exhibit 3) provides data on production and IR's loading growth for different years. Recent years figure on IR's loading have improved significantly and in fact, IR's loading growth has surpassed the production growth in high rated commodities for 2004-05 to 2005-06.

Exhibit 6: Production and IR's Loading Growth
Percent

	Production Growth (1991-92 to 2003-04)	IR's Loading Growth (1991-92 to 2003-04)	Production Growth (2003-04 to 2005-06)	IR's Loading Growth* (2003-04 to 2005-06)	Production Growth (2004-05 to 2005-06)	IR's Loading Growth* (2004-05 to 2005-06)
Low Rated Commodities						
Coal	3.61	4.25	5.6 ¹	8.1		8.4
Food grains	1.22	4.24		-3.3		-10.9
High Rated Commodities						
Iron & steel	8.28	1.09	6.0 ²	8.1	7.4	12.2
Cement	7.86	4.37	11.7	11.4	9.3	13.7
POL	8.02	2.88	4.7 ¹	2.9		5.6

[CRISIL, 2005; CMA, 2006; MOS, 2006; MOPNG, 2006; *MOR, Internal Correspondence]

5. Framework for Market Segmentation : OD Perspective

In a very fundamental way, IR focuses more on originating traffic and implicitly looks at customer service only at the origin. There is no focus on the destination end of the movement. While data on originating traffic originwise is available, similar data on terminating traffic is not readily available.

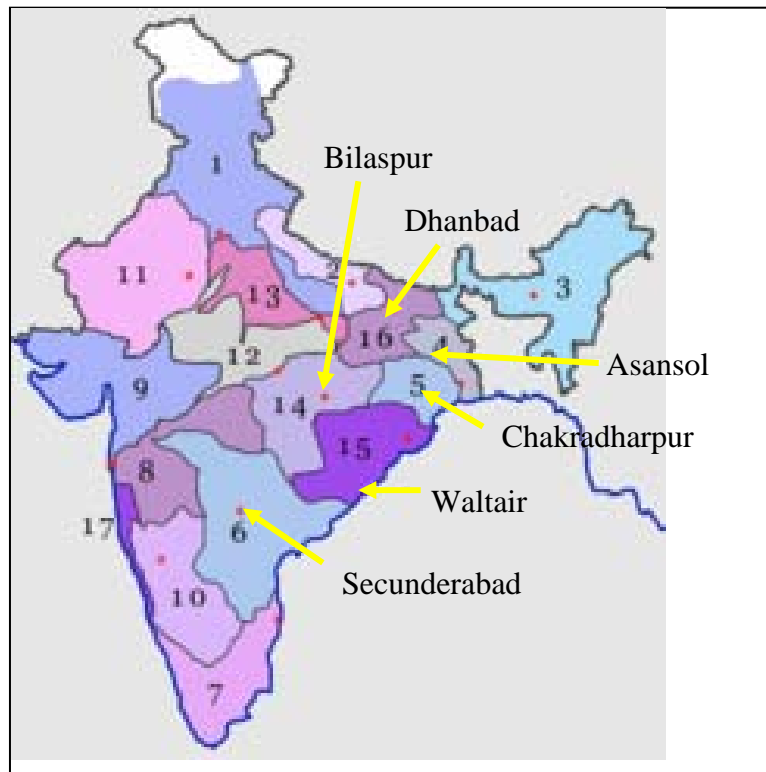
A recent analysis of IR's freight loading at the originating end revealed that IR's top six divisions accounted for 45 percent of the total originating traffic in 2005-06 (Exhibit 7). The total number of divisions in IR are 67. Exhibit 8 indicates the zones and location of the top divisions in the country's map.

Exhibit 7: Originating Loading for Top Six Divisions of IR

Division	Originating Loading (2005-06) (mt)	Growth over (2004-05) (%)	Share (%)	Major Commodities
Bilaspur	71.2	5.4	10.7	Coal
Dhanbad	59.8	6.7	9.0	Coal
Chakradharpur	57.6	21.0	8.6	Iron ore, Steel
Secunderabad	40.4	10.8	6.0	Coal, Cement
Asansol	37.9	13.9	5.7	Coal, Steel
Waltair	36.8	8.8	5.5	Iron ore, Steel
Originating loading of six divisions	304.0	12.1	45.0	
Originating loading of IR	666.5	10.7	100	

[Murty, 2006]

This brings out the scope for “focus” in improving services for originating traffic, with 45 percent share being accounted for by six divisions. However, the author (Murty, 2006) himself says that similar data and consequent focus is not there for terminating traffic. The authors are aware of one study that analyses terminating traffic (as part of a larger analysis), though it is now quite dated [Saxena R N, 1985].

Exhibit 8: Top Divisions of IR

[Wikipedia, 2006]

IR has a tremendous potential in freight segment, but an appropriate framework for market segmentation is missing. Originating traffic is only one perspective. A framework, which takes into account both origin and destination (OD) like in any other transport business, could be used. Rather than examine the origins and destinations geographically, the authors categorize origins and destinations on attributes that have implications for providing appropriate services.

The rail traffic can be viewed as almost entirely originating in one of the following three types of origins

- Industry or collection center (mandis in the case of foodgrains, inland container depots (ICD) in the case of containerized traffic, goods sheds in the case of wagons of different parties)
- Mine
- Port

A similar and exhaustive categorization of destinations would be

- Industry
- Port
- Distribution center

The total freight traffic handled by IR is allocated to these origins and destinations, as per the methodology given in annexure 1. The resultant traffic at origins and destinations is given in Exhibit 9.

Exhibit 9: Originating and Terminating Traffic

mt

2005-06	
Originating Traffic: Origin	666.5
Industry/Collection Centre	198.9
Mine	398.8
Port	68.9
Terminating Traffic: Destination	666.5
Industry	382.1
Port	72.1
Distribution Centre	210.3
2004-05	
Originating Traffic: Origin	602.1
Industry/Collection Centre	186.1
Mine	357.2
Port	58.8
Terminating Traffic: Destination	602.1
Industry	337.3
Port	70.7
Distribution Centre	194.1

[Authors' Analysis]

An attempt was made by the authors to assign this traffic in a two-way classification, using the origin-destination perspective (Exhibit 10). Annexure 1 explains the methodology used to derive the O-D matrix.

Exhibit 10: Origin Destination wise Freight Traffic**2005-06 (666.5 mt)**

mt

O \ D	Industry (382.1)	Port (74.1)	Distribution Centre (210.3)
Industry/ Collection Centre (198.9)		- Containers (13.5)	- Cement (61.2)
		- POL (4.9)	- Foodgrains (41.4)
			- Fertilisers (26.8)
			- Iron & steel (20.1)
			- POL(20.0)
			- Salt (4.7)
		- Other commodities (3.5)	
		- Sugar (2.8)	
	Total (18.4)	Total (180.5)	
Mine (398.8)	- Coal (245.6)	- Iron ore/other ores (40.4)	
	- Iron ore/other ores (72.7)	- Coal (15.3)	
	- Limestone/dolomite (12.0)		
	- Stones, excl marble (10.1)		
	- Gypsum (2.8)		
	Total (343.1)	Total (55.7)	
Port (68.9)	- Coal (33.3)		- Containers (13.5)
	- Other commodities (5.4)		- POL (8.5)
	- Iron ore/other ores (0.4)		- Fertilisers (5.9)
	Total (39.0)		- Iron & steel (1.7)
		- Foodgrains (0.3)	
		Total (29.8)	

2004-05 (602.1 mt)

mt

O \ D	Industry (337.3)	Port (70.7)	Distribution Centre (194.1)
Industry/ Collection Centre (186.0)		- Containers (12.3)	- Cement (53.8)
		- POL (4.1)	- Foodgrains (46.2)
			- Fertilisers (24.9)
			- POL (19.9)
			- Iron & steel (17.4)
			- Salt (4.2)
		- Sugar (2.1)	
		- Other commodities (1.1)	
	Total (16.4)	Total (169.6)	
Mine (357.2)	- Coal (224.9)	- Iron ore/other ores (38.1)	
	- Iron ore/other ores (57.9)	- Coal (16.2)	
	- Limestone/dolomite (10.0)		
	- Stones, excl marble (8.0)		
	- Gypsum (2.2)		
	Total (303.0)	Total (54.3)	
Port (58.8)	- Coal (29.3)		- Containers (11.5)
	- Other commodities (4.7)		- POL (7.8)
	- Iron ore/other ores (0.3)		- Fertilisers (3.9)
	Total (34.3)		- Foodgrains (0.3)
		- Iron & steel (1.0)	
		Total (24.5)	

[Authors' Analysis]

The above analysis has implications for leveraging the four Ps of marketing; product (service attributes), price, promotion, and place (logistics).

Service attributes would include development and ownership of sidings, which could be “private” (owned and managed by the customer) or “public” (owned by IR, but generally managed by customers), having the sidings at both the origins and destinations, automation of loading/unloading, special purpose wagons, 24 hours loading/unloading, Engine on Load (EOL) etc.

Pricing strategies for major bulk commodities and container traffic would be derived based on the competitiveness with respect to other modes and market potential.

Promotion would include freight schemes (like the schemes IR has announced recently) to improve the service attribute, and information sharing (including through FOIS).

Logistics attributes relate to inter-modal integration and warehousing.

6. Analysis of Key OD's

Mine to Industry

This is the most significant flow, accounting for 343 (303) mt, which is about 51.5 (50.3) percent of IR's traffic. Coal is the dominant commodity accounting for 246 (225) mt. Exhibit 11 gives the production figures of selected minerals in 2005-06 (2004-05), tonnage carried by IR and the share by IR. IR carried about 73 (71) percent of coal produced in 2005-06 (2004-05). More than 80 percent of the coal, that the IR transports, goes to industries. Other important modes carrying coal are merry-go-round (MGR) system, road, conveyor belt and the rail-cum-sea route. Iron ore and other ores is the second most important commodity for this OD segment, followed by limestone & dolomite and gypsum.

Exhibit 11: Minerals Traffic Share

Commodity	Production mt	Carried by IR		Mines-Industries Share	
		mt	%	mt	%
2005-06					
Coal	403	294	73.0	246	83.5
Iron ore and other ores	140	113	81.0	73	64.1
Limestone & dolomite	170	12	7.0	12	100.0
Gypsum	4	3	75.0	3	100.0
2004-05					
Coal	382	270	70.8	225	83.2
Iron ore and other ores	143	96	67.5	58	60.2
Limestone & dolomite	161	10	6.2	10	100.0
Gypsum	4	2	62.0	2	100.0

[MOM 2007; MOM, 2006]

For this traffic, both mines and the major industries (power plants, steel plants etc) usually

have direct rail access through sidings. IR faces less competition due to it being a door-to-door service provider.

In the service attributes, IR has a potential for productivity improvements. Mechanized loading/unloading, 24 hours loading/unloading, ensuring siding at both origin and destination, electrification of sidings, EOL are the services specific to these customers. Some of the initiatives have been taken in the recent past, but the scope is substantial. Electronic Payment Gateway facility, special purpose wagons, sidings for full rake load capability are other potential areas. As regards pricing, since IR has an inherent competitive advantage, they can charge high rates. Promotions are needed to reduce the pressure in the peak season and stir up demand in off peak season. Discounts for higher volumes (where scale economy operates) and in the empty flow direction (recently announced freight incentive schemes focus on these) are other possibilities. Explicit focus on logistics attributes beyond the service attributes may not be necessary, since this is essentially a door to door service.

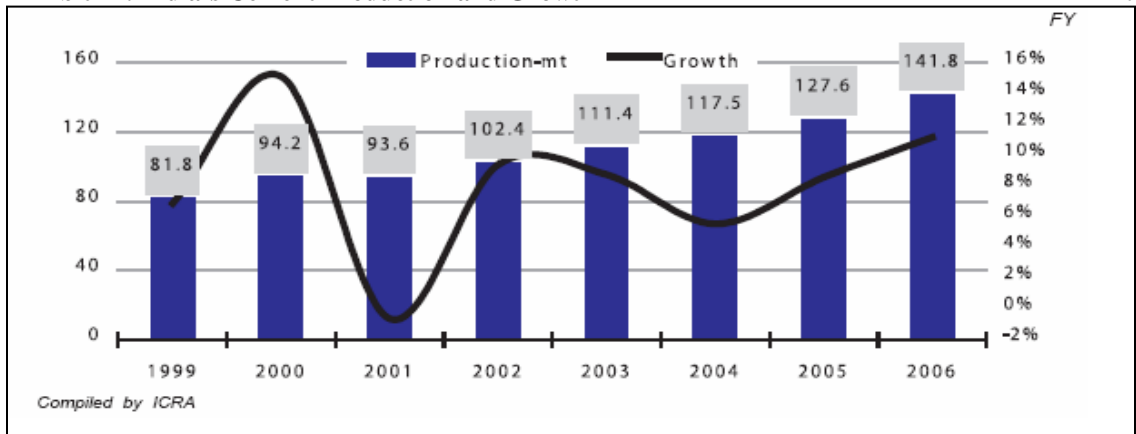
Industry/Collection Centre to Distribution Centre

This is second largest flow accounting for 180.5 (169.6) mt, which is about 27.1 (28.2) percent of IR's traffic. Cement and foodgrains alone account for about 103 (100) mt. Other significant commodities are fertilizers, iron & steel and POL. This is the segment where IR faces stiff competition by road and pipeline (in case of POL). IR's market share in iron & steel, cement and POL and has been reducing over the past 50 years.

IR's loadings for iron & steel had declined in the past. This is presumably because the primary and main steel producers have always remained the principal customers of the IR while the secondary producers refrained from using the rail network.

Cement production in the country recorded a compounded annual growth rate (CAGR) of 8.2 per cent between 1994-2003 [Business Line, February 02, 2006]. The production and growth from 1999 to 2006 is given in Exhibit 12. Although production had been witnessing an impressive growth, IR was loosing the market. Currently, IR's share in cement is about 40 percent.

Exhibit 12: India's Cement Production and Growth



[ICRA, 2006]

The demand for petroleum products is projected to jump from 115 mt to 370 mt in the first quarter of the century. It has been estimated that at this level of demand, it will be necessary to move 45 percent or 170 mt of the product through pipelines against 30 percent at present. After allowing 10 percent for movement by coastal shipping (about 35 mt) and another 15 percent by road (about 55 mt), there would be about 30 percent share (about 110 mt) for IR as against 33 mt carried in 2005-06.

Since the competition is very high, IR should be at par with the other modes in terms of services. Terminals, availability of wagons, automation, timely delivery and reliability are some of the service attributes. Special wagons for commodities eg cement (which is currently transported in bags) would add to the service. IR needs to offer competitive price to retain customers on this OD. Play on volumes to reduce unit cost can be tried. Promotions to attract more traffic would be needed. Recently announced schemes (volume growth incentive schemes, consignment volume based schemes) are a step in the right direction. Logistics attributes including multi-modal services would be a critical success factor.

Mine to Port

This is the third largest flow, accounting for 55.7 (54.3) mt, which is about 8.4 (9.0) percent of IR's traffic. Iron ore and other ores, and coal are the major commodities transported by rail. Iron ore and other ores move for exports. Coal moves to other parts in the country through coastal shipping. For this traffic, both mines and ports usually have direct rail access through sidings. IR faces less competition due to it being a door-to-door service provider.

This recognition of being the favored transporter made the IR upwardly revise the freight rates for iron ore for exports a few times in the past two years. However, significant quantities of iron ore for export still move by road since rail capacity to some of the ports (Paradip and Mormugao) is a bottleneck.

India's exports are growing at an average of 20 percent per annum. However, India's export development strategy encourages "value added" export. This means instead of increasing export of iron ore, finished goods ie steel, or even steel based finished products will be encouraged. (Such export items would have a reduced proclivity to use IR. This needs to be countered with effective marketing support). Thus, mine to port export traffic may not grow as fast. On the other hand, coastal shipping is expected to increase and this would be an opportunity for mine to port traffic by rail.

Service attributes could be door to door sidings, special purpose wagons, automation and EOL. IR also needs to view coastal shipping in an inter-modal perspective and provide for it. Improved hinterland connectivity to ports is an important requirement. In pricing, IR has a competitive advantage of being a bulk carrier. Promotion may be needed to keep the customers by offering discounts.

Port to Industry

This traffic flow accounts for 39.0 (34.3) mt, which is 5.9 (5.7) percent of IR's traffic. Major commodities are coal, other commodities and iron ore and other ores. Taking into consideration, India's import growth, this traffic is likely to grow significantly in future. Coal import is on the rise as the thermal power plants are gradually increasing use of imported coal as fuel. This is due to its high calorific value, and low ash and sulphur content as compared to the domestic coal. In 2005-06 (2004-05), it was 33.3 (29.3) mt, the largest commodity moving from ports to industry. Other commodities are all high value items, some moving in containers. The market share by rail of port to industry traffic does not exceed 30 percent [PC, 2006].

The opportunities in this segment are significant. Containerized traffic is expected to grow. Import of raw material is also likely to grow in line with our export strategy.

For long lead traffic, the following emerge as key strategies:

- Sidings to enable more door to door movement, EOL for quick turn-round at the terminals, flexible wagon design to enable use of the same wagon as open or covered so that empty wagon movement can be minimised and leveraged for goods movement
- Dynamic pricing policy taking note of road competition, peak demand, empty flow directions would be appropriate. Some of these would be in the nature of promotions.

Due to industrialization strategies, increasingly manufacturing locations are expected to be at or near ports. In such a case, the traffic between the port and the manufacturing location may move by other means of transport, like pipelines, conveyors belts, or even roads, more suited for short haul movement.

For short lead traffic, even though not apparent, opportunities for rail transportation could be available. There is significant industrial development within, say, 100 km of the ports, wherein, both the raw material and finished goods move from and to the port. Appropriate merry-go-round services could bring the traffic to IR.

Port to Distribution Centre

The traffic accounts for 29.8 (24.5) mt, which is about 4.5 (4.1) percent of IR's traffic. Major commodities are containers, POL and fertilizers. Traffic on this OD has a big potential to grow, taking into consideration the growth of imports (finished goods) and containerization.

Currently, 30 percent of the traffic is expectedly moving hinterland by rail and the remaining moves entirely by road, mostly to nearby Container Freight Stations (CFS), and some to interior ICDs [PC, 2006].

Marketing requirements would be similar as in the port to industry OD. In the context of container traffic, competition in the rail container service sector would be critical to improve all marketing attributes. Double stack container trains would be an additional service attribute.

Industry/Collection Centre to Port

The traffic accounts for 18.4 (16.4) mt, which is about 2.8 (2.7) percent of IR's traffic. Major commodities are containers and POL. While this is a growing segment, the market share by rail is less than 30 percent [PC, 2006].

Requirement of marketing attributes would be similar to the port to distribution centre OD.

Common Concerns

The analysis for marketing strategies of the different OD segments can be fine tuned by a further segmentation of short lead and long lead traffic. While this was explored in the port to industry segment, the paper does not carry it forward to all the other segments.

An analysis of wagon turn-round in each of the segments would also provide additional insights.

A few common strategies to all the segments would be:

- Improvements to rail capacity by (a) debottlenecking at loading/unloading stations, faster movement in and out of sidings, bypasses, etc, (b) converting key Meter Gauge (MG) segments to Broad Gauge (BG), and (c) doubling of saturated BG segments
- Freight forwarding and stock yard development at the originating/terminating end to enable consolidated movement of goods,
- Improved wagon design for flexibility of use between open and covered requirements, for stacking of packaged goods at multiple levels etc to ensure better service and utilization.
- Non-electrification and removal of overhead infringements on a nominated route to the north Indian hinterland to enable better utilization of track capacity by running trains with double stacking of containers.

7. Potential Clients of IR

IR handled 1333.0 (1204.2) mt of traffic either at origins or destinations in 2005-06 (2004-05). Out of this, industries handled 580.9 (523.3) mt, mines 398.8 (357.2) mt, distribution centres 210.3 (194.1) mt, and ports 143.0 (129.5) mt together at origins and destinations. The shares would be: industries 43.6 (43.4) percent, mines 29.7 (29.7) percent, distribution centres 15.8 (16.1) percent, and ports 10.7 (10.8) percent. In the above perspective, industries are the biggest client followed by the mines, distribution centres and ports. These figures and the OD analysis together have implications on client based strategies.

Industry

Industry originating traffic is 198.9 (186.1) mt and industry terminating traffic is 382.1 (337.3) mt, accounting for a total of 580.9 (523.3) mt, which is about 43.6 (43.4) percent of IR's traffic. Terminating traffic is about 92.1 (81.3) percent higher than the originating traffic. Coal, which accounts for 44.1 (44.9) percent of the total industry handled traffic, is the reason for relatively much higher traffic at the terminating end.

IR needs to respond to the industry specific needs by interacting with them regularly. IR should be in line with other modes to retain/improve its originating traffic, which is mainly to the distribution centres. There is a potential for IR provided high capacity wagons, special purpose wagons, bigger train loads, closed circuit rakes and round the clock operations are given significant focus based on the customer specific requirements.

Mines

Mines traffic is 398.8 (357.2) mt, almost 29.9 (29.7) percent of total IR's traffic. 86.0 (84.8) percent traffic from mines moves to the industries. The rest 14.0 (15.2) percent goes to the ports. By improving infrastructures at loading points (goods sheds, terminals, sidings, automation), IR could be the most competitive mode for these clients.

Distribution Centres

IR carried 210.3 (194.1) mt traffic to distribution centres, which is about 15.8 (16.1) percent of the total OD traffic. 85.8 (87.4) percent of this traffic is from industries, and the remaining 14.2 (12.6) percent is from ports. Traffic moved further from distribution centres to the retail outlets, is moved by other modes, mainly road. IR can target this traffic, and could be the single transporter to its customers. There could also be possibilities of providing multi-modal transportation services in collaboration with other transport modes.

Port

Port originating traffic is 68.9 (58.8) mt and port terminating traffic is 74.1 (70.7) mt, accounting for a total of 143.0 (129.5) mt, which is about 10.7 (10.8) percent of IR's traffic. The port as a significant client needs to be recognised in this framework, since otherwise IR tends to look at clients at the originating side.

IR has opportunities to increase its traffic volumes and market share in port traffic. Apart from increasing line capacity on the rail route to the hinterland (which the IR were already considering through appropriate infrastructural investments), it would also be important to develop appropriate customer oriented systems and other infrastructure. The strategies that IR needs to adopt for this would emerge as a result of understanding the supply chain requirements of the major commodities being handled at these ports.

India's international trade is going up. Port traffic is also going up, both due to international trade and coastal movement. IR's market share of domestic movement is going down. IR has a market share of about 30 percent of the port traffic for hinterland movement [PC, 2006]. Port traffic is largely bulk and containers and IR has expertise in this. There is potential for IR to focus on port based traffic and develop a sustainable niche. The mode choice for traffic from and to the hinterland is based on lead to/from port, freight rates, volume per shipment, availability of wagons and services at the customer interface.

8. Concluding Remarks

- IR has yet to evolve a culture of generating its strategies rooted in an understanding of the customer. For this, segmenting the market on key dimensions would be essential.
- IR should focus on the OD perspective proposed in this paper. They can also focus on interdivisional OD flows. This needs comprehensive information on terminating traffic. This orientation will allow each division to derive their own strategies based on market segmentation.
- IR needs to change their perspective of looking at the traffic. They must view traffic along with their clients as partners. There is a need for client based strategies.
- Integration and increase of IT related technologies are required. FOIS is a good initiative, and can be used to collect comprehensive data on OD, lead, customers at divisional level.
- Pricing, provision of infrastructure and services, long term contracting etc. could be driven effectively by appropriate segmentation. It would also be essential to have consultative process with key customers.

Annexure 1: Methodology Used to Derive the OD Matrix

1. Originating Traffic

The origins are categorized as:

- Industry/Collection Centre
- Mine
- Port

First, the IR traffic from the ports is estimated by assessing the portwise commoditywise import and then applying the IR market share.

For major ports, the share of IR for each port and commodity is taken as the modal splits estimated by the planning commission (PC), except for other ores, fertilizers, and iron & steel, which were not estimated. For these commodities, the authors made assumptions based on the nature and quantum of cargo, and the rail-port connectivity. More than 80% of the 'other ores' import is through Tuticorin. IR is estimated to be carrying only 30% of this traffic. Fertilizers import is largely at Visakhapatnam, Kandla, Chennai and New Mangalore. Existing rail connectivity from these ports enables IR to have higher share in the traffic, which is estimated to be around 70%. Iron & steel, which is largely imported through Mumbai and Kandla is estimated to be carried only 30% by rail.

A similar methodology was followed for non-major ports. Coal, POL, foodgrains, fertilizers and some dry bulk are the major commodities that are imported through the non-major ports in Gujarat and Maharashtra. Rail share is estimated to be the same as from the major ports, except for the thermal coal, which is entirely carried by IR.

The following table calculates the IR traffic originating at ports for 2005-06

Commodity Group	Commodity	Major Ports		Non-Major Ports		Total by IR (mt)	Total by IR (mt)
		Import ¹ (mt)	IR Share ² (%)	Import ¹ (mt)	IR Share (%)		
Coal	Thermal coal	22.36	20	2.11	100	6.58	33.32
	Coking	21.10	100	1.05	100	22.15	
	Other coal	9.18	50	0.00	0	4.59	
Iron ore and other ores	Iron ores	0.19	0	0.00	0	0.00	0.35
	Other ores	1.16	30	0.00	0	0.35	
Cement	Cement	0.85	0	0.00	0	0.00	0.00
POL	POL	16.79	25	11.58	25	7.09	8.54
	LPG	2.89	50	0.00	0	1.44	
Foodgrains	Foodgrains	0.05	70	0.32	70	0.25	0.25
Fertilisers	Fertilisers	6.62	70	1.79	70	5.89	5.89
Iron & steel	Iron & steel	5.51	30	0.00	0	1.65	1.65
Other	Other dry bulk	5.77	30	10.33	25	4.31	5.36
	Other liquid bulk	5.24	20	0.00	0	1.05	
Containers	Containers	30.02	45	0.00	0	13.51	13.51
Total	Total	127.73		27.18		68.88	68.88

[¹IPA, 2007; ²PC 2006]

After the above calculation of IR traffic from ports, the non port IR originating traffic is determined by subtracting the port traffic from the total commoditywise traffic of IR. The non port IR originating traffic has been allocated to industry and mines by recognizing the specific origin for each commodity:

- Coal - mine
- Iron ore and other ores - mine
- Cement - industry
- POL - industry
- Foodgrains - industry (collection centre)
- Fertilizers - industry
- Iron & steel - industry
- Limestone & dolomite - mine
- Stones - mine
- Gypsum- mine
- Salt - industry (collection centre)
- Sugar - industry

The consequent allocation of the IR's traffic (commoditywise and originwise) for 2005-06:

	Commodity	Total	Port		Industry		Mine	
			mt	mt	%	mt	%	mt
1	Coal	294.25	33.32	11.32	0.00	0.00	260.93	88.68
2	Iron ore and other ores	113.45	0.35	0.31	0.00	0.00	113.10	99.69
3	Cement	61.20	0.00	0.00	61.20	100.00	0.00	0.00
4	POL (mineral oils)	33.45	8.54	25.52	24.91	74.48	0.00	0.00
5	Foodgrains	41.64	0.25	0.61	41.39	99.39	0.00	0.00
6	Fertilisers	32.65	5.89	18.04	26.76	81.96	0.00	0.00
7	Iron & steel	21.76	1.65	7.60	20.11	92.40	0.00	0.00
8	Limestone & dolomite	11.95	0.00	0.00	0.00	0.00	11.95	100.00
9	Stones (excl marble)	10.06	0.00	0.00	0.00	0.00	10.06	100.00
10	Gypsum	2.74	0.00	0.00	0.00	0.00	2.74	100.00
11	Salt	4.69	0.00	0.00	4.69	100.00	0.00	0.00
12	Sugar	2.81	0.00	0.00	2.81	100.00	0.00	0.00
13	Containers	13.51	13.51	100.00	0.00	0.00	0.00	0.00
14	Other commodities	22.35	5.36	23.99	16.99	76.01	0.00	0.00
	Total	666.51	68.88	10.33	198.85	29.84	398.78	59.83

[MOR, 2007]

2. Terminating Traffic

The destinations are categorized as:

- Industry
- Port
- Distribution Center

First, the IR traffic to the ports is estimated by assessing the portwise commoditywise export and then applying the IR market share.

For major ports, the share of IR for each port and commodity is taken as the modal splits estimated by the PC, except for thermal coal, which was not estimated. For this commodity, the authors assumed 100 percent rail share, since this entire amount is brought from mines to the ports for the coastal movement.

There is hardly any rail movement for exports at non-major ports for rail movement. This is hence assumed to be zero.

The following table calculates the IR traffic terminating at ports for 2005-06

Commodity Group	Commodity	Export ¹ (Major Ports) (mt)	IR Share ² %	Total by IR (mt)	Total by IR (mt)
Coal	Thermal coal	15.30	100	15.30	15.30
	Coking	0.00	0	0.00	
	Other coal	0.00	0	0.00	
Iron ore and other ores	Iron ores	78.99	50	39.49	40.43
	Other ores	1.87	50	0.94	
Cement	Cement	0.00	0	0.00	0.00
POL	POL	19.71	25	4.93	4.93
	LPG	0.00	0	0.00	
Foodgrains	Foodgrains	0.00	0	0.00	0.00
Fertilisers	Fertilisers	0.00	0	0.00	0.00
Iron & steel	Iron & steel	0.00	0	0.00	0.00
Other	Other dry bulk	0.00	0	0.00	0.00
	Other liquid bulk	0.00	0	0.00	
Containers	Containers	29.92	45	13.46	13.46
Total	Total	145.78		74.12	74.12

[¹IPA, 2007; ²PC 2006]

After the above calculation of IR traffic to ports, the non port IR terminating traffic is determined by subtracting the port traffic from the total commoditywise traffic of IR. The non port IR terminating traffic has been allocated to industry and distribution centre by recognizing the specific destination for each commodity:

- Coal - industry
- Iron ore and other ores – industry
- Cement – distribution centre
- POL - distribution centre
- Foodgrains - distribution centre
- Fertilizers - distribution centre
- Iron & steel - distribution centre
- Limestone & dolomite - industry
- Stones - industry
- Gypsum- industry
- Salt - distribution centre
- Sugar - distribution centre

The consequent allocation of the IR's traffic (commoditywise and destinationwise) for 2005-06:

	Commodity	Total	Port		Industry		Distribution Centre	
		mt	mt	%	mt	%	mt	%
1	Coal	294.25	15.30	5.20	278.95	94.80	0.00	0.00
2	Iron ore and other ores	113.45	40.43	35.64	73.02	64.36	0.00	0.00
3	Cement	61.20	0.00	0.00	0.00	0.00	61.20	100.00
4	POL (mineral oils)	33.45	4.93	14.74	0.00	0.00	28.52	85.26
5	Foodgrains	41.64	0.00	0.00	0.00	0.00	41.64	100.00
6	Fertilisers	32.65	0.00	0.00	0.00	0.00	32.65	100.00
7	Iron & steel	21.76	0.00	0.00	0.00	0.00	21.76	100.00
8	Limestone & dolomite	11.95	0.00	0.00	11.95	100.00	0.00	0.00
9	Stones (excl marble)	10.06	0.00	0.00	10.06	100.00	0.00	0.00
10	Gypsum	2.74	0.00	0.00	2.74	100.00	0.00	0.00
11	Salt	4.69	0.00	0.00	0.00	0.00	4.69	100.00
12	Sugar	2.81	0.00	0.00	0.00	0.00	2.81	100.00
13	Containers	13.51	13.46	99.63	0.00	0.00	0.05	0.37
14	Other commodities	22.35	0.00	0.00	5.40	24.16	16.95	75.84
	Total	666.51	74.12	11.12	382.12	57.33	210.27	31.55

[MOR, 2007]

3. Assigning Traffic to OD

The commodities originating at ports are first examined to identify the destinations. Coal, other commodities, iron ore and other ores terminate at industries, while containers, POL, fertilizers, foodgrains, and iron & steel terminate at distribution centres.

The commodities terminating at ports are similarly examined to identify the origins. Containers and POL are from industry/collection centre, while iron ore and other ores, and coal are from mines.

After assigning the above, all the remaining

- (i) industry originating traffic can be assigned to the distribution centres, and
- (ii) mine originating traffic can be assigned to industries

Based on the above assignment, the OD matrix has been prepared.

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