

TRANSPORT & COMMUNICATION

The earliest reference of well-planned transport and communication system as found in the Indian history is in the period of Sher Shah Suri, the Afghan ruler (AD 1540-1545). Shaikh Nur ul-Hakh states, "Sher Khan made the road which now runs from Delhi to Agra, by cutting through jungles, removing obstacles, and building *sarais*. According to Mushtaki, from Gour to the confines of Oudh, a road was made with gardens and *sarais*. Another road, having *sarais*, gardens and shaded fruit bearing trees, from Banaras to Mandu near Burhanpur was constructed and other such similar roads connected Agra and Jodhpur, Bayana and Jaunpur upto Ajmer (Elliot of Dowson 1964). The present road network is the superstructure, raised on the old Mughal and other roads. The Jayakar committee in 1928 reported that road development is becoming beyond the capacity of the provincial governments and local bodies and thus the matter became of national importance. A Central Road Organization was set up in 1930 and a Transport Advisory Council in 1935. British showed little interest in road development. After realizing the serious situation of communication system, a ten-year road development scheme, the "Nagpur Plan", was

prepared in 1944, which covered a total road length of four lakh km. The plan is stated to be historical as it systematically classified the various types of roads on a functional basis into national highways, state highways, district roads and village roads. The country made rapid progress after 1947. Since 1951, it aimed at increasing the road length of two lane carriages on national highways.

The first railway line in India was laid in 1853 between Thane and Kalyan (Mumbai) covering a distance of 34 km. Till 1947, the British, in collaboration with the princely states, developed railway network largely for strategic reasons. Rapid progress started during the post independence period. Rivers were the cheapest means of transport from time immemorial. Barges of 300 to 500 tonnes sailed from Agra to Patna and Bengal in the seventeenth century. The downward journey was performed during the monsoons when the rivers were in flood and upward journey during the rest of the year. Rivers were the main trade route of the medieval India. Bengal silk was exported to Japan and Holland by the Dutch. Lahore and Multan were important river ports in the Punjab with traffic down to Sindh. Spices, butter,

indigo etc. were carried to Sehwan for shipment to Basra and occasionally via Surat to Europe.

Before the advent of railways, most of the country's trade, especially in northern India was carried by the rivers. Steamers used to ply regularly on the Ganges as far as Garh Mukteshwar, 640 km from Allahabad. In 1842, regular service was functioning between Kolkata and Agra on the Yamuna. Two British steamer companies operated on the Brahmaputra. Steamers plied as far as Ayodhya on the River Ghaghra, 320 km upstream with the Ganga. A great bulk of traffic was carried in country boats plying from Delhi and Nepal border upto Assam. The country registered 1,78,627 boats in Kolkata and 1,24,357 boats in Patna operating per year in 1976-77. Water transport lost its importance with the development of railways during the middle of the 19th century.*

Air transport is a communication system without a competitor where speed and time are concerned. Air transport plays an important role in remote and inaccessible areas like mountains, forests and deserts areas where roads and railways are not conveniently connected. Air transport is inevitable in times of emergency like war, flood and other natural disasters. Civil aviation has made a rapid progress since independence. During 1974 Indian aircraft flew, both on scheduled and nonscheduled services, about 5.39 crore km as against 2.16 crore km in 1947.

Roadways

Throughout the first millenium of the Christian era, India's trade was widespread and the merchants controlled many foreign markets. Roman writers bemoaned the fact that gold flowed from Rome to India and the east in exchange for various luxury articles (Nehru 1998).

India, after independence, has strengthened the

infrastructure of surface communication, especially regarding road network and attained fourth position global surface communication after United States, Brazil and former Soviet Union. Today, road transport plays the key role in socioeconomic development with their flexibility, reliability, speed and door to door service, through national highways, state highways, district and block level roads and linkways.

The Figure 17.1 presents a consolidated picture of distribution of roadways and railways in India at a glance. The map, being small scale, covers only the national highways, other roads including a major portion of state highways and district major roads as well as rail routes of two gauges, viz. broad and meter.

In 2003-04 the country's total road length of 3.32 million km was spread over more than twenty-five states and seven union territories having a total land area of 32,87,263 sq km. There are 75 national highways, including bypass, operating in India with a total length of 1,95,000 km, a fraction (2003-04). National highways, which is only a fraction (65,569 km) of the total road length, carry 40 per cent of total freight traffic.

Seventh plan laid emphasis on a coordinated and balanced development of road networks in the country under (a) primary roads, comprising national highways and major district roads, and (b) rural roads including village roads and other district roads. Substantial outlays were proposed for road developments in the rural and tribal areas. During the seventh plan period, Rs 179.75 crores were spent on road development. For the eighth five year plan, an outlay of Rs 2600 crore and Rs 10,610 crores has been approved for central and state sector roads respectively, which is raised up to Rs 59,700 Crore during the Tenth Plan outlay. State wise break-up of the length of roads is given in Table 17.1

TABLE 17.1. Status of road length in India

(In Km)

	Surfaced	Un-surfaced	Total
All India	13,34,078	10,69,556	24,03,634
STATES			
Andhra Pradesh	1,01,832	70,837	1,72,669
Arunachal Pradesh	3,962	6,548	10,240
Assam	11,421	56,658	68,079
Bihar & Jharkhand	32,980	52,585	85,565
Goa	4,875	2,582	7,457
Gujarat	1,17,479	16,371	1,33,850
Haryana	25,868	2,039	27,907
Himachal Pradesh	14,500	15,110	29,610
Jammu & Kashmir	8,150	4,892	13,042
Karnataka	97,537	45,217	1,42,754
Kerala	43,146	98,710	1,41,856
Madhya Pradesh & Chhattisgarh	87,704	1,11,232	1,98,936
Maharashtra	2,66,394	92,868	3,59,262
Manipur	3,595	7,165	10,760
Meghalaya	3,946	4,445	8,391
Mizoram	2,360	4,550	6,910
Nagaland	2,515	11,217	13,732
Orissa	41,878	1,68,360	2,10,238
Punjab	46,232	11,919	58,151
Rajasthan	73,041	61,591	1,34,632
Sikkim	1,527	307	1,834
Tamil Nadu	1,39,729	65,977	2,05,706
Tripura	4,577	10,149	14,726
Uttar Pradesh & Uttaranchal	1,24,350	1,13,008	2,37,358
West Bengal	45,569	32,010	77,579
Union Territories			
Andaman & Nicobar Island	1,176	48	1,224
Chandigarh	1,723	—	1,723
Dadra & Nagar Haveli	435	83	518
Daman & Diu	—	—	—
Delhi	24,071	2,511	26,582
Lakshadweep	—	—	—
Pondicherry	1,776	567	2,343

Does not include about 8,00,000 km of rural roads constructed under Jawahar Rozgar Yojana

Source: India 2000- A Reference annual, New Delhi.

Table 17.2 shows state wise break up of national highways of India and a total description of the destination is be available from Appendix XIV.

TABLE 17.2. State-wise break-up of national highways

Name of the states	National highways in km.
Maharashtra	3626
Kerala	1010
Tamil Nadu	3681
Uttar Pradesh & Uttaranchal	4307
Orissa	2515
Karnataka	3234
Andhra Pradesh	3640
Madhya Pradesh & Chhattisgarh	4994
Rajasthan	4081
Bihar & Jharkhand	3079
Gujarat	2241
Assam	2652
West Bengal	1896
Punjab	1328
Haryana	1361
Himachal Pradesh	1073
Tripura	400
Jammu & Kashmir	738
Nagaland	369
Manipur	954
Arunachal Pradesh	352
Meghalaya	717
Goa	269
Mizoram	857
Sikkim	62
Delhi	72
Pondicherry	53
Chandigarh	24
Andaman & Nicobar	N.A
Lakshadweep	N.A
Dadra & Nagar Haveli	N.A

Source: Annual Report (1999-2000) Ministry of Road Transport and Highways :

Statistical Abstract, India, 2003

State highway and district rural roads are maintained by various agencies, apart from state governments under Minimum Need Programmes (M.N.P.). The objective of M.N.P. is to link all villages with a population of 1,500 with all weather roads. Further, for accelerating economic developments and strengthening defense preparedness, Border Road Organization (B.R.O.) executes its work departmentally. As on 1992, B.R.O. had constructed about 23,460 km of roads and maintained about 18,000 km of roads in various regions of its operations. It has constructed major bridges of 8,713m and smaller bridges of 14,000m. Apart from the construction of air fields at Agra, Dibrugarh, Agartala, Pune and Srinagar, other important works of B.R.O. includes construction of express highways NH-4B at Panvel (Maharashtra) and NH-2 at Varanasi by pass (Uttar Pradesh) etc.

The Inter State Transport Commission (1958) is set up for the development and co-ordination as well as regulation of road transport services. The commission formulated five zonal permit schemes for the north, west, south, east and central zones for free movement of public carriers on payment of road tax.

National highways carry 40 per cent of total freight traffic. Among the national highways, No. 7 is the longest of all highways joining Varanasi with Kanyakumari via. Rewa, Hyderabad, Bangalore and Madurai. Highways, like No. 5 (NH6 junction at Baharagora to Madras), No. 15 (Pathankot to Samakhiali near Kandla), and No. 6 (Dhule to Kolkata) having road length of 1,500 to 2,000 km each. There are six national highways with a total route length of 1,000-1,500 km each. There are NH 2 (Delhi-Kolkata), NH 3 (Agra-Mumbai), NH 4 (NH 3 junction near Thane to Chennai), NH 8 (Delhi to Mumbai), NH 7 (Panvel to NH 47 junction near Edapally) and No 31 (NH 2 junction near Barhi to NH-37 junction). Rest of the national highways are below 1,000 km each.

Rope-ways

Although insignificant to roadways and railways, rope ways are found sometime very useful in hilly and

inaccessible areas. These conditions exist in the foothills of the Himalayas and in some parts of southern India. The main rope way operating in India are (a) Darjeeling-Bijanbari monocable rope way, five miles long with one span of 6,000 ft, (b) monocable ropeway at Kalimpong, which climbs 3,400 ft in its length, (c) Cherra Chattak rope way at Cherapunji in Meghalaya and (d) Annamalai rope way in the south. India serves tea and coffee gardens on high plateau. The first two rope ways are the extension of the railway system. In addition, the worlds longest and fastest rope way was commissioned in February 1966 at the Jharia Coal mines in Bihar with a total length of 30 km which costs Rs 3.33 crore. It conveys sand from the bed of the River Damodar to the mining sites at the rate of 1,350 tonnes per hour. The eight km long India's first passenger-cum-rope way near Darjeeling was operated on May 8, 1968 at the cost of Rs 28 lakhs. Ropeways provide economical method of transportation in the tea plantation districts, coal mining area and in quarries. There are more than hundred rope ways operating in India today. (Hindustan Year Book, 1996). The Darjeeling "Toy Train" is granted world heritage status by UNESCO.

Railways

Indian Railways, from a modest beginning in April 1853 from Mumbai to Thane have grown into Asia's largest railway system as well as ranking third in the international global communication system. Indian Railways have spread into a vast network of 7,068 stations connecting a route length of 63,122 km, with a fleet of 67,681 locomotives, 39,852 coaches, 4,904 electric multiple units and 2,80,791 wagons as on March, 2003. As a part of modernization efforts, railways are engaged in a massive conversion programme leading to a uni-gauge system for the 62,000 km network. In the first phase of the gauge conversion work, 11,000 km of narrow gauge and metre gauge were to be converted into broad gauges by the turn of the century. Out of all these, 6,000 km were to be converted during eighth plan period (1992-97).

Indian Railways, in about 150 years of existence played a vital role in the economic, industrial and social development of the country. The gauge-wise route and track lengths of the system is included in Table 17.3

TABLE-17.3 Status of railways

Type	Route (km)	Running track In km	Total tracts In km
Broad gauge (1.676mm)	45,622	64,461	87,889
Metre gauge (1.000mm)	14,364	14,859	17,848
Narrow gauge (762mm and 610mm)	3,136	3,172	3,484
Total	63,140	82,492	1,09,221

Source: India-2000- A Reference Annual

Indian Railways are divided into nine zones. The following table (17.4) shows the names of the zones, their headquarters and the route in kilometres for each zone. These nine zones are again extended as follows :

TABLE 17. 4 Railway network

No.	Railway zones	Headquarters	Route in km
1	Central	Mumbai	8,849
2	Eastern	Kolkata	4,238
3	Northern	New Delhi	10,975
4	North Eastern	Gorakhpur	1,967
5	North-East Frontier	Maligaon (Guwahati)	3,580
6	Southern	Chennai	10,067
7	South Central	Secundrabad	7,023
8	South Eastern	Kolkata	7,041
9	Western	Mumbai (Churchgate)	10,293

Source : Hindustan Year Book, 1996,

10. East Central Railway with head quarters at Hazipur

11. East Coast Railway with head quarters at Bhubaneswar
12. North Central Railway with head quarters at Allahabad
13. North Western Railway with head quarters at Jaipur
14. South East Central Railway with head quarters at Bilaspur
15. South Western Railway with head quarters at Hubli and
16. West Central Railway with head quarters at Jabalpur

Central Railway serves Maharashtra, Madhya Pradesh, Uttar Pradesh, Karnataka, Rajasthan and Punjab. The network consists of the former GIP Railway, Scindia Railway, Dholpur Railway and Nizam's State Railway. Eastern Railway covers West Bengal, Bihar and part of Uttar Pradesh. It extends to Budge Budge, Diamond Harbour, Lakshmikantapur and Canning in the south; Petrapol and Gede to Bangladesh border to the east; Lalgola and Barharwa to the north and Mughal Sarai to the northwest (via Grand Cord, the main line, the Sahibganj loop and the Gomoh-Barkakhana-Daltonganj loop). Starting from Haora the main line runs 219 km to Sitarampur, where it radiates in two directions: via Patna and via Gaya, to converge at Mughal Sarai where it joins the Northern Railway. Connecting Kolkata with its vast hinterland, the Eastern Railway provides transportation facilities to the agricultural and industrial products of eastern India.

Northern Railway is the synthesis of the three divisions of the former Eastern India Railway, a portion of the Bengal-Bihar and Central India Railways and the whole of Eastern Punjab, Jodhpur and Bikaner Railway. This line serves Punjab, Delhi, northeastern Rajasthan and Uttar Pradesh up to Varanasi.

North Eastern Railway operates in well developed agricultural regions of northern part of Bihar. Further, North East Frontier Railway begins in Assam and

serves the northern parts of West Bengal. The Darjeeling Himalayan line is within this railway.

South Central Railway, serving 774 stations including halts and flag stations, caters to the transport requirements of about 50 million people of Andhra Pradesh, south Maharashtra, northwestern Karnataka and Goa, i.e. stretching from the east coast to the west coast. This railway traverses through a vast and variegated terrain of fertile plain areas rich in mineral wealth and stone quarries.

South Eastern Railway caters to the needs of six states, namely West Bengal, Bihar, Orissa; Andhra Pradesh, Madhya Pradesh and Maharashtra. Stretching from Haora the line runs up to Kharagpur and the main line goes to Nagpur. To the south, the East Coast line runs up to Waltier. The third line runs in the northwesterly direction from Kharagpur and serves the coal fields of Bihar and West Bengal. The Raipur-Vizianagaram broad gauge section links Vishakhapatnam with Madhya Pradesh. This link helps in exporting the heavy manganese ore. This railway joins the Eastern Railway at Haora, Asansol, Gomoh, Barkakhana and Chandrapur. It joins Southern Railway at Waltier and Central Railway at Nagpur and Katni. Four of the major steel plants are located on this railway.

Western Railway serves Maharashtra, Rajasthan and Madhya Pradesh. This line consists of the former Bengal, Bihar and Central India Railways, Saurashtra Railway, Rajasthan Railway and Jaipur Railway. This line serves the industrial areas around Mumbai. Ahmedabad and Vadodara handle tremendous quantities of cotton.

Southern Railway covers the states of Tamil Nadu, Kerala, southern parts of Karnataka and Andhra Pradesh. The railway line ends with the southern tip of India, i.e. Kanyakumari. In the northwest, Southern Railway joins Western Railway at Hubli. The line runs along the eastern coast from Chennai to Kanyakumari. A section extends up to Rameshwaram. From Mangalore, Southern Railway runs along the western coast terminating at Kanyakumari.

The main objective of railway planning has been to develop the transport infrastructure to carry the projected quantum of traffic and goods. It is also the biggest public sector undertaking in the country with a capital-at-charge of Rs 16,125.80 crore and a total investment of Rs 22,200.48 crore.

The Indian Railways, the third longest system in the world carries four-fifth of India's long distance freight. Daily, more than 4,971 million of people board the trains and 518.7 million tonnes of goods are transported to various destinations through 7,116 railway stations. Earnings from passenger traffic are reported to be Rs 4,865 crores during 2002-03 when revenue earned in the same period were Rs 2,263 crores.

Integral Coach Factory at Perambur (Tamil Nadu) produced 17,489 fully furnished coaches since its inception when the government owned Hindustan Steel Limited has been producing all steel passenger coaches. In addition to Rail Coach Factory (RCF), Kapurthala, two more units in public sector are M/s Jessops, Kolkata and Bharat Earth Movers Limited (BEML), Bangalore manufacture passenger coaches. The responsibility of the administration and management of the railways vests in the Railway Board under the supervision of a Cabinet Minister assisted by the State Minister. A Central Board of Railway Research (C.B.R.R.) having eminent scientists and engineers from research organizations, teaching institutions and industry also function as advisor to research and developmental activities of the missions and projects. Other railway organizations include:

1. Indian Railway Conference Association who lays down rules and tackle all problems of common interest as coaching, tariff, freight, structure etc.
2. Railway Rates Tribunal who enquires into complaints lodged by commercial bodies and trade associations.
3. Railway Service Commission recruits railway personnel.

4. Efficiency Bureau investigates various railways related problems.
5. Central Clearing House allocates inter-railway revenue and expenditure under various heads to different railways.

Although the under ground railway could not be shown on the map, but it is a momentous event in the Indian railways. The Metro Rail started functioning in Kolkata on 24th October 1984. The total stretch is 16.43 km extending from Dum Dum to Tollygunge with 17 stations out of which two terminal station are on the surface. The line is being extended up to Garia. From Tollygunje the railway track will be overhead upto the terminal station at Garia. Though it is a little step but indeed a great leap forward in the Indian railways. Metro Rail in Delhi has also started while other major cities are under consideration. The progress of Indian railways traffic and inputs are shown in the Tables 17.5 and 17.6.

Electrification of tract has been undertaken in the extra high traffic density areas of those with difficult

profile. From 1950-51 onwards the rate of conversion has been doubled. Table 17.6 highlights the rapid growth in every sector of Indian Railways, viz. route length (electrified or non-electrified), carrying capacity of both passenger and goods, number of locomotives (steam, diesel and electric), number of coaching vehicles and number of wagons.

India has been honoured to head a multi-country task force for establishing a southern corridor for the Trans-Asian Railway Scheme which is the part of the Asian Land Transportation Infrastructure Development Project envisaged at the 1992 in Economic and Social Committee for Asia and the Pacific (ESCAP) session in China. The transitional railway network covering over 30,000 to 40000 km is expected to be completed by 2010. The scheme comprises three rail land bridges between Southern China and Europe. India became a part of the southern corridor linking Singapore to Turkey via Myanmar, Bangladesh, Pakistan and Iran. According to the plan, India's entry point is at Tamu in Manipur, bordering Myanmar, enter Bangladesh at

TABLE-17.5. Indian railways at a glance

Items	2002-03	2001-02	2000-01	1999-00	1998-99	1995-96	1990-91	1980-81	1950-51
Route in km ('000)	n.a.	63.1	63.0	62.8	63.0	62.9	62.4	61.2	56.6
Electrified kms ('000)	n.a.	16.0	14.9	14.3	14.6	12.3	10.0	5.4	0.4
Freight traffic									
Originating (Mn Tonnes)	550†	522	504	478	446	405	341	220	93
Revenue earning (Mn Tonnes)	519	493	474	456	421	391	318	196	73
Net tonne km (Bn)	n.a.	336	316	308	284	274	243	159	44
Revenue earning (Bn)	357	333	312	305	282	271	236	148	38
Earnings (Rs crore)	26,782	24,587	23,045	21,755	19,676	15,290	8,247	1,551	139
Freight per tonne km (paise)	n.a.	73.8	73.8	71.3			35.0		
Passenger Traffic									
Originating (Mn.)	4,971	5,093	4,833	4,585	4,411	4,038	3,858	3,613	1,284
Passenger km. (Bn)	515	491**	457	431	404	342	296	209	67
Earnings (Rs. crore)	12,572	11,196	10,515	9,581	8,551	6,125	3,145	828	98
Fare per passenger km. (paise)	24.3	23.0**	22.9	22.2	21.1	17.9	10.6	4.0	1.5

Source : Statistical Outline of India, 2000-2001, Tata Services.

TABLE 17.6. Progress of railways traffic

Year	Route length (km).			Running track (km)	Passenger originating (lakh)	Goods originating (lakh tonne)	Number of locomotives			Number of coaching vehicles	Number of wagons
	Electrified	Non-electrified	Total				Steam	Diesel	Electric		
1950-51	388	53,208	53,596	59,315	12,840	930	8,120	17	72	19,628	2,05,596
1960-61	784	55,499	56,247	63,602	15,940	1,562	10,312	181	131	28,439	3,07,907
1970-71	3,706	56,081	59,790	71,669	24,311	1,965	9,387	1,169	602	35,145	3,83,990
1980-81	5,345	55,895	61,240	75,860	36,125	2,200	7,469	2,403	1,036	38,333	4,00,946
1985-86	6,517	55,319	61,836	77,153	34,335	2,864	5,571	3,046	1,302	38,277	3,59,617
1986-87	7,275	54,538	61,813	77,254	35,937	3,073	4,950	3,182	1,366	37,988	3,54,041
1987-88	8,157	53,819	61,976	77,671	37,921	3,185	4,427	3,298	1,433	37,746	3,46,844
1988-89	8,880	53,105	61,985	77,845	35,003	3,295	3,826	3,454	1,533	37,847	3,45,821
1989-90	9,100	53,111	62,211	78,320	36,531	3,343	3,336	3,610	1,644	37,953	3,49,661
1990-91	9,968	52,399	62,367	78,607	38,576	3,414	2,915	3,759	1,743	38,511	3,46,102
1991-92	10,653	51,805	62,458	78,969	40,486	3,600	2,492	3,905	1,871	39,350	3,46,394
1992-93	11,064	51,422	62,486	79,200	37,494	3,709	1,725	4,069	2,012	39,924	3,37,562
1993-94	11,260	51,202	62,462	79,188	37,080	3,775	911	4,192	2,117	40,053	3,12,405
1994-95	11,772	50,888	62,660	79,495	39,150	3,816	358	4,259	2,302	39,214	2,91,360
1995-96	12,306	50,609	62,915	80,441	40,180	4,055	209	4,313	2,387	39,104	2,80,791
1996-97	13,018	49,707	62,725	80,754	41,530	4,234	85	4,363	2,519	39,257	2,72,127
1997-98	13,490	49,005	62,495	80,908	43,480	4,455	64	4,496	2,646	40,030	2,63,981
1998-99	13,765	49,044	62,809	81,512	44,115	4,416	58	4,586	2,785	40,998	2,52,944
1999-00	14,261	48,498	62,759	81,252	45,849	4,782	56	4,651	2,810	41,382	2,34,397
2000-01	14,856	48,172	63,028	81,865	48,327	5,042	54	4,702	2,810	42,657	2,22,193
2001-02	15,994	47,146	63,140	82,354	50,927	5,222	53	4,815	2,871	44,069	2,16,717
2002-03	16,272	46,850	63,122	82,494	49,708	5,187	52	4,699	2,930	44,756	2,14,760
2003-04	17,503	45,781	63,221	83,859	51,123	5,573	45	4,769	3,003	46,119	2,28,170

Source : India : 2006 A Reference Annual.

Mahissan or Shahbajpur and re-enter in India at Gede while that of western side is at Attari in Pakistan. In India, the route from Haldia to Kolkata has been agreed upon as a path of international significance to facilitate sea-cum-rail movement to Central Asia and Europe.

Waterways

Waterways, the cheaper transport system can help to keep the cost of industrial production low. India

has got about 14,500 km of navigable waterways comprising rivers, canals, backwaters, creeks etc. At present, a length of 3,700 km of major rivers is navigable by mechanised crafts out of which only 2,000 km is utilised. Further, out of 4,300 km of navigation canals, only 900 km is suitable for navigation. About 160 lakh tonnes of cargo is being moved by Inland Water Transport (IWT). The most important waterways of the country are the Ganga and Brahmaputra rivers and their tributaries; the delta and

lower courses of Mahanadi, Godavari, Krishna, Narmada and Tapi and the creeks of the rivers of the west coast, south of Mumbai including the Zuari and Mandavi in Goa; Kali, Sharavati and Netravati in Karnataka; the backwaters and lagoons in Kerala; the Buckingham canal of Andhra Pradesh and Tamil Nadu and other canals in the country. The Ganga, being glacier fed, contains water throughout the year. On its 2,560 km Journey to the Bay of Bengal, Ganga flows through the most densely populated parts of India and the important towns and business centres along the river are Hardwar, Kanpur, Allahabad, Mirzapur, Varanasi, Ghazipur, Patna, Monghyr, Murshidabad and Kolkata. River Hugli, an important tributary of Ganga is one of the intensively navigated waterways linking the major ports of Kolkata and Haldia. Other important navigable tributaries of Ganga are the Yamuna, Gomati, Ghaghara and Gandak. The rivers carry goods and passengers.

River Brahmaputra is the most important waterways in India. Important towns and cities of Assam situated along the river are Pandu, Jogigopa and Dibrugarh. This river is serving as a major artery for trade between Kolkata and Assam for a long time. Even after independence, 80 per cent of tea, 90 per cent of jute and considerable quantity of oil from Assam was transported upto 1963-64 though Assam rail link. The river is navigable throughout the year upto Dibrugarh, i.e. 1,280 km inland.

The peninsular rivers are unsuitable for navigation throughout the year as they are rain-fed. The lower courses of Mahanadi, Godavari, Krishna, Narmada and Tapi are navigable. The Zuari and Mandavi rivers of Goa are very important arteries of trade and carry large quantities of manganese ore, timber, fish and coconut to the Marmagaon port. The creeks of the western coast of India particularly those of Kali, Sharavati and Netravati are heavily navigated.

Canals

Buckingham Canal (412.8 km) along the east coast in Andhra Pradesh and Tamil Nadu is the most important navigation canal in India which is linked with the Kommamur canal of the Krishna delta in Andhra Pradesh and extends upto 100 km south of Chennai. Kurnool-Cuddapa canal in Andhra Pradesh Orissa canal in Orissa; Medinipur canal in West Bengal and Son canal in Bihar were constructed primarily for irrigation, however they are also used for transportation. The left bank main canal of Durgapur barrage (DVC) and the left bank canal of the Tungabhadra project are designed for navigation as well.

Back waters

Almost all the ports of Kerala are directly connected with inland water transport which run parallel and close to the coast as backwater and river

TABLE 17.7 Merchant shipping

	2003	2002	2001	1998-99	1995-96	1994-95	1980-81	1970-71
Tonnage of Indian vessels ('000GRT)	6,178	6,821	6,817	6,785	7,100	6,344	5,741	2,399
Overseas going	5,372	6,087	6,119	6,131	6,393	5,664	5,589	2,147
Coastal	805	734	697	654	707	680	250	250
Cargo carried (Mn. tonnes)	297.8	274.8	253.7	n.a	166.1	146.5	74.9	52.5
Indian vessels	44.7 (15.0)	467 (17.0)	56.8 (22.4)	62.6 (30.7)	46.0 (27.8)	42.0 (28.7)	24.2 (32.3)	10.4 (19.8)
Foreign vessels	253.1 (85.0)	228.1 (83.0)	196.9 (77.6)	141.1 (69.3)	120.1 (72.2)	104.5 (71.3)	50.7 (67.7)	42.1 (80.2)

Source:-Statistical Outlined of India, 2000-2001 Tata Services Ltd.

Ports

The word 'port' comes from the Latin word 'porta' which means gateway. Port is the gateway of a country as exports and imports are handled through these points. There are two main types of ports, namely, sea port and riverine port. Also, there are dry ports where linkage is maintained by rail or air routes. Our country with a long coast line of about 7,500 km possesses about 150 working ports (11 major and 139 minor ports). Nearly 94 per cent of its foreign trade moves by sea routes. In shipping tonnage India ranks sixth in Asia; however, it comes at the 17th position in world merchant shipping.

Mumbai, Kandla, Marmagao, New Mangalore, Kochi (Cochin) and Jawaharlal Nehru port of Mumbai are the major ports of the West Coast. On the East Coast, Tuticorin, Chennai (Madras), Visakhapatnam, Paradwip and Kolkata-Haldia are the major ports. All these major ports are administered in accordance with the provisions of the Major Port Trust Act., 1963. They handled a toll cargo traffic of 390 million tonnes during the financial year 2003-04.

Airways

Airways or civil aviation has made a rapid progress in India since independence. Department of Civil Aviation is under independent charge of the minister of state but the operation of Air Transport is entrusted to four public undertakings. Air India for international services; Indian Airlines corporation (now Indian) for domestic services and to neighbouring countries like Afganistan, Nepal, Mayanmar, Pakistan, Bangladesh, Maldives and Srilanka; the Alliance Air which operates as a feeder services for domestic destinations not always covered by Indian Airlines. Pawan Hans Limited setup in 1949 has helicopters leased to ONGC and to various states and union territories. The three main functional division are regulatory, infrastructural and operational. On the operational side, Indian Airlines, Alliance Air (subsidiary of Indian Airlines) and private scheduled airlines and air taxis provide domestic services whereas Air India provides international services. The regulatory functions and provisions of the required infrastructure are:

- (a) Construction, maintenance and management of terminal buildings, runway aprons etc. of civil aerodromes,
- (b) Provision of navigation aids and communication facilities to civil air transport.
- (c) Enforcement of air transport regulations including safety requirements
- (d) Inquiries into air accidents and incidents and

TABLE 17.8 Indian Airlines at a glance

	2002-03	1998-99	1995-96	1994-95	1990-91	1981
Domestic						
Hours flown ('000s)	295	210	104	101	89	93
Kilometers flown (Mn.)	1658	117.2	58.7	57.8	48.7	44.4
Passenger carried ('000s)	13951	12,017	7,464	7,272	7,464	5,560
Passenger km (Mn.)	12,848	10,820	6,838	6,545	6,861	4,458
Passenger load factor (%)	56.3	60.4	66.5	63.6	74.2	69.0
Freight tonne km (Mn.)	179	120.5	83.6	81.1	88.0	59.8
Total tonne km (Mn.)	179	1,099	673	645	666	438
International						
Hours flown ('000s)	129	101	97	83	73	64
Kilometers flown (Mn.)	845	70.2	66.3	57.4	51.1	43.7
Passenger carried ('000s)	4,201	3,520	3,096	2,592	2,436	1,938
Passenger km (Mn.)	15,819	13,089	12,257	9,934	8,820	7,580
Passenger load factor (%)	73.9	69.8	69.0	63.7	67.4	66.7
Freight tonne km (Mn.)	104	399	532	503	553	368
Total tonne km (Mn.)	1,884	1,618	1,669	1,423	1,375	1,078

Note:- 1981 data relate to scheduled services only. Figures for subsequent years include additional flights which account for roughly 1 per cent of the total.

Source: Statistical Outline of India-2000-2001. Tata Services Limited.

TABLE 17.9. Position of post, telegraph and communications in India

	Units	2002-2003	1998-99	1995-96	1994-95	1990-91	1980-81
Post offices	('000s)	155.6	154.1	152.8	152.8	148.7	139.2
Urban	('000s)	16.6	16.3	16.7	16.7	16.1	14.5
Rural	('000s)	139.0	137.8	136.1	136.1	132.6	124.7
Telegraph offices	('000s)	n.a.	43.5	44.0	40.7	40.1	31.5
Telephone connections	('000s)	54,620	22,466	12,892	10,588	6,021	2,785
Direct exchange lines	('000s)	54,617	21,594	11,978	9,795	5,075	2,150
Waiting list	('000s)	1,810	1,983	2,277	2,153	1,961	4,470
Total number of calls	(Cr.)	n.a.	14,656	7,848	5,872	2,412	847
Telex lines	('000s)	5.1	18.7	38.9	43.9	46.7	19.3
Waiting list	('000s)	n.a.	-	0.4	0.8	2.8	7.3
Total number of calls	(Cr.)	n.a.	9.2	18.7	28.8	47.1	19.5

Source : Statistical Outlined of India 2004-2005, Tata services Limited.