INLAND TRANSPORT IN INDIA : A STUDY

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CERTIFICATE

This dissertation entitled " INLAND TRANSPORT IN INDIA - A STUDY" is an original work carried out in the Centre for Studies in Science Policy, School of Social Sciences, Jawaharlal Nehru University, New Delhi. This work has not been submitted in part or in full for any degree or diploma of any University.

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PREFACE

Transportation is a vital sector of economic activity, without proper transport facilities planning, development of a country is not possible. Mobility gives rise to prosperity and without proper transportation-network economy of a country does not develop adequately. Transportation not only affects the economic aspects of life, but also the defence of a country, hence its values can not be under-estimated. Transportation system is thus the life line of a country.

This study has been taken with the intention of studying at a preliminary level the major transportation systems in the country.

Study of air transport has not been included in this study nor those of the ropeway and pipeline transportation. The present study encompasses the railways, inland waterways and the roadways systems in India.

Transportation being a very significant sector of the national economy, various activities involved in it call for a multi-disciplinary approach of scientists, engineers, economists, sociologists, planners, administrators and the like. Being technology-oriented, a well developed technology is a prerequisite, it requires an organised R&D effort by the state and the

enterprises engaged in the industry. Similarly a proper planning and forecasting technique is equally essential. Combined efforts of all these essentials will give an effecient, cheap and reliable public transport system. In the study only the problems and R&D efforts in railways, roadways and inland water transport made so far, have been highlighted.

The railways in our country being under the direct control of the Central Government enjoys the most privileged position among the three modes of transport studied. This has helped the railways to offer passenger and goods transportation at a cheaper rate than the road transport system in India, because it is exempted from various central and provincial taxes which the road transport industry is liable to pay. At the R&D front, efforts of the railways have borne fruits. Import substitution has been brought down from 23% (1950-51) to 12% (1974-75). Services provided by the railways to meet the passengers' demand are gradually improving but remain woefully inadequate because of the shortage of rolling stock, but the services offered in goods carriage are definitely adequate. Modernisation of the railways has been started but the rate of progress is slow. On the whole this system is in a slightly better position to meet the transportation requirements of the country.

Inland water transport continues to remain the most neglected 'mode of transport' in India. Efforts of the State Governments and the Central Government have not been whole-hearted. No specific attempt towards modernisation and indigenisation has been observed. R&D efforts in this area are lacking. Being a disorganised sector, data are also not adequately available to deal with the planning and development aspects of this sector.

Roads and Road Transport is mostly a preserve of the private operators in our country. Most of the operators are economically not so well off to provide efficient and reliable services to the customers. Services offered by the State Road Transport Corporations to carry passengers are not adequate. Poor road condition increases the cost of operation. Therefore, the efforts to improve the road conditions are needed and unfortunately there is no effort in this direction. R&D efforts in this direction are highly inadequate. Laboratories and field testing stations are not adequate in number; machineries needed for road construction are still imported from abroad. R&D programmes must cover all these aspects in this significant sector of transport industry.

Road lengths (per thousand of population) are inadequate, even less than those in countries like Sri Lanka. Fair weather roads are large in number than the surfaced roads, resulting in inefficiency and lack of reliability in operation. Such a situation increases the maintenance cost of the roads and automobiles in the transport industry. R&D efforts in automobile industry are almost absent in India. However, small testing facilities exist but their services are not utilised by the manufacturing units.

Lastly, transport policy of a country cannot be decided in isolation by keeping other aspects affecting it out side its purview. Public policies regarding energy, industrial localisation, urban development, science and technology must not be mismatched with the transport policy enunciated by a country.

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CHAPTER - I

INLAND TRANSPORT IN INDIA - A STUDY

1.1 INTRODUCTION

Prosperity of a nation depends to a large extent, upon the resources, material and human, it is endowed with. Unfortunately, these resources are not distributed all over the world in an even and equitable manner, due to which the rate of economic growth and the speed of developments have not remained uniform everywhere. The factors which minimise the evil effects of these and also tend to distribute the bounties of nature and fruits of social, economic and technological developments more evenly, are related to the transportation system, "the dominant economic fact of our age"[1].

Transportation is vital for economic development of any country, as it acts as a bridge between man the consumer, and nature the supplier. In the production stage, transportation is required for carrying raw materials and in the distribution stage, it is required to transport the finished goods and other agricultural products from production centres to consumption centres.

Regional specialisation in the production process will be well nigh impossible without adequate transportation. The cotton goods of Bombay or the jute goods of Calcutta are produced for the markets which extend far beyond their immediate environs. In the sphere of economic activities, transportation is, therefore, a decisive factor determining the size and quality of the market and also the price of the commodities.

Apart from economic and social significance, transportation is a foundation upon which the defence of the country rests. Without proper facilities of transportation, mobility of troops in times of need is marred and, therefore, it is of little surprise that some of the modern developments in transportation are broadly the by-products of the last two global wars, and in the case of India because of the Sino-Indian and Indo-Pakistan border clashes.

Transportation does also help in the mobility of ideas, due to which a cultural unification of people in a country is possible. Exchange of ideas and mobility of cultures through peoples has also been facilitated by it and without transportation we could not have thought of this

present society. Transportation, is an essential factor for social, cultural, economic and political mutation and hence the activities of these sectors must be related to transportation in a planned and co-ordinated way so that it may not become a hindrance in the development of a country.

In our country railways, road transport, airways and inland water transport are the principal modes of transportation which are used for carrying passenger and goods. All of these modes have characteristics of their own. Like mode of operation, investments etc., they require on long-range basis an investment to create necessary infra-structural facilities like rail tracks, ports and harbours, roads, waterways etc. This demands that programmes in this sector of economy be looked beyond the boundaries of current needs and to take into account future technological and scientific developments. It is, therefore, necessary to make careful and realistic projections of transportation requirements in advance and also to review them from time to time, so that suitable adjustments can be made, as and when required.

"With the initiation of industrial development plans, the main considerations in the planning of

transport were the demands of heavy industries because an efficient and rapid transport system was needed to transport ores, iron, steel and other basic raw materials for the industries. And more recently stress has shifted to agricultural and rural industries. Therefore, it is necessary to take steps to strengthen the road and rail systems in the country to meet the increasing demands of road and railways traffic between the larger industrial and urban centres. Thus as a part of the planned national economy, looking forward to remove poverty, providing social justice and trying to attain self-reliance, the transport system has to serve now a much wider range of purposes, than ever before, and has a crucial role in economic, social and technological developments at the national and regional levels as well as in the expansion of international trade and commerce[2].

Scale of efforts taken during the Five Year Plans shows that significant development has taken place in transportation since the commencement of First Five Year Plan. "Investments in transport facilities and its expansion during the first three

plan periods have been of the order of Rs.4,243 crores out of a total investment of Rs.21,810 crores. Transport accounted for 17.2 per cent of the total investment in the First Plan, 20.4 per cent in the second, 19.6 per cent in the Third Plan and 20.4 per cent in the Fourth Plan[3]. Stress on transport sector has been increasing gradually in each plan but inspite of all the efforts of the Government, this sector appears to be sick as if a whole-hearted and comprehensive attempt is lacking. Efforts in the First Plan concentrated largely in the rehabilitation and replacement of over-aged assets which had been subjected to great pressure during the preceding decades. In the Second Five Year Plan, the emphasis shifted to programmes required to augment capacity on the railways and other media. The development of roads and road transport also received increasing emphasis to meet relatively more dispersed traffic requirements all over the country. While there has been continuing expansion in the transport sector under successive Five Year Plans, there have been some shifts in the popularity of different modes of transport and share of different modes of transport in the total traffic has undergone substantial variation with the change in the

pattern of economic development. There has been significant changes in the relative share of rail and road transport in the total traffic; the share of roadways in the total traffic; both passenger and goods traffic has been increasing faster than the railways, eventhough in absolute terms traffic on both the modes of transport has increased. The trend of development of goods and passenger traffic and their shares in rail and road is shown in the Table-I[4].

TABLE-I

Estimated Relative Share of Railways and Roadways In Goods & Passenger Traffic

Year	Railway	Road Transport	Percentage Share Railway	Road Transport
I. Goods Traffic (Billion Tonnes-Km)				
1960-61	88	17	83.8	16.3
1965-66	117	34	77.5	22.5
1968-69	125	40	75.8	24.2
1973-74	147	65	69.3	30.7
II. Passenger Traffic (Billion Passenger-Km)				
1960-61	78	57	57.8	42.2
1965-66	96	82	53.9	46.1
1968-69	107	98	52.2	47.8
1973-74	135	130	50.9	49.1

While, there have been developments in rail and road transport at a faster rate, the inland water transport has remained woefully neglected. Number of vessels which had outlived their economic utility have been scrapped without being replaced. This important mode of transport has vast potentialities in the regions like Assam, Bihar, Orissa, Andhra Pradesh, Goa, Tamil Nadu etc.

1.2 AIMS AND OBJECTS

This study has been undertaken to provide a basis for the understanding of the different activities at various societal and administrative levels involved in organising a transportation system within the country and to relate them with R & D activities and other related technological programmes. All this is necessary because with the increasing rate of economic growth, requirements of transport will grow exponentially in the years to come, coupled with such problems related to fuel pricing mechanism, environmental pollution and rapid rate of urbanisation it will confront the people at the policy planning and policy making levels to review the situations from time

to time and find out better policy alternatives. Here a review of the following has been made to understand the system :-

(a) Existing modes of transportation in our country except the airways;

(b) Problems of each mode of transportation; and

(c) Role of R&D in the development and better management of the transportation system.

1.3 LIMITATIONS AND SCOPE

In this study, an attempt has been made to review the existing facilities in this important sector of national economy. Transportation is such a sensitive sector in the national economy that slight changes in the pattern of demand can alter the economic activities. It is a well established fact that the transport requirements have increased faster than the rate of growth of economy and from time to time, temporary imbalances between supply and demand within the sector of transport services have manifested themselves. Therefore, a careful and

comprehensive study is needed to assess the present state of affairs prevailing in this sector so that a proper regulation of the system, as a whole, may be possible. In this study, however, only shortcomings present in the three modes of transportation, such as, waterways, roadways and railways have been pointed out and some aspects of public policies like pricing policy, science and technology policy etc., has been highlighted.

While dealing with this problem of transport, airways has been excluded, mainly because of time factor. Absence of data specially in case of inland water transport and road transport (in case of private operations) has been a problem to deal with the subject matter in more detail. Except railways comprehensive datas are not available for other two modes.

This problem requires elaborate data collection for each mode and only then one can think of output optimization, allocation of goods and passenger transport for a certain mode of transport and projection of future demands. This enquiry could also involve the study of organisational structures, investment

policy, pricing policy and efficiency of each system. With more reliable data and their proper analysis, forecasting of demand could be possible but such exercises could not be undertaken in the present study because of absence of reliable data and time constraints for completion.

1.4 DATA BASE FOR THE PRESENT STUDY

Deficiencies in respect of data relating to the movement of commodities and cost of operation of different transport services are by no means peculiar to India. Except railways, there has been a complete absence of comprehensive and codified data. Though at regional levels some data are available in these respects, it was found difficult to deal with them in this study. In case of internal waterways, data are absent because inland water transport is exclusively operated by private operators and the sector is very much disorganised and incoherent for purpose of investigation. The State Governments do not exercise any control over them. Inspite of such provisions for them in the Constitution, these services are allowed to develop in an unorganised fashion.

The data have been primarily collected from the published government reports and other documents. Certain books and journals on the subject in the field have been examined for purpose, some UN and IBRD documents have also been referred. Use of Indian statistical documents have been made. They have been referred to at places in the text, as and when they are used.

1.5 RELEVANCE WITH SCIENCE POLICY STUDIES

Transportation has been defined by Kurt Weidenfeld in Encyclopaedia of Social Sciences as "a system of all technical instruments and organisations designed to enable persons, commodities and news to master the space[5]. The scope yet depends upon the meaning attributed to the terms like "technical instruments" and "organisations". The terms implicitly and explicitly contain the scientific and technological inputs to the transportation system as a whole. Each of these factors are undergoing drastic changes with advances in science, which makes it imperative that the R&D activities have to be geared to the specific needs depending upon the prevailing conditions and the desired development pattern.

The transportation sector has three major aspects, such as, (a) Economical, (b) Technological; and (c) Organisational. The development plans for these sectors are no doubt, expected to be integral components of the socio-economic development strategy to be evolved on the basis of economic, social, political and technological matrices or indicators. Therefore, the industrial as well as technological problems requires an interdisciplinary enterprise of scientists, technologists, sociologists, politicians and economists, so that the locus of decision making in this sector may be an efficient and judicious one, giving rise to optimal results.

"Science Policy is a part of the general policy of the government - the part of which consists in improving the resources of science and promoting technological innovations to attain national goals. It has, therefore, very close links with other spheres of governmental actions directed at some objectives"[6]. In general the governments formulate their science policy with two objectives, viz., utilisation of scientific research for 'military purposes' and for the development of scientific research for the 'civilian purposes'.

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CHAPTER - II

THE RAILWAYS SYSTEM

2. GENERAL

The Indian Railways are the country's largest public undertaking and a vital national asset. The railways are regarded as the lifeline of the transportation system. Its certain inherent characteristics like low cost of transportation and operational cost, bulk carrying capacity and speed has made it vital for industrial development of the country. Railways are not serving the industries only but also the wider political, social and economic interests of the country. The quality of services it provides as compared to other modes of transportation, and its operational efficiency are of great importance for the growth of economy. Consequently, technical and administrative measures required for raising the level of performance in the railways are also the matters of general concern.

Railways are highly capital intensive as well as labour intensive. Technical complexities of the railway system calls for an efficient public policy instruments regarding research and development, finance and management. Also, when the country is determined for increase in growth

rate and attainment of self-reliance in all possible sectors of economy, the role of transportation, and especially railways because of its public service obligations, acquires more importance. Therefore, the Indian Railways will continue to play its role of major transport carrier during the Fifth Five Year Plan period also.

Though in the previous years, the railways have lost their traffic to the road transport, yet as a bulk carrier its importance is very much recognised. The Table-II shows the trend of the development of traffic on railways and the roads[1]. Road transport is more popular for shorter distances, but high rated freights are being handled by roadways to a larger distances than the average. Railways has lost traffic to the roadways because of its quality of services it provides to its customers.

TABLE - II

TREND OF DEVELOPMENT OF TRAFFIC ON RAILWAYS AND ROADWAYS

Year	Railways	Road Transport	% of Railways	% of road transport
I. Goods traffic (X 10^9 transport km.)				
1960-61	188	17	83.8	16.2
1965-66	117	34	77.5	22.5
1968-69	125	40	75.8	24.2
1973-74	147	65	69.3	30.7
1978-79	399	110	73.2	26.8
II. Passenger traffic (X 10^9 pass. km.)				
1960-61	178	157	57.8	42.2
1965-66	196	182	53.9	46.1
1968-69	107	198	52.2	47.8
1973-74	135	130	50.9	49.1
1978-79	175.5	180	49.5	50.5

The Indian Railways since 1853 progressed a lot and at present has attained the second largest place in the world railways with 1.4 million regular employees and a capital investment of Rs.5050 crores[2]. With such vastness, it calls for an efficient policy instrument for its management. This present chapter has been devoted to highlight the trend of its development, R&D orientations and expansion along

with the fundamental problems of the Indian Railways. The problems of the Indian Railways are colossal and large in number; but some of them are such that they require immediate attention to make the system trustworthy.

2.2. DEVELOPMENT OF THE INDIAN RAILWAYS

Since 1853, the Indian Railways has developed into the largest public undertaking employing nearly 1.4 million persons over a stretch of 101,395 km. of track length comprising of broad gauge, meter gauge and narrow gauge. At present the Railways have a total capital investment of Rs.5050.3 crores[2]. Rapid development took place only after independence. Table-III shows the amount of the investments and the more important items of physical achievements of the Indian Railways.

TABLE - III

Investment/Physical achievements upto Fourth Plan[3]

	Units	Beginning of Planning (1951-52)	Added in 51-52 to 1973-74	End of 4th Plan (73-74)
1. Investment	Rs. Crores	855.2	3,936.2	4,791.4

TABLE-III Contd...

	Units	Beginning of Planning (1951-52)	Added in 1951-52 to 1973-74	End of the 4th Plan (1973-74)
2. Increase in Line capacity				
(i) New Lines/ restoration of dismantled lines	Km.	53596	6,638	60,234
(ii) Doublings	Km.	5127	7,177	12,304
(iii) Electrification	Km.	388	3,803	4,191
(iv) Conversion from MG to BG	Km.	---	760	760
3. Track Improvement				
(i) Primary Rail Renewal	Km.	---	34,826	34,826
(ii) Primary Sleeper renewal	Km.	---	38,500	38,500
4. Acquisition of Rolling Stock (Addition & replacement)				
(i) Locomotives				
Steam	Nos.	8120	727	8,847
Diesel	Nos.	17	1,593	1,610
Electric	Nos.	72	597	669
(ii) Passenger vehicles		13562	14,431	28,000
(iii) Wagon (4 wheeler)		205596	182,770	388,366

Investments in 1973-74 became almost four and a quarter times of what it was in 1951-52, i.e., it rose from Rs.855.2 crores to Rs.4,791.4 crores and in 1974-75 it rose to Rs.5050.3 crores. During this period of 25 years route kilometerage has increased from 53,569 to 60,234 km. and dieselisation has received much attention. This reflects on the intensive development of the railways made during this period. Establishment of the Research, Design and Standards Organisation (RDSO) ushered a new era in the development of railways, alongwith the impetus given in the Five Year Plan for the development of the railways.

Each plan had an objective to carry the forecast freight traffic for the plan period, closely tied to the needs of the core sectors of the plan. These sectors now generate about 80 per cent of the Railway's revenue earning traffic. Provision for increase in passenger traffic also received due attention in the plans. The First Five Year Plan concentrated mainly on replacement and rehabilitation of over-aged assets. During Second Plan, development was accelerated but this development rate was rather slow and therefore, demand outstripped the capacity. In the Third Plan period, railways intended to increase its capacity so that rail transport may not become a hinderance in industrial development.

By the end of Third Plan period capacity on broad gauge was ahead of demands, mainly because of failure of the achievements in production targets of finished materials as well as raw materials; on the meter gauge, capacity was in balance with demands[4]. In the Inter-Plan periods, planning investments were made on annual basis to meet the immediate requirements keeping in view the long term objectives of developing sufficient capacity to meet the anticipated demand.

The emphasis in Fourth Plan was to modernise the existing facilities and to improve the efficiency of operation. The basic objectives of this Plan were to provide capacity for freight and coaching traffic anticipated during the Plan period, increase in efficiency of operation and to reduce the cost of transportation.

In the Fifth Plan, it is anticipated that following broad trends will persist in future and therefore, these trends have been given consideration in formulating the plan. The trends are as follows :

(1) The busy arterial routes which form only 24 per cent of the route kilometerage of the Indian Railways carry about 72 per cent of the traffic.

(11) The share of bulk commodities such as public coach, iron and steel, ores and stones, cement, fertilisers, foodgrains and petroleum products which formed 58% of the total revenue earning tonnage in 1950-51 accounted for as much as 80 per cent in 1971-72.

(111) The demand for through the 'limited stop' fast passenger services between main centres of industry and population has been increasing rapidly[5].

The Fifth Five Year Plan envisages an originating traffic of 300 million tonnes for the railways. This traffic target has been arrived at after taking into account the likely growth in production of important commodities during the Plan period. Short lead traffic to steel plants is likely to increase substantially during the Fifth Plan and this will have an impact on overall lead.

On the basis of traffic forecast, the Indian Railways will spend Rs.2350 crores with a foreign exchange component of Rs. 330 crores, about 68 per cent of the outlay proposed is for the rolling stock,

track renewals and line capacity works, this again goes in favour of intensive development. The details of the programme are given below :

TABLE - IV

Outlay on Railway Development Programmes in Fifth 5 Year Plan[6]

Rs. in crores.

Programme	Fourth Plan			Fifth Plan
	Original Outlay	Revised Outlay	Likely expenditure	Total outlay
1. Rolling Stock	620	568	609	900
2. Workshops & Sheds	30	30	22	120
3. Machinery & Plants	15	25	22	40
4. Track Renewals	200	180	161	200
5. Bridges Work	28	29	30	60
6. Line Capatity	315	234	230	500
7. Signalling and Safety	40	49	59	110
8. Electrification	82	73	68	160
9. Other electric works	12	15	18	20
10. New Lines	83	86	32	180
11. Staff welfare	15	20	16	26
12. Users Amenities	20	20	20	20
13. Staff Quarters	30	36	65	40
14. Other specific works	10	10	11	20
15. Investments in State Road Transport Corp.	10	10	14	30

contd....

TABLE - IV contd...

Programme	Fourth Plan			Fifth Plan
	Original Outlay	Revised Outlay	Likely expenditure	Total Outlay
16. Inventories	15	15	61	50
17. Take over of open line works of P & T	--	--	2	--
18. Probable Saving	--	--	(-21)	--
	1525	1400	1419	2350

From the Table-IV, it is apparent that there is a shift in the expenditure pattern in Fifth Plan, programmes like line capacity is likely to get a boost in this plan as Rs.500 crores has been earmarked for this against Rs. 234 crores in Fourth Plan. Similarly, programmes like establishment of workshop and shed, track renewal, signalling and safety, electrification, new lines etc., have been allocated more funds than the Fourth Plan allocations. Another feature of the Fifth Plan is the modernisation of present facilities in the railways.

2.3 PERFORMANCE OF RAILWAYS

In the first year of Fifth Plan, a remarkable recovery has been observed in the freight business of the Railways. The volume of revenue freight

originating amounted to 173.6 million tonnes with an increase in lead to 699 km. Revenue freight traffic actually showed rising trend since the beginning of the Five Year Plans with an increase of lead distance, except in the year 1973-74 where freight traffic declined and lead distance was also reduced. The Table-V shows the trend of freight traffic.

TABLE - V

Trend of Growth of Freight Traffic[7]

Year	Revenue Earning		Lead	Total (Incl. Dept)		Lead
	Tonne	Tonne-Km	Km.	Tonne	Tonne-Km	Km
1950-51	73.2	37,565	513	93.0	44,117	470
1955-56	92.2	50,435	541	115.9	59,576	510
1960-61	119.8	72,333	603	156.2	89,680	561
1965-66	162.0	98,978	611	203.0	116,939	576
1970-71	167.9	110,696	659	196.5	127.956	648
1974-75	173.6	121,374	699	196.9	134,837	686

Revenue for the year 1974-75 averaged at 7.15 paise per tonne-km against 5.89 paise in the previous year. It is a reflection on the change in composition of traffic and length of haul.

Railways have been able to meet the demand of industries in the recent years, because bottle-necks in transport due to railways have never been experienced so far. Another cause of its adequacy can be the share taken by road transport, especially in the area of the short distance commodities. Though railways have lost their popularity for the commodities which are perishable and fragile but has made considerable progress in carrying bulk commodities for longer distances as shown in the Table VI below :

TABLE-VI

Percentage Composition of Traffic[8]

Year	Commodities in Tonnes		Commodities in Tonne-Km	
	Bulk	Others	Bulk	Others
1950-51	58.2	41.8	NA	NA
1960-61	72.8	27.2	66.07	33.93
1970-71	79.9	20.2	73.41	26.59
1974-75	81.3	18.7	73.32	26.68

Basic and heavy industries were given more attention in successive plans because of their demands, location of those industries with the interest in regional development among other

considerations, accentuated the demand for rail transport. With this result Railways have come to be organised as the bulk carriers of heavy goods over longer distances. Railways are more fuel efficient on long hauling distances. This has been revealed in one of the studies of the World Bank on Coal. The following Table compares the cost of rail and road transport as worked out in the World Bank Study Team's report[9].

TABLE - VII

Cost of Haulage of Coal (Per Tonne)

Distance	Rail cost	Road Cost	
		13 ton tractor & semi-Trailor Rs.	19 ton tractor & semi-trailor Rs.
100	7.47	6.14	3.71
200	9.36	10.38	9.61
300	11.25	14.16	13.18
400	13.14	18.62	17.28
500	15.03	23.09	21.24

Committee on Transport Policy and Coordination (CTPC) in its final report made an attempt to compare the rail and road cost with the help of data furnished by the Railway Board and the World Bank Study Team on rail and road cost respectively.

It was found that road transport cost for 13 tonne tractor trailor are higher than rail cost for bulk movement over and above 100 kilometers on both meter gauge as well as broad gauge. For light merchandise cost of road transport in 8 tonne trucks were lower than the costs of haulage of light merchandise by rail upto a distance of about 50 kilometers on the broad gauge and upto about 100 kilometers on the meter gauge[10]. Railways are cheap for carrying bulk commodities for longer distance than the light merchandise for the shorter distance in comparison to road transport. This was revealed by the CTPC in its report.

2.4 PASSENGER SERVICES

The railways services with reference to passenger traffic are not adequate. Overcrowding in trains, especially on important mail/express trains and suburban trains at peak hours is a very common feature on the Indian Railways. Though the railways have taken several steps like dieselisation, strengthening of tracks to carry heavy traffic at faster rate, and modern signalling techniques on the main routes etc., they have not been able to make a mark. This has happened mainly due to increase

in demand at a faster rate than the existing physical facilities and the resources provided. Insufficient line capacity and rolling stock have been the main hindrance in the expansion of railways, in some places terminal facilities like platforms, loco-sheds and other passenger amenities have also been a limiting factor leading to unnecessary detention of trains. They occupy the track and terminal facilities, proving an obstacle to the movements and effectiveness of line capacity and rolling stocks[11].

Since 1950-51 the passengers traffic has doubled in 1974-75 with the highest average distance travelled by each passenger i.e. 52 km. On the average, annual rate of growth has been 3.72 per cent in terms of passengers. The Table VIII shows the trend of passengers growth[12].

TABLE - VIII

Growth of Passenger Traffic on Suburban and Non-Suburban Trains

(In Millions)

Year	Suburban	Non-Suburban	Total
1950-51	412	872	1,284
1955-56	495	780	1,275
1960-61	680	914	1,594

contd...

TABLE - VIII contd....

Year	Suburban	Non-Suburban	Total
1965-66	1,018	1,064	2,082
1971-72	1,275	1,261	2,536
1972-73	1,385	1,268	2,653
1973-74	1,437	1,217	2,654
1974-75	1,373	1,056	2,429

From this trend it appears that after 1971-72 passengers on suburban trains have increased as compared to non-suburban trains. This rate of growth has been faster in case of non-suburban trains; long distance traffic has increased, giving rise to increase in average lead distance.

The rapid growth of suburban passenger traffic vis-a-vis non-suburban passenger traffic is attributed to the more rapid increase in population in the outer zones of metropolitan areas of Bombay, Calcutta and Madras[13]. Growing rate of industrialisation and urbanisation of villages in the outer zones have given rise to satellite towns, from where thousands of people

travel daily to their working places as is the case in Delhi, Bombay and Calcutta. Table-IX shows the rate of growth of different components of traffic since 1950-51[14].

TABLE - IX

Proportion of Total Traffic

	No.of Passengers		Passengers - Km	
	1950-51	1974-75	1950-51	1974-75
Non-Suburban	68.0	43.5	90.1	78.5
Suburban	32.0	56.5	9.0	21.5
Total :	100.00	100.0	100.0	100.00

To cope with the increasing passenger traffic, Railways are augmenting regularly to their existing capacities. Besides this, coaches with larger capacity are being designed for medium distance travel on main lines. Two-tier air-conditioned sleeper cars and doubledecker coaches to carry 146 passengers are likely to come out very soon. Design of various coaches with increased capacity are under test, which will help to increase the capacity of the present fleet. The passenger-carrying capacity of Indian Railways are shown below[15].

TABLE - X

Passenger Carrying Capacity of Indian Railways

Year	E.M.U. Coaches		Conventional Coaches	
	Number	Capacity* (000s)	Number	Seating Capacity (000s)
1950-51	460	87,986	13,109	854,678
1955-56	574	101,409	15,984	1,050,811
1960-61	846	150,854	20,178	1,280,797
1965-66	1,355	250,825	22,804	1,426,918
1970-71	1,750	340,541	24,676	1,505,047
1974-75	2,043	390,158	26,224	1,598,789

*Includes standing capacity

This capacity has been found inadequate to cope with demand.

2.5 Some Prublems of the Indian Railways

At present, the Indian Railways is faced with number of problems like social, financial, technical and managerial, which hampers the efficient functioning of the railways, and also take away its revenue which could have been utilised for its development.

2.5.1 TICKETLESS TRAVEL

One of the perennial problems of Indian

Railways is that of ticketless travel of which even the Railway Board do not possess an exact account to tell how much revenue is lost. According to the Indian Railway Enquiry Committee, commonly known as 'Kunzru Committee' (1947) ticketless travellers can be divided into three categories (1) The cheat: the man has the money to pay for his fare but evades payment if possible (2) the penniless passengers (3) the victim of the circumstances: the man who tries to buy a ticket but cannot, usually because either the booking office is not open in time or booking office facilities are inadequate[16].

Ticketless travel gives rise to several other social menaces like theft of passengers luggage, theft of railway property, pick-pocketing, overcrowding of trains etc. Railway staff also help public to travel without proper ticket, sometimes they themselves accompany such party of ticketless travellers. Though Railway Board has taken several measures to combat such evil and in 1969 rate of fine was also enhanced but this problem still remains uncombated. The loss of revenue due to ticketless travel is considerable. The statement given below reflects on the dimension of problem.

TABLE - XI

Statement of revenue earned, number of persons detected travelling without tickets

1.	No. of persons detected travelling without tickets or improper tickets	16,17,222	46,86,649	23,39,161
2.	Amount of Rly. dues realised	2,09,12,731	2,36,00,192	3,27,09,756
3.	No. of unbooked luggage cases detected	9,50,488	10,32,436	14,63,347
4.	Amount Realised from unbooked luggage	65,82,298	80,27,865	1,22,77,163
5.	No. of persons prosecuted	2,14,217	1,81,429	2,76,130
6.	No. of persons jailed	1,32,983	1,05,578	1,81,043
7.	Amount of judicial fines realised	13,56,503	14,31,011	31,52,813

Source - Indian Railways 21(3), p.35-38[17].

During the year 1975-76 recovery of fines was more as compared to the previous years, also number of persons detected travelling without tickets or

with improper tickets was large. It was mainly due to the intensive checking of trains by the railways all over the country. During this period special squads were deputed. But such measures are not of much help because railways have to spend considerable amount of organising such raids. Railways should launch programmes to teach the people about the evils of ticketless travel through mass-media, and if possible through schools by introducing lessons on this problem in the text books. Besides, this, railways should improve their ticket distribution system at stations and to clear the rush during vacations, special arrangements should be made. In this direction, the railways have taken steps like opening of booking counters in the colleges and universities during holidays/vacations, mobile booking units have also been started.

2.5.2 PAYMENT OF COMPENSATION

Due to the corrupt practices of railway staff and Railway Protection Force (RPF), the Indian Railways has to pay compensation to its customers and its percentage with respect to its gross earning is increasing since 1970-71, (Table XII). In 1974-75, Railways paid 69 per cent of total amount of compensation for the ten commodities listed in Table XIII,

being essential, these commodities are generally scarce and readily marketable[18].

TABLE - XII

Showing the Number of Claims & Compensation paid by Railways

Year	Number of claims settled in(000)	Gross amount of compensation	
		Paid in Crores of rupees	%age of gross earnings
1960-61	456	3.93	1.18
1965-66	587	5.87	1.03
1970-71	723	12.23	1.66
1971-72	737	12.68	1.58
1972-73	710	12.29	1.46
1973-74	663	13.62	1.65
1975-76	691	14.65	1.50

Source - Indian Railways, Year Book 1974-75.

TABLE - XIII

Ten Commodities for which 69% of Total amount of Compensation paid in 1974-75

Commodity Groups	Amount of Compensation Paid In lakhs of rupees	Percentage of Total
Grains and pulses	334.81	22.9
Sugar & Jaggery	117.54	8.0
Oilseeds	86.24	5.9
Coal and coke for public	109.01	7.5
Iron & Steel	77.75	5.3
Cotton manufactured	83.45	5.7
Fruits & Vegetables etc.	85.91	5.9
Tea	62.13	4.2
Vegetable & other edible Oils	25.57	1.8
Spices (provisions)	27.00	1.9

Source - Indian Railways, Year Book 1974-75.

Till 1962, liability of Railways for loss, damage etc., of goods in transit was that of a mere bailee under the Indian Contract Act, with the enactment of Indian Railways (Amendment) Act, 1961, Railways assumed much greater responsibility as common carriers, holding themselves liable for loss, destruction, damage, pilferage or deterioration

of goods in transit[19]. In this connection the Report on Railways furnished by the Administrative Reforms Commission in January, 1970 recommends:

> The Railway Administration should be held responsible for loss of or damage to goods enroute. Where Railway Administration is held responsible for loss of or damage to goods it should evolve a system under which responsibility can be fixed on the Railway staff concerned collectively or individually and appropriate penalties be imposed for the loss suffered[20].

2.5.3 SOCIAL BURDEN

Railways, being a service of public utility, the section 27(a) of the Indian Railways Act, makes a binding upon it to carry or give preference to the goods, specially low rates commodities like coal, foodgrains, minerals and ores, raw materials for iron and steel factories, salt, edible oils etc., in the interest of public. When such directions are given by the Central Government to Railway Administrations, they have to provide facilities, notwithstanding high rated traffic waiting to be moved[21]. In addition to this railways have to suffer by giving concessional fare to students,

military personnel, farmers and industrial workers in groups, tourists, social workers, nurses and mid-wives, seasonal tickets on suburban trains also do not fetch adequate revenue to the railways. Uneconomic lines are also a source of loss of revenue to the railways. For all such losses no compensations are made to the railways as are made in foreign countries. ARC has recommended in its report on Railways that uneconomic lines should be run only at the instance of the state government and suitable arrangements should be made to share the loss or expenditure with the State Government[22]. ARC in its report on railways has also recommended for dialogue between railway officials and state government officials on such lines.

On account of social burden, the railways in 1975-76 incurred an estimated loss of Rs.165.19 crores. The Table XIV shows the statement of the estimate.

TABLE - XIV

Loss Due to Social Burden

Item	Rupees in Crores
(a) Loss on coaching services	122.92
(b) Loss on freight concessions on relief measures	0.66

TABLE - XIV Contd...

Item	Rupees in Crores
(c) Loss on low rates commodities:	
Foodgrains	10.75
Fodder	7.16
Coal	6.96
Salt	5.31
Oil Seeds	2.89
Fruits & Vegetables	2.86
Gur, Sakkar & Jagrrey	1.81
Firewood & Charcoal	1.62
Ores other than iron ore and manganese ore	1.13
Edible Oils	0.51
Limestone & dolomite	0.29
Molasses	0.29
Sugar Cane	0.09
Total :	165.19

2.5.4 COMPETITION WITH ROADS

The Table-I shows the trend of growth of freight traffic on roadways in tonne-km., it is mainly due to the guarantee, regularity, safety and flexibility which the road transport provides. This question of competition was examined by the

Administrative Reforms Commission (Committee on Railways) in 1970. They made valuable recommendations for improving the services so that the customers may be attracted. In one of the recommendations the Commission maintains :

(i) The Railways should make efforts to win back the high rated goods traffic by ensuring better services;

(ii) The Railways should pay particular attention to complaints regarding the misrouting of wagons and the wagons going astray;

(iii) The Railways should extend the programme of door-to-door delivery and adopt the system of advising the consignee about the arrival of goods in advance;

(iv) Container service should be progressively extended all over the Railway system[23].

In another recommendation, the Committee stressed on the need for intensive market research and traffic survey by commercial department in order to ascertain the views and requirements of railway users.

Multi-gauge system on the Railways is also responsible for diverting freight traffic to roads,

it causes unnecessary detention of goods at the junctions, due to this efficiency of system is also reduced. Administrative Reforms Commission has also recommended to the Government that the Railway Administration's attention should be drawn towards the conversion of gaugesto a single system of gauge. Besides, these, the Commission has made recommendations for increasing the speed of trains for the movement of goods in order to compete with the road transport, steam traction should be taken off if possible, diesel and electric traction should be used, haulage of empty wagons should be reduced and unnecessary detention period at the sidings should be reduced[24].

Some of the recommendations have received due attention from the Railway Administration and super-fast trains to carry goods traffic have been introduced, to discourage the use of wagons as godowns at sidings demurrage charges have been increased and the period of auction of unclaimed goods have also been reduced. But still considerable market research is needed to solve the problem of competition. State Road Transport Authorities should also be involved in this issue and settlements should be made with them.

2.6 RESEARCH & DEVELOPMENT ON RAILWAYS

Seeds for R&D activities were sown as early as 1903 with the constitution of the Indian Railways Conference Association - set up to enforce, co-ordination and standardisation amongst the many railway systems that had grown up by then, since 1853. This was followed by setting up in 1930, of a Central Standard Office (CSO) at Delhi for preparation of designs, specifications and standards for the railways. However, these efforts were made in a scattered and un-coordinated way because of the lack of interest to invest in the R&D activities on the part of operators who were operating the private railways. This was due to the consulting engineers and builders of U.K. who provided technical know-how to them easily. It did not continue for longer time. Various Committees which went into enquiry of working of the Indian Railways specifically mentioned the need for research and investigation on the Indian Railways to meet its day to day problems. Such Committees were Pope Committee (1933), the Pacific Locomotive Committee (1939) and Indian Railways Enquiry Committee (1947) who recommended for the creation of research organisation for railways progress.

Till 1952, progress made in this direction was very slow, phenomenal upsurge in the growth of economic and industrial development, pushed up the needs of rail transport as a result of which a new organisation was created in that year viz., "Railway Testing and Research Centre" (RTRC), thereby dispensing with the services of foreign consultants from 1955. In 1957, CSO and RTRC were merged into a single unit, named 'Research, Designs & Standards Organisation' (RDSO) with headquarters at Lucknow[25].

The research activities of RDSO are guided by the Central Board of Railway Research (CBRR) consisting of eminent engineers, scientists, technologists, managers, educationists, senior executives from the industries interested in Railway technology, materials and equipment. Chairman, Railway Board is the Chairman of RDSO and the Director General, RDSO is the Member-Secretary of this Organisation. The CBRR has number of sub-committees on civil, electrical, mechanical, metallurgical, chemical, signalling and telecommunication engineering consisting of specialists who review the working of RDSO from time to time. It has a Committee on standards also with heads of departments from zonal railways as members from each branch of railway technology.

The main function of RDSO is to keep the Indian Railways abreast of upto-date technical know-how and expertise related to world-wide railway oriented development. It keeps an eye on the manufacture of railway equipment right from prototype development stage to bulk manufacturing stage, their testing and standardisation. At present, it has following directorates :

1. Architecture
2. Carriage
3. Civil Engg. (Permanent ways, bridges and structures)
4. Electrical Engg. (Electric Locomotives, air-conditioning and train lighting)
5. Electrical Engg. (Traction Installation)
6. Metallurgy and Chemical
7. Metropolitan Rolling Stock
8. Motive Powers (Diesel, Steam Locos and Power Cranes)
9. Research
10. Signalling & Tele-communication
11. Traffic Research, and
12. Wagons

These directorates help the RDSO in its main functions like preparation of all standards, designs, specifications and code of practice including development of ad-hoc designs for specific projects. They

also conduct field trials of newly developed railway equipments, inspection of railway materials supplied by public sector as well as private sector undertakings. In addition to all these activities the RDSO is providing consultancy services to the railways of the developing countries like Saudi-Arabia, Philipines, Thailand, New Zealand, Syria, Iran, Iraq, Egypt etc. Such consultancy services are offered by the RDSO through other agencies like Indian Railways Construction Company (P) Ltd., (IRCON), Rail India Economic and Technical Service (RITES) which were brought up in April 1976 and 1974 respectively.

RITES and IRCON undertake works right from survey stage to final execution and because of the wide range of services provided by RITES it has been registered with the International Organisations like UNDP, UNIDO and IBRD for rendering consultancy services. IRCON undertakes the projects on turn-key basis, it is being backed by RDSO's technical expertise and of other companies in India.

2.6.1 EXPENDITURE ON R&D

R&D activities on Indian Railways derive their finances from the general budget of the Indian Railways. Since 1958-59 R&D expenditure has gone

TABLE - XV

R&D Expenditure on Railways at a Glance

	1958-59	1965-66	1968-69	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
G.N.P. at* Current Prices (Crores)	12,600.00	21,866.88	30,417.00	33,669.00	36,558.00	38,814.00	42,077.00	51,902.00	63,375
R&D Expenditure (crores)	22.93	68.39	107.56	116.62	139.64	137.64	185.76	203.89	-
Expenditure as of G.N.P.	0.18	0.31	0.35	0.35	0.38	0.39	0.44	0.39	-
R&D Expenditure on Rly.(crores)	0.40	1.25	2.09	2.65	2.78	3.20	3.53	3.54	-
Rly.working expenses(Crores)	334.58	598.92	756.26	805.04	862.22	927.89	998.34	1,082.78	-
Rly.R&D Expenditure as % of Rly working expenses	0.12	0.21	0.28	0.33	0.32	0.34	0.35	0.31	-
Expenditure on R&D Min. & Deptt.	3.20	11.07	14.43	22.31	24.10	25.54	29.96	39.00	-
Railway R&D Expenditure i.e. % of R&D expenditure	1.74	1.83	1.94	2.27	2.00	2.11	1.90	1.74	-

Economic Survey 1975-76
1) 1971-72 to 1973-74 Provisional
2) 1974-75 Quick Estimate

up from 0.40 crores to 3.54 crores in 1973-74. Table No. XV shows the trend of expenses of R&D on the Indian Railways. R&D expenditure on railways as the percentage of railways working expenditure rose to 2½ times in 1973-74 of what it was in 1958-59. On the average, the Indian Railways have been investing 1.90% of the total R&D expenditure for the last 15 years.

2.6.2 PROGRESS MADE BY THE RAILWAYS ON ACCOUNT OF R&D ACTIVITIES

Since beginning of R&D activities on the Indian Railways, import of materials and equipments has reduced to a larger extent. R&D programmes have given stress towards indigenisation and has helped the Indian Railways to bring down the purchase of imported items from 23% in 1950-51 to 12% in 1974-75, though during these years amount of purchase has gone up. Table XVI shows the amount spent by the Indian Railways for the purchase of various items, imported as well as indigeneous[26].

TABLE - XVI

Imported & Indigenous Content of Railway Purchase

Year	Total Purchases	Indigenous		Imported	
	Rupees in Crores	Rupees in Crores	Percent	Rupees in Crores	Percent
1950-61	82	63	77	19	23
1955-56	126	94	74	32	26
1960-61	178	158	89	20	11
1965-66	330	280	85	50	15
1969-70	332	314	91	33	9
1972-73	364	331	88	60	12
1973-74	507	447	88	60	12
1974-75	591	520	88	71	12

Popularity of RDSO expertise has won market of export for railway equipments, as a result of which the Indian Railways were also to export equipments of worth Rs.18.22.80 lakhs upto the end of year 1975. The Table XVII shows the growing demands of the Indian Railways' rolling stock abroad.

As a result of sustained efforts of the RDSO, the Indian Railways were able to report 37 inventions to The National Research & Development Council upto 1972-73. Out of these 37 inventions, 12 were

TABLE - XVII

Rolling Stock Exported by Railways*

Year	Rupees in lakhs
1967-69	16.58
1969-70	36.67
1971-72	380.00
1973-74	15.04
1974-75	27.70
1975-76	53.07
	Under Execution - 982.00
	Total upto December 31, 1975 - 1882.80 lakhs

*Source : Indian Railways Year Book 1974-75.

TABLE - XVIII

Process Referred to NRDC by various Organisations for Commercial Exploitation*

S. No.		No.of Inventions Reported			Less inventions dropped/withdrawn	No.of effective Inventions
		Upto 31.3.72	During 72-73	Total		
1.	CSIR	1018	107	1125	176	949
2.	ICAR	29	-	29	6	1
3.	ICMR	-	1	1	-	1
4.	DAE (BARC)	1	-	1	-	1
5.	Min.of Defence	103	19	122	27	95
6.	Min.of Railways	29	8	37	10	27
7.	Min.of Transport	1	-	1	1	-
8.	Min.of Information & Broadcasting, A.I.R.	5	1	6	5	1

*Source : Annual Report of NRDC of India 1972-73.

given licenses for industrial production and rest of them were either dropped or withdrawn by them. Those 37 inventions constitute the 2% of the total inventions reported by the various research establishments to NRDC upto March 1973. Table XVIII shows the processes referred to National Research and Development Council for development and Commercial exploitation upto the year 1972-73.

Research and Development programmes on railways have helped it to attain self-sufficiency in locomotives, signalling equipments, civil engineering and other fields of railway technology. In the sphere of locomotive development and designs, the RDSO have given due emphasis to speed, load and operation criteria of various modes of traction motive power. The RDSO has developed many new designs of Diesel Locomotives viz., WDS_4, EDS_6, WDS_7 and WDS_9 for shunting, WDM_6 for broad gauge branch line operation, ZDM_3, ZDM_4, ZDM_5 for narrow gauge operations. In the field of electric engine technology, investigation and study of three types of AC electric locomotives and Electrical Multiple Units (EMU) have been undertaken by the RDSO, they have developed the designs for said locomotives viz., WCG_2, WAM_4, $WCAM_1$. The RDSO is now giving more stress for the further development of electric

and diesel locomotives. They are looking for the design of locomotives, diesel as well as electric, with greater horse power and tractive efforts to cater to the needs of future[27].

The RDSO functions as an organisation for standardisation and evolution of all designs and developments for 25 KV AC and 1500 V DC traction system, including development of indigeneous substitute and provides consultancy and engineering back-up to Indian Railways 25 KV AC electrification programmes. At present it has undertaken replacement work of copper wire conductors with that of aluminium which is not only much cheaper than copper but also less prone to theft.

In the field of metallurgical and chemical engineering, RDSO's main research activities is to test and evolve materials for their utilisation on railways. Some of the important materials evolved by RDSO are spheroidal graphite cast iron bearing shells for carriages and wagons to replace bronze shells, anti-corrosive compounds to prevent corrosion of railway structure, ultrasonic devices for testing axles and rails, advanced welding technique for all metal coaches and rails. Besides these RDSO undertakes the detailed metallurgical investigations into the cause of failure of various engineering materials and selection of appropriate materials.

In the field of civil engineering, RDSO has evolved a new code of loading standards for the design of bridges, the past code of practice of 1926 for bridges was found inadequate by the RDSO, keeping in view rapid increase in traffic and heavy loads pre-stressed concrete bridge upto the span of 45 meters has been designed by the RDSO. Tracks to cope with high speed trains have been developed and are under further investigation at this organisation, a special 52 kg. rail has been designed to meet such demand of the Indian Railways.

For efficient and safe operation the RDSO has developed vehicle check devices, drivers vigilance control devices, automatic warning and train stop-system, twilight switches, continuous cabin signals, axle counters for providing expeditious and safe movement of trains between two stations on single line and tokenless block system.

The RDSO has very recently developed a 39.0 meters long overall dimension for a consignment weighing upto 245 tonnes for Heavy Water Project of Atomic Energy Commission, coming up at Talchar in Orissa.

The RDSO is also collaborating with the foreign research centres. India being a member of ESCAP, it undertakes to study subjects decided by

its Railway Research Coordinating Committee.

2.7 TRAINING OF PERSONNELS

To train manpower in highly specialised field of railway technology, the Indian Railways at present have 125 training schools under the control of various zonal railway administrations. These training schools impart training to the non-gazetted staff in various aspects of railway operations. Field training is imparted in the workshops and lines. Besides these training courses, refreshers courses for the working staff are also given from time to time. During 1974-75, 13,685; 32,292 and 12,106 persons were given initial, refresher and promotional training on various zonal railways respectively[28].

For training officers in various fields of railway operation, at present there are four training institutions under the control of Ministry of Railways. These institutes impart training to officers selected by UPSC through competitive examinations like Indian Administrative Services etc. Combined Engineering Services Examinations and Special Class Railway Apprentices Examinations.

Indian Railways Institute of Advanced Track Technology mainly trains the officers from Civil

Engineering Services in the field of track design and development and other associated branches of track technology.

Indian Railways School of Mechanical and Electrical Engineering trains the officers in the field of design of traction installation, designs of locomotives, coaches etc.

Railway Staff College, Baroda prepares the officers for management and operations of the Railways.

Institute of Signal Engineering & Telecommunication at Secunderabad imparts training in the field of signal and telecommunication engineering; officers are trained in the design of signal and communication equipments, micro-wave transmission and modern techniques of traffic control[29].

2.8 SCIENCE AND TECHNOLOGY PLAN IN RAILWAYS

The S&T Plan is a derivative of Fifth Five Year Plan and is related to the achievements of its targets. The planning group has identified a number of specific R&D tasks to be taken up to achieve the railway development plan targets which would reach fruition in the subsequent plans. The tasks identified by the planning groups are given in the Table-XIX.

TABLE - XIX

The Projects Identified by the Planning Groups of N C S T

Title of the Project	Financial Outlay Rs. in lakhs
1. Traction System	467.00
2. Coaching Stock	141.50
3. Freight Stock	64.00
4. Suspension Development	296.00
5. Brake Engg.	75.50
6. Stress analysis & Testing Materials	177.50
7. Track & Bridges	912.00
8. Signalling Safety & Cibernatics	184.00
9. Multi-Disciplinary Research facilities	1222.00
10. Transportation	77.70
11. Rapid Transic System	813.50
12. Environmental Pollution	17.00
13. Management Development	30.00
14. Information Dissemination	275.00
15. Material Science Directorate/ Division	92.35
16. Miscellaneous	1167.00
Grand Total :	6000.00

During the Fifth Plan period, it is estimated to incur an investment of Rs. 60 crores. The Railway Revenue Budget would contribute towards this R&D budget expenditure which would amount to ½% of the total revenue budget.

In Science & Technology Plan much stress has been given towards indigenisation and lowering of transportation cost, improvement of system operation etc. To cope with such problems the planning groups have recommended certain arrangements on the institutional basis such as setting up of Institutes of Production, Design, Development, Repairing and Maintenance Engineering, linkages with I.I.Ts., Universities and installation of test tracks[30]. Though at present there are number of institutes and organisations with the Indian Railways, but they appear to be inadequately staffed and their functions are not comprehensive enough to cope with the fast expanding railways of the country which requires immediate attention of the Railway Administration.

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CHAPTER - III

INLAND WATER TRANSPORT IN INDIA

3.1 GENERAL

Transport is a common denominator and a necessary ingredient of nearly every kind of social activities, not only this it is an essential pre-requisite to the economic development, because transportation services have been found to be decisive factor in the distribution of country's production. Therefore, it needs a careful planning of transport network within an integrated and co-ordinated transport system keeping in view the present and future needs of the country.

Out of the various modes of the transports available in the country, this chapter deals with the problems of waterways and 'Inland Water Transportation' (IWT). Inland water transport being the cheapest mode of transportation, it is getting more and more attention from the government but inspite of all the efforts of the government no appreciable headway has been made with regard to the development of this mode. The problem regarding development of IWT has been examined by the various committees from time to time viz., The Estimates Committee of Parliament (1956-57), The Gokhale

Committee on IWT (1959), The Committee on Transport Policy and Co-ordination (1966). The Estimates Committee of Parliament (1968-69), The Inland Water Transport Committee (1970) and The Estimates Committee of Parliament (1974-75). Almost all the committees have recommended the Government to develop this mode of transport because it affords the cheapest media to transport the goods in bulk as compared to any other mode. The relative cost per tonne-km. of rail, road and water transport relating to Eastern India, where they exist together is illustrated in the table below[1].

TABLE - XX

Mode of transport	Region	Cost per tonne in paise
Rail	Eastern Railway (B.G.)	4.40
	North Eastern Railway (M.G.)	5.74
	North East Frontier Railway (M.G.)	11.70
Road		10.00
IWT	For long leads of 600 km and above	2.50
	For short leads upto 200 km.	5.00
	Allahabad - Haldia	2.44
	Patna - Calcutta	2.60
	For movement of Iron Ore in Goa Waters	4.00

Waterways are the gift of nature and can be used for navigation with a minimum investment, whereas railway lines and roads have to be laid at considerable cost. The following table indicates the investment required for provision of 1 Km. of road, railway track and waterway[2].

TABLE - XXI

Investment Provision for 1 Km. of Road, Railway Track and Waterways

Mode of Transport	Initial Investment (Rs.in lakhs)	Maintenance Cost (Rs. per year)
Water	1.25 to 2.00	1,000
Road (NH single lane)	1.5 to 4.50	4,500
Rail (Plain Section, B.G.)	8.0 to 10.00	9,600

It is also a recognised fact that it requires less power to move an equivalent tonnage on waterways and a barge has the lowest relative dead weight and a minimum of friction loss. One horse power is known to move 150 Kgs on road, 500 Kgs on rail and 4,000 Kgs on water. That is why the cost per-conne-km is lowest in the case of IWT[3]. Inspite of all these points in favour of IWT, it is still a neglected mode of transport, even after 29 years of independence. It can not be denied that it does not possess demerits, some of the points which go against this mode of

of transport are : (i) it is highly capital-intensive. Compared to the road transport or the railways investment made in IWT is much large, (ii) it can be developed only the regions, where the natural source of water exist, (iii) it requires feeder services like roadways or railways to carry goods into interior, causing considerable wastage of time and hence least flexible, (iv) it is sensitive to weather conditions, (v) speed, being slow it does not attract traffic, etc. But still it has some advantages as mentioned earlier which can be taken from this mode of transport[4].

3.2 DEVELOPMENT OF I.W.T.

India had 14,344 kilometers of navigable inland waterways in the year 1972-73 (Table-XXII), out of which only one-fifth is navigable by steamers and other mechanically propelled vessels[5].

TABLE - XXII

Navigable Length of Waterways (1972-73)

States/Union Territories	Rivers (Km.)	Canals (Km.)	Total (Km.)
Andhra Pradesh	309	1,690	1,999
Assam	1,983	-	1,983
Bihar	937	325	1,262
Gujarat	286	-	286
Karnataka	284	160	484
Kerala	840	708	1,548
Maharashtra	501	-	501
Orissa	761	224	985
Tamil Nadu	-	216	216
Uttar Pradesh	2,268	173	2,441
West Bengal	1,555	782	2,337
Goa	317	25	342
	10,041	4,303	14,344

Source: Central Inland Water Transport Directorate.

The first mechanically propelled vessel appeared in 1823 and afterwards number of services on Ganga and Jamuna were established. But they soon disappeared, the reasons for which are not known clearly. Committee on Transport Policy and Coordination notes that it was due to the v development of a number of other transport facilities like railways, roadways and diversion of water from the rivers for irrigation and deforestation on the hilly ranges leading to erosion and accumulation of silt in the rivers[6]. Whatever may be the reasons ascribed to it, the Government did not pay attention for its development neither in the pre-Independence time nor in the post-Independence period. Whatsoever, we see today is only due to the efforts of private companies and some individuals. Some recommendations made by the U.N. experts after 1950's have been implemented by the Government, but still in this direction whole-hearted attempts have not been made[7].

Before 1917, various enactments were in force for regulating the traffic on the rivers. In 1917,

Inland Steam vessels Act was passed. Another Act known as Government of India Act was passed in 1935. Under the provision of this Act inland waterways and traffic thereon was the responsibility of the Provincial Governments, but Shipping and navigation on inland waterways as regards mechanically propelled vessels and the rule of road on such waterways; carriage of passengers and goods was a subject for concurrent legislation[8]. In this Act, the term National Waterways was not visualised. But the term 'National Waterways' appears in entry 24 of List I of the Seventh Schedule of the Constitution of India, although this term as such, not been defined anywhere.

Water is thus the exclusive responsibility of the state governments. And the Central Government is vested with powers to declare any waterway as a National Waterway by an enactment in the Parliament for the control of Shipping and navigation by mechanically propelled vessels. The states have exclusive legislative powers to impose taxes on

goods and passengers carried on an inland waterways the executive authority for all inland waterways also rests with them.

So far the Central Government has not declared any waterway as the National Waterway. Though, several states have requested the various committees on I.W.T. to recommend the Central Government to declare the waterways of their states as the National Waterway. Gokhale Committee in 1959 evolved the criteria for declaring a waterway as a National Waterway but did not make any recommendation for declaration of any particular waterway as a National Waterway.

Soon after Independence, a Master Plan for Inland Navigation was chalked out by the Ministry of Irrigation and Power, Government of India. This Plan included several schemes suggested by Sir Aurther Cotton in 1874. This Plan had five major schemes as mentioned below[9].

Scheme-I.

This scheme envisaged the linking of river Ganga and its tributaries with the west flowing

streams of Narmada and Tapti, this would connect the two major parts of India viz., Calcutta and Bombay.

Scheme-II.

It has only one interlinked proposal to connect river Narmada with Godavari via various tributaries. River Polda, a tributory of river Ganga will be linked with Banjhar a feeder of Narmada. River Godavari is navigable upto Chandrapatla at its confluence with Indravati. From Chandrapatle, Godavari would be trained upto its confluence with river Pranhita.

Scheme-III.

This scheme envisages the linking of river Wardha, a tributary of Godavari with river Tapti.

Scheme-IV

It connects river Ganga with Mahadi via Son, Rihand, Genj and Masda (Mahanadi System).

Scheme-V.

Under this scheme, it is proposed to have interlinked navigable canals on both east and west coasts of India. Starting from Calcutta via Orissa Coastal Canal,it will pass through Cuttack which will

be linked with lake Chilka by a 45 miles long canal. From lake Chilka, a 250 miles long canal will join the Godavari Delta Canals.

This mater Plan seems to be quite ambititious, but it is unreasonable, to that extent that it fails to include the scheme of making Ganga and Yamuna canals in Uttar Pradesh. These canals pass through the developing area and can give stimulus to the economy of the areas if they are developed with navigational facilities[10].

Master Plan is in no way a blue-print of certain concrete proposals. It has simply mentioned the possibilities of developing waterways that could be developed in future if the essential requirements are fulfilled. To make this plan a success it is necessary that hydrographic surveys of existing water sources are undertaken and their potentialities be estimated. The Master Plan doesn't mention the potentialities of the various scheme; and without which it is indeed, difficult to put forward any specific proposal. If this Plan is implemented properly, then country can have a network of waterways which would connect the sugar belt of India with the ports of Bombay and Calcutta; The cotton belt with the textile industries of Bombay, Ahmedabad, Kanpur and Calcutta. There would be a possibility of steamer service from Hardwar to Madras, and Bombay in the West to Dibrugarh in the East[11].

The river valley development projects launched in India after Independence have little relevance for inland water transport. The success of Master Plan depends upon the extent to which the requirements of I.W.T. are included in the design of dams and canals. Master Plan cannot be seen in isolation. It has to be fitted in the overall plan of water resources and transport development. In our country multi-purpose river valley projects have been conceived individually and navigational elements have rarely found place in them. As a consequence, the canals have been laid for irrigational purposes only. To design them for navigational purposes it would amount to investment higher than made earlier. In the context of the scarce-resources, how far would it be justified, has to be considered seriously. It would, therefore, be desirable to prepare a perspective plan for water resources development for the whole country keeping in view the future irrigational, power and navigational needs.

Of the several multi-purpose river-valley projects in hand or completed, the Hirakund Project in Orissa, Tungabhadra of Mysore and Damodar Valley of West Bengal have provisions for river training and navigation.

The concept of National Water Grid with a Ganga-Cauvery link canal as its mainstay has a great significance for I.W.T. in India. If this multi-purpose project is launched, it will be the largest water project attempted in the world. This will be a boon for water scarce regions of the country. During rainy season excess water from the basin of Ganga can be transferred to meet partially the demand of water on drought prone areas of Gujrat, Andhra Pradesh, Karnataka and Tamil Nadu. Therefore, it can be considered as a part of the drought relief programme and at the same time it can solve the problem of unemployment in the rural areas of the places on the bank of link canal. The canal will help to divert superfluous water from upper reaches of Ganga making direct navigational link between the western and the peninsular states of the country[13].

This plan has serious objections, such as high cost of the project, huge quantity of power needed to pump water of Ganga upto a height of 150 feet near Patna to the extent of 40 to 50% of the total generating capacity of the country long gestation period etc[14]. Keeping in view the present rate of economic growth, the country's requirement of power would not be the same on the one hand and the water problem is becoming more and more intricate, which

demands an alternative resource to keep pace with the developmental requirements. Under such circumstances the objective of the plan does not carry much weight. What is needed is a new plan, long range perspectives with due consideration for economic and technical viability.

In other regions, problems of development of I.W.T. should be considered separately, considering the nature of traffic available and nature of waterways. As stated earlier, waterways afford cheap transportation of goods, also the track cost is low. Therefore, in such circumstances this gift of nature should be fully exploited. Advantage should be taken of recent technological advances to achieve possible economics offered by this natural mode of transport. This requires a co-ordinated efforts of State and Central Government.

3.3 DEVELOPMENT OF INLAND WATERWAYS

So far the Governments in State and Centre do not have a clear policy regarding the development problems of the I.W.T., States have been dependending on the Centre for assistance. Hence each of them have the desire to get the waterways in their states declared as 'National Waterways' so that they may do away with the responsibilities of maintenance and development etc., while the Central Government insists

that each state should develop their waterways in their interest and that of the nations, and therefore Centre has refrained from taking the responsibility of any of the waterway in the country. Due to this divergent attitude of the Centre and State towards the Inland Water Transport problem and no clear cut policy, there has not been any noteworthy progress.

An official committee was appointed by the Ministry of Transport & Shipping in 1973 to consider the declaration of the water ways of different regions as National Waterways. After reviewing the matter, giving due consideration to the criteria of Bhagwati Committee and Gokhale Committee for the declaration of National Waterways, it recommended that the Ganges System should be declared as National Waterways as it has good potentialities of development of traffic after the completion of Farakka Barage and the link canal in the lower reaches of river Hooghly. However, development policies can be chalked out on the basis of the nature of waterways and traffic on them, which requires coordinated efforts of the State Governments and the Central Government.

3.4 WATERWAYS OF INDIA

3.4.1 Ganga River System :

The Ganga River system has about 2000 miles of navigable channel, which excludes the river Hooghly. The Ganges and its tributaries lie mostly in Uttar Pradesh, Bihar and West Bengal. The Ganges originates from Gangotri and in its youthful stage near Hardwar its water is diverted into upper and lower Ganga canals. Primarily, these canals were meant for irrigation-cum-navigational facilities but later on use for navigation purpose was abondoned. The main stream of Ganga has wide potentialities for inland water transport to develop specially after Allahabad and onwards. But the State Governments neither take any interest nor submit any scheme of development of I.W.T. to the Central Government. However, U.P. Government once asked for financial assistance of Rs. 5 lakhs for creation of a technical cell to undertake investigations and studies for the formulation of schemes[15]. At the suggestion of Bhagwati Committee a hydrographic survey was carried out between Allahabad and Varanasi by the Ministry of Irrigation & Power to assess the depth of channels with a view to consider the potentialities of running river ferry service.

Ganga has an opportunity of providing rail-cum-river service at Ghazipur, because at present goods

sent by rail to stations in Ghazipur district have to be transhipped from broad gauge to meter gauge at Manduadih - Varanasi. Ghazipur is on the meter gauge on the north bank of Ganga whereas broad gauge exists at the south bank of Ganga in Eastern Railway zone. Such a link if adopted will not only ease the situation in Ghazipur district but will also ease the difficulties of transhipment in Ballia, Gorakhpur, Azamgarh etc., lying on the meter gauge[16].

After Ghazipur and Ballia, the Ganga enters Bihar, besides Ganga, other rivers like Ghaghara, Gandak, Son, Pun-Pun etc., also exist. Bihar has about 1,808 kms of total length of waterways out of which 1,295 kms are navigable throughout the year.

Bihar is one of the states where the inland water transport can be relied upon, when other modes of transport get paralysed. The state government has taken some steps to develop the mode of transport because of its indispensibility. Bihar is divided into parts by Ganga with the population of 46% and 54% on either side and there exists only one bridge at Mokamah, 315 kms. from the Malviya Bridge at Varanasi. This got more attention after 1958, when the services of Joint steamer companies were terminated. Afterwards more technical feasibility of operation of shallow draft push tow services on Ganga was tried besides several other experimental services to assess

the various potentialities of waterways and I.W.T. This was carried out by Ganga Brahamputra Water Transport Board with the encouraging results. But in the absence of publicity to secure traffic, it fizzled out[17].

The State Government of Bihar have submitted two specific schemes for running ferry services on the Ganga in the following stretches of the river :

i. Between Patna (South Bank) and Buxar (South Bank) - a distance of 185 km. via Dighwara, Chapra and Ballia (all on the North Bank);

ii. Between Bhagalpur (South Bank) and Karagola (North Bank) - a distance of 70 km., via Colgong (South Bank).

The proposal envisages the use of existing establishment and the fleet of CIWT Directorate at Patna. The State Governments feels that prospects of running such services are bright although there might be some losses in the initial stages of operations[18].

Lack of rail-cum-road bridges on the rivers in Bihar make the transportation cost more expensive and time consuming. For example, goods despatched from Arrah to Muzaffarpur have to move via Barauni involving a haulage of about 350 kms., distance. If point

to point road-cum-river transport is provided, it would mean a coverage of 130 kms by road and 10 kms by river, thereby reducing the overall distance by 50%[19]. Similarly, there is no direct and easy mean of communication, except the river services between Shahabad on the Western part of Patna district on the South of the Ganga and Saran. Ballia and Ghazipur districts in the north. Traffic moving from Buxar to Darauli on the Ghaghra river goes via Mokamah or via Varanasi by rail and takes several days. By steamer, the journey from Buxar to Darauli should take only a day and a half and would be competitive in cost. The table below shows the distance between the various stations in the state, from the table it is apparent, if IWT be developed properly it will involve a saving of both time and money[20].

TABLE - XXIII

Distance Between Various Stations By Road, Rail & Waterways

From	To	Distance in Km.		
		By rail	By road	By water
Patna	Ballia	379	407 (via Varanasi)	130
Patna	Chapra	314	268 (Via Mokamah)	80
Patna	Dighwara	283	248 (Via Mokamah)	40
Buxar	Chapra	327	405 (Via Mokamah)	105

contd...

TABLE - XXIII Contd...

From	To	Distance in Km		
		By rail	By road	By water
Buxar	Dighwara	358	385 (Via Mokamah)	145
Buxar	Ballia	262	251 (Via Varanasi)	55
Buxar	Ghazipur	193	182 (Via Varanasi)	65
Bhagalpur	Karagola	132	265 (Via Mokamah)	70

But the State Government has not given its attention to develop the I.W.T. on such routes. Transport Research wing of the Ministry of Transport and Shipping in one of its analyses of traffic survey anticipated the following traffic on some or the stations proposed to be served by river service, based on freight charge of 10 paise per tonne-km[21].

TABLE - XXIV

Anticipated Traffic Between Various Stations in Bihar State

From	To	Distance by river in Km	Quantity in tonnes
Patna(South Bank)	Dighwara(North Bank)	40	4,505
Patna(South Bank)	Chapra(North Bank)	80	7,022
Chapra(North Bank)	Patna(South Bank)	80	7,654
Patna(South Bank)	Ballia(North Bank	130	25,949
Buxar(South Bank)	Dighwara(North Bank)	145	8,624
Buxar(South Bank)	Chapra(North Bank)	105	8,624
Bhagalpur(South Bank)	Kargola(North Bank)	70	59,100
Kargola(South Bank)	Bhagalpur(North Bank)	70	47,300

It is not sure, whether this much amount of traffic will actually exist or not. To attract more traffic it is essential that link roads and railway lines be constructed to connect the river banks and ghats. Besides this, it will require the facilities of godowns, wharves, rest houses etc. Therefore, there is a need to develop such facilities, also. The Ministry of Transport and Shipping also runs ferry services at two places in Bihar and a steamer service between Patna and Ghazipur but this service is not profitable because adequate traffic is not there due to the unpopularity of I.W.T. and lack of other facilities, which the railways provide.

Next, the river Ganga enters the State of West Bengal, the most important among the waterways of this state, the Ganga plays its major role. The state has 3,170 km., of waterways and about 1,098 kms is navigable by vessels having a draft of 4 feet.

West Bengal faces the main transport difficulties in its Northern parts, the Sunderbans and Calcutta Metropolitan district. In Calcutta problem is of mass transportation of commuters, ferry services in well organised manner at selected points across the river can help to reduce the burden on the roads and suburban rail transport. Sunderbans deltaic region has no other mode of transport except the water transport, therefore, river transport from Calcutta and other points can be easily introduced on the commercial basis for this region with the completion of Farakka Barage much of the transport problems of North Bengal can be solved. Farakka can become an important rail and road-cum-river transhipment point on the completion of barrage across it. Traffic from Assam to Calcutta will find it easier to move. At present all tea meant for export has to come by roads, or rails, but the completion of Farakka Barrage will reduce burden on rail and road transport, direct loading into deep sea vessels will be possible at Farakka thus reducing the problems of multiple handling and

warehousing which are faced by the industries in Caocutta during peak season between December and September[22]. It requires only facilities of godowns and material handling equipments at Farrakka. Apart from tea, the Cargo in the downward direction may consist of foodgrains, jute, potato, onions, tobacco, sugar and building materials.

All depends on the completion of Farakka Barrage, its completion will start a new era in inland water transport system of the state.

3.4.2 Waterways of Southern Region :

In the Southern region of India there are 3.158 kms on navigable waterways. Among the three states in this region Andhra Pradesh has got the maximum navigable waterways length, it has one-sixth of total navigable waterways. Andhra Pradesh has three main rivers viz., the Godavari, the Krishna, and the Sabari. Besides this one important canal viz., Buckingham canal has 258 kms of navigable length in this state, and has the maximum length of this navigable canal.

Inland water transport plays an important role in this state specially the districts situated on the East and West banks of the river Godavari, Krishna and Bhadrachalam division of Khammam district has a

scope for bulk movement of food-grains and ores, as they are connected to important commercial centres of Rajahmundry, Elore and Vijayawada by canal. The Canals in the Godavari-Krishna delta system serve to transport commodities like coconuts, firewood, foodgrains, iron ore and building materials. In this system nearly 2,31,743 country boats operated during 1967-68. Ninety five percent of the boats cater to the needs of goods traffic and rest of them meet the demands of the passenger traffic on the Buckingham canal. During the past years traffic has shown an increasing trend on the canal. During 1963-64, according to the statistics furnished by the State Government, the traffic in the Godavari delta was of the value of 30 crores, whereas in 1967-68, the value of cargo transported by canals was of the order of Rs. 71 crores. Thus, there was an increase in cargo by 137% within 5 years. Also, Buckingham Canal has shown a rising trend in carrying cargo, but it declined in 1966-67 to 53,472 tonnes only[23]. These figures were taken, while only production of region was considered. Diversion from roads and rails will make the traffic still more than that. It has been felt by the State Government as well as by the business community that the services of road transport and railways are over-burdened and inland water transport if developed properly will reduce the cost of transport as well as supplement other two modes of transport.

Rivers in Andhra Pradesh have little similarities with those of the north and the north-east Indian rivers. The sandy character of bed and large scale bank erosion are absent here. The rocky and stoney bed does not permit the shift of course that is often witnessed in Ganga-Brahmaputra system of rivers. Being rain-fed rivers discharge during non-monsoon period is quite meagre and it prevents navigation. But the good network of canals form an easy and principal carriers of cargo to ports of Masulipatnam and Kakinada. The Masulipatnam and Elore canals are the busiest among them. The traffic remains suspended for three months because these canals are mainly irrigational canals and increase in draft can help to increase the capacity of the canal.

Tamil Nadu does not have back waters or large lakes. It has canals of 216 km length navigability. Buckingham canal and Vedaranyam canal are the two canals in this state. Buckingham canal has three main sections :-

i. North of Madras,

ii. South of Madras, and

iii. The Cooum river which connects the two.

The canal north of the river Cooum in Madras City is known as North Buckingham Canal. It is 316 kms long of which 58 kms are in Tamil Nadu and rest in Andhra Pradesh. This canal maintains a minimum draft of 3 ft (0.9 m) and its bed level ranges from 3 ft. to 5 ft with a bed width of 20 ft. except at wharves where 60 ft width is provided for the berthing of boats.

In the South of Cooum river, this canal is known as South Buckingham canal. It is 102 km in length and of same bed width as North Buckingham canal has. But it maintains a smaller draft of 2 ft.

The Cooum river runs parallel to railway line and roads. Thereafter it passes through the city limits of Madras and then empties itself into the Bay of Bengal. It mainly serves the purpose of linking South-North Buckingham Canal. It dries up after monsoon leaving behind a sand bar. This sand bar is excavated every year.

Vedaranyam Canal is 57 kms. in length. It connects only the sea port of Nagapattinam and serves as a drainage for the Vennar Delta.

Traffic on Buckingham canals have declined because of the fact they don't pass through the

agricultural areas. Mostly, paddy and rice, salt, shell, firewood etc., move on this route. There is no sufficient traffic from Madras to upper reaches. Only after the Second World War it carried peak cargo of 4.86 lakh tons, since then traffic has declined as shown in the table[24].

TABLE - XXV

Traffic on Buckingham Canal

Year	Total Traffic Handled (Tonnes
1938-39	2,30,000
1943-44	4,80,000
1952-53	2,16,000
1953-54	1,21,003
1955-56	1,83,000
1956-67	2,71,000
1957-58	2,87,000
1965-66	2,00,000
1967-68	1,57,000

The Buckingham canal in Tamil Nadu was faced with numerous problems. Silting is one of the main problems and it increases the maintenance cost of the canal. This is due to the fact that all rivers which feed the canals bring considerable amount of

silt with them and transfer it to canals, due to this draft is reduced and dredging has to be done quite frequently within the limits of Madras city condition of canal becomes still worse, as it passes through the city it collects sewage, which polluts the environs of canal, specially when the outlet of river remains blocked for several months. Therefore, due to all such reasons the Buckingham canal is a losing concern and a drain on public exchequer[25]. Shortage of traffic at Madras ports in the upper reaches makes the operation costlier. Besides all these, facilities of godowns, transit sheds, etc., also do not exist. These things require special attention from the government to popularise inland water transport.

3.4.3 South Eastern Region :

In the South-Eastern region, Orissa is the only state which is poorly served by rail and road transport. Here, the inland water transport plays a proportionately better role than any other mode. Canals play the major role in inland water transport. Out of the total navigable length of waterways 224 kms are shared by canals.

Mahanadi, Brahmani, Baitarani and Dhamra are the main navigable channels of Orissa. Mahanadi is

the most important river and flows through important towns like Sambalpur, Sonepur, Baideshwar, Cuttack and Bonaigarh. It's navigable reach has been divided into three sections namely,

i. The rocky reach from Sambalpur to Dholpur - a distance of 152 kms.

ii. The sandy reach from Dholpur to Cuttack - a distance of about 160 kms.

iii. The delta reach from Cuttack to the sea - a distance of about 104 kms[26].

Of these three sections, the third section of 104 km is most important from the navigational point of view. Hirakud Dam, 13 km upstream of Sambalpur has a mean draft of 3 feet available round the year and from Cuttack to sea it is navigable by steamers.

The river Brahmani is the second biggest river in the state, it maintains a constant draft of 3 feet and is navigable upto a distance of 96 km by country crafts. The river Baitarni has a quite deep esturary which allows Coasters of 12 feet draft upto Chandbali, a distance of 40 km from its mouth, this is navigable throughout the year. Besides these rivers, there are other rivers also which are navigable throughout the year for shorter distances with country boats[27].

The Mahanadi flows through an area of forest with timber, bamboo and other forest products, where the all weather roads do not exist. In 1951 a team of five engineers from France was invited by the Government of India to study the navigational prospects of this river. They made some valuable suggestions, which were implemented by the government at a rather slow rate[28]. The Mahanadi has good prospects of navigational development and it mainly helps to transport agricultural products, building material and bamboo for paper pulp to Cuttack. Due to the improper navigational facilities on Mahanadi, the paper industry on the opposite bank of Cuttack has to suffer and has to pay more because of multiple transits from rails to roads and roads to waterways. It is anticipated that it will bring about a saving of Rs. 40 per tonne in case bamboo and timber is carried by river Mahanadi[29].

The development of Paradip Port (1963) caused an increase in the traffic on the Taldanda canal, the traffic was estimated at 63,159 tonnes in 1960-61 and 41,707 tonnes in 1961-62, this traffic survey was carried out by NCAER. The delta canal has been used for the transport of iron-ore from the Tomka-Daitari mines to Paradip-Port for export.

But most of the iron-ore traffic is carried to Pradip-Port by roads, nowadays Taldanda canal is being used mostly to meet the transport requirement of the local area and it is also a source of revenue loss, it earned a revenue of Rs.32,257,10 against an expenditure of Rs.55,283,00 on the maintenance of staff[30]. The State Government feels that if the canal is linked with the Pradip Port, bulk of the commodities entering and moving out of Cuttack market through Calcutta and Visakhapatnam Ports will get diverted to Paradip Port and water transport between Cuttack Paradip will flourish.

Orissa has a good network of waters. However, it is faced with the problems of silting poor organisation and shortage of trained personnel. Much depends upon the development of Paradip Port. If all channels leading the Pradip Port be maintained and widened properly then steamers can directly go the port and can unload directly into ocean going liners. This will reduce the detention time for liners and the capacity of railways and roadways will also be spared.

This requires the dredging of canals. Even, if sandy reaches of Mahanadi is improved the popularity of I.W.T. can increase. It is expected

that Mahanadi can handle a traffic of million tonnes by 1985. At present it handles the traffic to the tune of 1,25,000 tonnes, mainly consisting of bamboo, agricultural produce and building materials[31].

3.4.4 I.W.T. in other States :

Kerala - Next only to the North-Eastern region I.W.T. has the most important role to play in Kerala. The state is traversed by 44 rivers. Three of which flow through hills towards east and are not navigable. The rest of the rivers flow towards West into the Arabian Sea and are navigable. Kerala has 1548 km of navigable waterway consisting of coastal canal, rivers and other lakes and backwaters.

All the waterways in this state are looked after by state P.W.D. and no regular maintenance work is carried out except occasional dredging in small pockets that get silted up. Kerala has vast potentialities for the development of I.W.T. There is a scheme for a high level navigation canal interlinking all rivers at about M.S.L. - 15.24 M. This will provide for transfer of waters from one basin to the other and for securing navigation in the mid-reaches of rivers.

Although Kerala is suited for the development of I.W.T. but it has not developed because of the crafts and their speed. Kerala has more than 21,200 crafts of capacity over 1,35,000 tonnes. But the number of mechanised crafts and vessels is coming down. Boat building facilities are also not sufficient.

The traffic of bulk commodities covers a wide range of materials like bamboo, petrol, cashew, fertilisers, sugarcane, sulphur, paper and building materials. Besides, these state government is also operating passenger cargo services on several routes and it was reported that it earned a profit in 1967-68 and even prior to that also.

At present Kerala produces number of items of economic importance and produce of these industries require a good transport network in that case I.W.T. can play a prominent role if properly managed. The State Government submitted a scheme of development to Bhagwati Committee (1970), which were mostly endorsed by the Committee.

Goa - Goa has 342 km of navigable waterways. Here the canal and river system mainly carry the iron ore. These ores are transhipped from boats to ships and this accounts for substantial economy in the cost of handling of iron ore. Mormugao port is

negotiable by barges by Mandovi river, but it becomes rough during monsoon. As a result of which the barges carrying ores use cumbarjua canal during monsoon months. Ore traffic at Mormugao Port has increased in the post-Independence period and at present average export is of 9 million tonnes. This figure is expected to rise still further. With the coming of fertiliser industry, the burden on Mormugao port has increased, therefore it requires loading facilities with sophisticated mechanical equipments and further expansion of the harbour on the inner side.

The network of roads and railway lines in this state are inadequate and due to this, people rely on ferry services to go to their places of work, at present these ferry services run by River Navigation Department and is not enough to meet the demands of people. Besides this agency, there are private operators also, who run the ferry services in the state. The Bhagwati Committee (1970) has felt the need for the expansion of the ferry services and enlargement of the organisation of the Captain of Ports.

Gujarat - Gujarat has two main rivers Narmada and Tapti, besides these rivers there are other

smaller rivers like, Mahi, Purna, Ambika, Auranga and Par also. They combined together provide a navigable channel of 286 km length. Narmada is navigable upto 66 km by steamers and afterwards by sailing vessels upto 100 km. The river Tapti is navigable in its total reaches a distance of 25 Kms and Purna for about 15 Kms from its mouth.

In the past Narmada was navigable by vessels of 12 feet draft upto Bharauch. Several sand bars and silting between sea and Bharauch have made the navigation difficult in this reach now. These sand bars shift each year depending on the upland discharge, sailing vessels with 8 feet draft can negotiate the bars only in the spring high tides. There are also a few bars in Tapti between Surat and Sea, the main bar is about 3 km long and close to the mouth of river.

At the recommendation of the Gokhale Committee (1959) a hydrographic survey was carried out for Narmada from Bharauch to Hosangabad. It revealed that it would not be possible to develop navigational facilities in Narmada and Tapti because of the presence of rocky outcrops and steep slopes of rivers. Rivers depths also fluctuate from season to season causing a variation in pattern and extent of situation.

Traffic is usually very thin, number of sailing vessels that visited Bharauch during 1955-57, 1957-58 and 1958-59 were 875, 825 and 850 respectively. During 1967-69, 438 vessels entered this port and handled 13,170 tonnes of Cargo. Ports here provide facilities of warehousing, electricity and water supply. Main cause of drop of traffic is poor maintenance and emergence of shoals between the port and the mouth of river restrict navigation to a short period of 2 to 3 hours at high tides. Thus a vessel takes 4 to 5 days to negotiate the distance of 48 km from the mouth of river to Bharauch.

A new inland port at Magdal 10 km downstream of Surat and about 15 km from the sea has a 350 feet long RCC jetty, three mobile cranes and other facilities It is equipped to handle 60,000 tonnes of Cargo annually. If sand bars are dredgedout then it can go upto 200,000 tonnes with the development of Dahej Port at the mouth of Narmada, ferry service can develop between Ghogha and Dahej as this distance is 55 km by waterways and 433 km by railway.

Assam - Brahamputra is the main river in this state and it has been serving as the important mean of transportation. Assam has 1983 km of

navigable waterways, the rivers are the only source of water transport in this state. Joint Steamer Company was operating regular services in the past, but by 1967 all services of the company were terminated, the main blow came during 1965 Indo-Pakistan war when the ships on sail in Pakistan waters were seized by the Pakistan Government.

Later on the attempts by governments to popularise inland water transport among the users proved to be unsuccessful. The Central Inland Water Transport Corporation Limited, which was set up as a public undertaking in Central Sector to operate cargo services within Assam between Dibrugarh and Jogighopa, and to Calcutta by river-cum-rail route by transhipping goods at Jogighopa (where broad-gauge railway line was extended from Bongaigaon) But the corporation has failed to secure cargo inspite of two directives by the State Government, mainly due to the delay in transhipment at Jogighopa.

There are a number of important inland ports like Dibrugarh, Neamati, Tezpur, Gauhati, Pandu, Dhubri and Jogighopa. But none of them possess modern cargo handling facilities. Due to which, ships and vessels have to wait for longer time.

Temporary sheds and loading ramps do not serve the purpose. Therefore, it is necessary to develop these ports with modern amenities of berthing, handling of cargo, storage sheds etc.

Prior to 1950 earthquake, the rivers and their tributaries were deep enough to maintain the regular services. But the earthquake of 1950 brought a voilent change in the regime of channels and since then the situation is deteriorating day by day. It needs an extensive conservancy measure to restore the channel. Also, the vessels plying in Brahmaputra system are old and frequently meet accidents causing loss of life and property. The Sunderbans route is subjected to tidal influences and hence its navigability depends upon weather prevailing in the Bay of Bengal. During the storms, the route becomes unsafe and sometimes there are chances of vessels being thrown off and wrecked. This needs efforts like replacement of old vessels and telecommunication link on the route, as are available in countries like U.S.S.R., U.S.A., and France.

3.5 PRICING POLICY

None of the Committees have mentioned about the pricing policy of the government either in states or in Centre. Perhaps this was out of their

terms of references. Actually, governments do not have any control over the price structure of either freight traffic or passenger traffic on the I.W.T. The I.W.T. being run by the private operators, they charge according to their whims and this has given rise to unhealthy and bitter competition among the operators. Specially in case of country crafts the situation is more hopeless. Individual boatman sometime carries more than permitted passengers at cheap rates which leads to accidents. As such, Gokhale Committee recommended that such boatman with one boat at their disposal should not be allowed to operate but it has remained unheeded.

Also, auctioning of ghats about which Gokhale Committee was very much against is still in practice. This auctioning system gives rise to corruption and bitter competition. Therefore, steps must be taken to formulate a pricing policy for the passenger traffic as well as freight traffic. Auctioning system should be waived off and instead the state government should be made responsible for the maintenance and development of ghats etc. This needs considerable amendments in the 1935 Act on inland vessels.

Unlike airways, roadways and railways, in waterways no insurance against the passengers risk exists at present. This is also one of the reasons for the poor popularity of I.W.T. State Governments do appoint Courts of Enquiry* to find out the causes of accidents but there is no statutory provision to give compensation to the victims in the shape of cash. In the absence of such statutory provision, it is difficult to regulate the traffic of country boats and crafts. Under Inland Vessel Act 1917**, the State Governments have the powers to make such rules in respect of

i. Fixation of fares and freight rate on inland services;

ii. Protection of Passengers;

iii. Carriage of Passengers etc.

but the State Governments have not made use of their powers, except a few.

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* Section 32 of Inland Vessels Act, provides for the reporting of accidents by the Master of Vessel and the appointment of Courts of Enquiry by the State Governments to look into the case of accidents.

** The operation of mechanised vessels on inland waterways is governed by the provision of Inland Steam Vessels Act, 1917. Although it is a Central Act, it is being administered by the State Governments.

3.6 RESEARCH AND DEVELOPMENT IN I.W.T.

So far, the inland water transport has remained neglected and this has caused damage to the economy as well as to the I.W.T. itself. Government should think of reviving this languishing mode of transport which needs an intensive R&D effort. In the past several committees reviewed the current problems of inland water transport and they found that the government was unwilling to invest money for their improvements.

The Central Government established the Road and Inland Water Transport Advisory Committee to deal with I.W.T. only on the recommendation of the Estimates Committee of the Lok Sabha on inland water transport (1956-57). Later on, Gokhale Committee (1959) found it inadequate and suggested for the creation of an expert technical organisation at the centre under an expert technical officer to be designated as the Director General of I.W.T. Accordingly, the Central Government established Inland Water Transport Directorate in the Ministry of Transport & Shipping in March, 1965, to deal with the technical matters relating to the development of I.W.T. The Ganga-Brahmaputra Water Transport Board was merged in this Directorate in March, 1967. The Inland Water Transport Directorate is charged with the following functions :

(a) To study the transport requirements of the country with a view to co-ordinate I.W.T. with other modes for immediate requirements and long term planning.

(b) To prepare technical reports on design of waterways and connected structures.

(c) To formulate proposals for extension of navigability of inland waterways for immediate and short term implementation having regard to availability of water under irrigation and power generating in the multipurpose projects, including any special projects to be undertaken purely for navigation.

(d) To study the existing waterways in the country and to formulate the schemes for their improvements.

(e) To study modern development in all aspects such as improved design of craft navigational aids, terminal facilities and conservancy; necessary research would also be carried out.

(f) To draw up standards of for classification of waterways size of locks and clearance under bridges etc.

(g) To set up suitable training establishments for training of -

i. diesel mechanics;

ii. deck and engine room personnel; and

iii. conservancy and technical staff.

(h) To render technical advice to the Central and State Governments on I.W.T.

Even after the setting up of the Inland Water Transport Directorate at the Centre, Bhagwati Committee (1970) has noted that no progress has been made in the development of I.W.T. in the country. This committee observed, "In several cases implementation of the project included in the Third Five Year Plan has not been taken in hand and even where a beginning has been made, the execution has not been taken according to the schedule[32]. Bhagwati Committee has reiterated the recommendations of Gokhale Committee (1959) on the establishment of Inland Water Transport Directorate with slight changes in it. Bhagwati Committee has felt that this Directorate is not adequately manned with technical experts and the present Director General should be assisted by four directors to look after Traffic, Navigation, Engineering and Naval Architecture.

The Inland Water Transport Committee (1970) has pointed out the need for facilities to provide training for officers in all fields of I.W.T. It further states that though some institutions train personnel , they do so for their own purposes. Therefore, it is necessary that the subject of I.W.T., covering the Commercial and Operational aspects be included in the cource of study in the Institutes of Technology.

Bhagwati Committee (1970) has felt the need of research and development programme for this industry, specially they have mentioned about standardisation of country crafts to achieve economic production; reduction of foreign exchange component in the manufacture of vessels, reducing time of delivery, free availability of spare parts and training of personnel for operation and maintenance. It has further noted that besides standardisation, special features of the old conditions which are advantageous to local conditions, i.e., accessibility of propeller for carrying out underwater repairs without recourse to dry docking, easy clearance of cloating materials etc., should not loose sight of[33].

This will require a systematic study of country crafts and their requirements according to the local

conditions of course. The Joint Technical Group comprising of I.W.T. users operators of shipyards has gone into the question of standardisation problem but its results are still awaited.

Regarding maintenance of waterways, the Bhagwati Committee observes that the data base in respect of I.W.T. Schemes is not adequate and the methods adopted in rendering survey is not uniform. It has further observed that it is due to the shortage of qualified hydrographic surveyors to carry out the survey on scientific lines. At present such facilities are available under the Indian Navy and Commissioners for the port of Calcutta only. For the maintenance of waterways and to increase the navigability of waterways, temporary measures like bandalling, bottom panelling and dredging would not do. Permanent measures comprising construction of spurs, groynes, band revetment, capital dredging and regulation of flow by construction of dams in the higher reaches of rivers. This programme needs the study of hydraulic characteristics of rivers and other hydrological characteristics over a number of years, before training a river for navigational purposes. Sustained efforts of research are needed in this area. An allocation of Rs. 80 lakhs has been made

for R&D in the S&T plan for I.W.T. Out of Rs. 80 lakhs, 8 lakhs constitutes the foreign exchange component (Table-XXVI).

No separate data is available to indicate the extent of investment in research and development in I.W.T. under the joint expenditure on R&D in the Ministry of Transport & Shipping. However, NRDC statistics show that one invention has been reported by the Ministry of Transport & Shipping, which shows that in the recent past some attention has been given to I.W.T. and its potentialities are being understood by the governments in states and at centre.

TABLE - XXVI

The Financial Outlays Proposed in the S&T Plan for I.W.T.[34]

Items	Rupees in Lakhs
1. Engineering Studies	
(a) Study of the optimum cross sections of navigable channels with reference to types of crafts.	
(b) Vertical clearance of bridges covering navigable channels.	10.00
(c) Types of embantments/lining of banks for reaches of navigable waterways vulnerable.	
2. Hydrographic Surveys, River Training and Conservancy.	15.00

contd...

TABLE - XXVI contd...

Items	Rupees in Lakhs
3. Standardisation of Navigational Aids for I.W.T.	5.00
4. (a) Mechanisation of Country Boats - Feasibility & Utility	25.00
(b) The possibility of Indigineous production of in Board and out-Board Engines, Schottel Navigation and other equipments specially useful for I.W.T.	
5. (a) Standardisation of Ferry Crafts and Tugs.	8.00
(b) Development of Fast Transportation Passenger Crafts.	
6. Adaption of I.W.T. draft for meeting requirements of Container Traffic.	1.00
7. Terminal facilities needed	5.00
8. Rationalisation of the Manning Scale of Inland Craft, Deemp & Powered keeping in view the distinct requirements of various inland waterways ports.	1.00
	80.00

Source : S&T Plan (1974-75) Draft.

3.7 REFERENCES

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6. op. cit., 1. p. 4.
7. ibid. p. 7.
8. ibid. p. 14.
9. op. cit., 4. p. 149.
10. ibid. p. 150.
11. ibid. p. 148.
12. ibid. p. 151.
13. ibid. pp. 156-157.
14. ibid. p. 160.
15. op. cit., 1. p. 82.
16. ibid. p. 82.
17. ibid., p. 44.
18. op. cit., 1. p. 44.
19. op. cit., 1. p. 44.
20. op. cit., 1. p. 45.
21. op. cit., 1. p. 46.
22. op. cit., 1. p. 85.

23. op. cit., 1. p. 85.

24. op. cit., 4. p. 97.

25. op. cit., 4. p. 99.

26. op. cit., 1. p. 73.

27. ibid, p. 73.

28. op. cit., 4. p. 89.

29. op. cit., 1. pp. 74-75.

30. ibid. p. 75.

31. op. cit., 4. p. 92.

32. op. cit., 1. p. 6.

33. ibid. pp. 23-25.

34. India, Science & Technology Plan (1974-79) Draft. New Delhi. National Committee on Science & Technology, 1975. pp.

CHAPTER - IV

ROADS AND ROAD TRANSPORT

4.1 GENERAL

While the railways and the inland water transport provide a cheaper means to transport goods and passengers for a longer distance. The road transport affords the same service for a shorter distance. Specially, perishable and fragile goods are more suitable for transportation by roads than any other mode of transport. Increasing popularity of road transport is mainly due to the quality and efficiency of service, it provides to the customers. Since 1951-52, the share of traffic has undergone drastic changes. Share of passengers traffic and goods traffic in 1951-52 was 24.9% and 10.2% respectively. It increased to 48.9% and 34.7% in the year 1973-74[1]. With the spread of green revolution and industrial growth, the roads and road transport will assume greater importance than ever before, because of its certain inherent characteristics, which are advantageous over the other modes of transport. Committee on Transport Policy and Coordination in its preliminary report has indentified the following characteristics in favour of the road transport.

(1) Flexibility : It is, perhaps, an important factor in the favour of road transport. Motor vehicles can supply services over public highways between any two points in the country, if necessary from door to door, on difficult gradients or on poor roads. Road transport has been found suitable for certain special jobs, such as, pick up and delivery purposes, in handling small loads and in carrying loads and traffic between places not directly connected by rails, to replace trains on unremunerative lines and providing services to rail-off points.

(2) Personal Services : Another important characteristic of road transport, arising out primarily because of small size units is that a personal service is frequently developed. This is not usually developed by the railways, since as a large public undertaking they necessarily suffer from an impersonal approach to business.

(3) Speed and delivery : Speedy delivery of certain kinds of commodities, specially,

the fruits, vegetables, semi-processed materials etc., are the important considerations in favour of road transport[2].

In addition to these, other factors in favour of road transport are low investment, low maintenance cost and maximum utility. All these factors joined together make this mode of transport indispensable for carrying passengers and goods for short distances.

Keeping in view all the advantages of road transport, it is necessary to develop an efficient road and road transport system in the country at all levels viz., village, district, city and national. Besides this, there should be a readiness to pay for their construction and maintenance, to discover the ways, both direct and indirect, of shouldering the responsibilities. At the same time this sector calls for the scientific and technological research efforts, so that the cost of construction and maintenance of infra-structure needed may be optimized to suit the Indian condition.

4.2 REVIEW OF ROAD DEVELOPMENT

Immediately after the First World War an increase in number of motor vehicles was observed as

a result of the sale of surplus army vehicles to the civilians. This, alongwith the limitations of railroads, caused an increase in traffic, which the existing roads were incapable to meet. Consequently, the need for an efficient road network was felt. A resolution was passed by both Chambers of the Indian Legislature in 1927 for the appointment of a Committee to examine and report on the question of road development in India. A committee was appointed by the Government with M.R. Jayakar as the Chairman, which submitted its report in 1928, Some of the major recommendations are as under :

1. The road development in the country should be considered as a national interest as it has become beyond the capacities of the provincial governments and local bodies.

2. An extra tax should be levied on petrol from the road users to develop a road development fund to be called as Central Road Fund. This fund should be a non-lapsing fund.

3. A semi-official technical body should be formed to pool technical know-how from various countries and to act as an advisory body on various aspects of roads.

4. A research organisation should be instituted to carry out research and development work and to be available for consultation[3].

These recommendations were accepted immediately and some of the major items were implemented. Still today the recommendations of the Jayakar Committee provide guidelines for road development with some modifications and amendments.

4.2.1 CENTRAL ROAD FUND

In 1929, on the recommendations of the Indian Road Development Committee (Jayakar Committee), the Government of India instituted a non-lapsing Central Road Fund. The proposal of the Committee was to raise the duty on petrol by two annas per gallon and proceeds to be credited to the Fund and utilised for road development. This proposal was accepted by the Government in 1931 and duty was raised to 2½ annas per gallon of petrol. Of the proceeds, 80% is distributed to the State Governments on the basis of the actual petrol sale within their territories and 20% of the funds are retained by the Central Government for grants to be made for expenditure on experiments and research schemes, specified projects for construction of roads and bridges. There is another sub-division of Central

Road Fund, called the 'special reserve' to which contributions are made by the Central Government Organisations who require works to be done for them[4].

4.2.2 INDIAN ROAD CONGRESS

A semi-official technical body known as the Indian Road Congress (IRC) was established in 1934. It was recommended by the Jayakar Committee in 1928. At present this organisation is engaged in evolving standards, specifications and recommendations regarding designing and construction of roads, bridges etc.

4.2.3 CENTRAL ROAD RESEARCH INSTITUTE

The Central Road Research Institute is one of the laboratories of the Council of Scientific and Industrial Research. This was established in 1950 in New Delhi to deal with the engineering aspects of road design, it offers technical advice to state governments on various problems concerning roads.

4.2.4 NAGPUR PLAN (1943)

At the initiative of the Indian Road Congress a conference of PWD chief-engineers incharge of roads was convened at Nagpur in December 1943 to finalise a plan of road development. It was the

first ever attempt to prepare a coordinated road development programme in planned manner. The plan proceeded on the basis that in highly developed agricultural area no village should be more than 2 miles (3.2 km) from a road, nor more than 5 miles (8.00 km) from the main road, the average distance from a metalled road being generally less than 2 miles (3.2 km). In non-agricultural and less developed area, no village should be more than 5 miles (8.0 km) from a road, nor more than 20 miles (32.0 km) from the metalled road, the average distance being 6 or 7 miles (9.5 to 11.2 km) from roads in most of the cases.

Two plan formulae* assumed the star and Grid pattern of road network. Five types of roads were visualised. This was the first scientific attempt to plan the highways in India.

Nagpur plan was a 20-year plan intended to provide 1,98,00 km of surfaced roads and 3,33,600 km of unsurfaced roads. The first category of roads were meant to provide main grids bringing the farthest point in developed and agricultural area within 8.00 km of metalled roads. The second category of roads

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*See Appendix 'A' at the end.

were meant to provide internal road system linking small villages with first category of roads.

4.2.5 20-YEAR ROAD DEVELOPMENT PLAN (1961-81)

20-year Plan was chalked out to decide the further road development programmes in the country. The Chief Engineers of PWD's met in 1959 at Hyderabad. The Plan proceeded on the basis that in developed agricultural area no village should remain 1½ miles (2.4 km) from any type of road and 4 miles (6.4 km) from metalled road. In working out specific proposals factors such as area, population, regional level of development and development needs were taken into consideration. This plan intended to provide 32 km of road length per 100 sq. km. of area, while, Nagpur Plan aimed at 16 km per 100 sq. km. of area, 20-year Plan included the provision of establishing missing road links, bridges, strengthening of roads, besides the extensive development programme. The cost of completing the programme was estimated at Rs.5200 crores, which, included an expenditure of Rs.630 crores for village roads.

To find the length of various road categories, five formulae* were evolved instead of two, as was

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*See Appendix 'A' at the end.

in the Nagpur Plan. In addition to these five categories of roads, provision for 1600 km of expressway was also made in this Plan.

4.3 PROGRESS IN ROAD DEVELOPMENT SINCE 1951

By 1951, the country had 156,107 km of surfaced roads and about 241,600 km of unsurfaced roads. Progress since 1951 is shown below in following table[5].

TABLE - XXVII

Progress in Road Development

Year	Types of Roads		Total
	Surfaced	Unsurfaced	
1950-51	156,107	241,512	397,619
1955-56	181,960	313,496	495,450
1960-61	234,419	470,581	705,000
1965-66	283,680	674,240	957,920
1972-73	474,007	679,881	1153,888

It is apparent that between 1951 and 1972 the length of surfaced road increased by about 300% and of unsurfaced roads by 280%. Also, the expenditure on road development programme has increased steadily. During the annual plans, from 1951-52, the expenditure on roads rose from about Rs.18 crores to

Rs.72 crores. During the Fifth Plan period expenditure on road development will go upto Rs.714 crores, which aims at extensive development of roads in border as well as hilly areas.

4.4 ROAD DEVELOPMENT POLICY IN INDIA

India is a vast country with a second largest population in the world having an area of 3.27 million square kilometers with more than 580 thousand villages and towns scattered all over. It measures 3.129 kilometers from north to south and about 2,977 kilometers from east to west, its coast-lines measure 6,689 km and frontier measures 15,168 km, against such a vastness. India possesses 11,53,888 km of total road length comprising of 4,74,007 km of surfaced roads and rest of unsurfaced roads. The table below shows the lengths of various surfaced roads in the states of India, Karnataka has got the maximum kilometerage of roads lengths followed by Andhra Pradesh[6].

TABLE - XXVIII

Surfaced Lengths of Different Highways(in Kms)

States/ U.Ts	N.H.	S.H.	District & Block Roads	Total
All India				
1971-72(Rev)	26,480	87,165	2,63,037	3,76,882
1972-73	27,584	88,755	2,78,703	3,95,042
State-wise				
A.P.	2,372	5,098	34,424	41,894
Assam	1,212(A)	746	1,879(C)	3,837
Bihar	1,832	11,686	6,586	20,104
Gujrat	1,352	7,798	10,822	19,972
Haryana	682	2,795	9,202	12,679
H.P.	594(B)	1,331(B)	606	2,531
J & K	534(B)	635	3,899(C)	5,068
Karnataka	1,968	6,005	36,449	44,422
Kerala	772	2,146(B)	22,485	25,403
M.P.	2,480	9,941(B)	20,393	32,514
Maharashtra	2,848	14,041	22,333	39,222
Manipur	211(B)	634	312	1,157
Meghalya	217	-	375	592
Nagaland	103(B)	726	73	902
Orissa	1,560	2,208	6,491	10,259
Punjab	660(B)	1,862	10,935	13,457
Rajasthan	2,089	7,832	11,882(C)	21,803

contd...

TABLE - XXVIII Contd...

State/ U.Ts	N.H.	S.H.	District & Block Roads	Total
Tamil Nadu	1,698(B)	1,732	47,175	50,605
Tripura	123	136(B)	670	929
U.P.	2,246(B)	7,379(A)	16,900	26,525
W.B.	1,673(B)	2,351	11,588(C)	15,612
U.T.	358	1,673	3,224	5,255

(A) Relates to year 1969-70, (B) Related to year 1971-72, (C) Excluding Block Roads.

The initiative for development of roads in India did take place in a planned manner. But lack of comprehensive and integrated policies of the State Governments and the Central Government, has been responsible for this present state of affairs. State Governments had the responsibilities of all sorts of roads in their states prior to 1956, but they passed on their responsibilities on to the poor local bodies like 'Zila Parishads', Village Panchayats, Municipalities etc., for the development of roads. In 1956, the National Highway Act gave new dimensions to the road development policies. Besides this, Nagpur Plan and the 20-year Plan (1961-81) ushered a new era in the development of roads in India. Today India has 56 National Highways, totalling

28,849 km. The Government of India is now giving them high priorities as they are the lifeline of the nation.

As a result of planned development the aim of 20-year Plan to have 32 km of road per 100 sq. km of area was achieved in 1973 at the national level, but at the regional level imbalances exist. The Table-XXIX shows the extent of road development in each state of the country by the year 1972-73.

TABLE - XXIX

Road Length/100 sq. km of Area

State	Length of surfaced road (i)	Area in sq. km. (ii)	Ratio (i)/(ii) x100
Andhra Pradesh	80,809	2,76,800	29 km.
Assam	30,833	78,500	38.4 km.
Bihar	1,10,936	1,73,900	64.8 km.
Gujarat	45,530	1,96,000	23.2 km.
Haryana	24,776	44,200	53.7 km.
H.P.	13,199	55,700	23.7 km.
J&K	14,347	2,22,200	6.5 km.
Karnataka	85,433	1,91,800	44.4 km.
Kerala	1,24,232	38,900	62.5 km.
M.P.	87,571	4,42,500	19.7 km.
Maharashtra	1,02,497	3,07,800	34.0 km.
Manipur	8,651	22,400	30.5 km.

contd...

TABLE - XXIX Contd...

State	Length of surfaced road(i)	Area of in sq.km. (ii)	Ratio (i)/(ii) x100
Meghalaya	9,306	22,500	41.2 km.
Nagaland	5,340	16,500	32.4 km.
Orissa	46,326	1,55,800	29.0 km.
Punjab	21,515	50,400	42.7 km.
Rajasthan	43,777	3,44,200	12.8 km.
Tamil Nadu	98,611	1,30,100	75.6 km.
Tripura	3,853	10,500	37.0 km.
U.P.	1,23,861	2,94,400	41.9 km.
West Bengal	54,646	87,800	62.5 km.
U.Ts	17,839	1,19,400	14.980 km.

Source: Basic Road Statistics of India-197 .

Kerala has the maximum length of surfaced road per 100 sq. km. area. State of Jammu and Kashmir has 6.5 km/100 sq. km of road length for all types of roads[8]. Keeping in view the importance of J&K State from strategic as well as economic point of view the road density is very less. Whatever roads are existing in J&K, they are due to the efforts of the Central Government who has developed it through the Border Roads Development Board to meet the defence

requirements of the country. Besides the state of Jammu & Kashmir, there are many other states who have got their own importance in maintaining the economy of the nation, and have insufficient road lengths to cope with the demands of traffic.

The Nagpur Plan and the 20-year Plan can be said to have given a new dimension to the road development programme and the guide lines for future development are obtained from them. The 20-year Plan took into consideration the following important factors in addition to future trends in traffic.

(i) The needs of semi-developed and undeveloped area, including forest areas, in addition to the needs of highly developed and agricultural areas;

(ii) Location of administrative headquarters places of pilgrimage, health resorts, tourist centres, universities and cultural centres;

(iii) Location of industries, important commercial centres, big railway junctions and ports; and

(iv) The stretegic needs of the country[9]. These factors were not considered while formulating the Nagpur Plan. In addition to these factors, Nagpur Plan had other short comings such as lack of consideration for standards of road surface, types and nature of bridges and other physical characteristics of roads.

Road development programme needs a fresh look and in planning such factors, as the rate of urbanisation, requirements of the areas depending upon the nature of industries, extent of backwardness of the region etc., should not be overlooked. Agricultural revolution and the industrialisation has increased the inter-district movement of goods and a spurt in the growth of major district roads and other district roads has been experienced in the recent years. Table below shows the increase in road lengths since 1951. There has been an increase of 400% in MDR and 300% in ODR[10].

TABLE - XXX

Increase in Road Length of various categories

Category	1951	1956	1961	1973
National Highways	19,696	20,485	22,504	28,347
State Highways	42,560	46,883	61,691	96,862
MDR	89,280	94,634	112,824	26,4673
ODR	80,800	86,429	111,310	26,4616
YR	165,283	240,589	386,582	-
Unclassified	-	6,430	10,090	-

Rapid rate of industrialisation will throw more burden on road system. A comparision with highly industrialised and demi-industrialised nation shows that India has 29.8 km of road length for 100 sq.km. of area, while countries like USA, Japan, France and even Ceylon had more kilometerage per 100 sq.km., in the year 1972. The table mentioned below shows the road lengths in different countries[11].

TABLE - XXXI

Road Lengths in Different countries in the Year 1972

Country	Length of Road per 100 sq.km.	Road length in Km. Paved	Unpaved	Total
Ceylon	31.9	15,297	56,568	20,955
India	29.8	324,940	647,390	972,330
Pakistan	11.1	27,568	77,094	104,661
Newzealand	35.0	39,170	54,762	93,932
Malasiya	5.5	13,845	4,607	18,452
Israel	4.4	4,000	5,100	9,100
U.S.A.	62.2	2533,374	33955,420	5928,784
Argentina	4.9	29,000	107,500	136,500
France	269.9	629,593	853,146	1482,739
Japan	272.0	127,188	878,243	1005,431

Source: World Bank, Sector Policy Paper on Transport, 1973.

This only emphasizes the need for considerable growth in the road length to keep pace with the industrialisation of the country.

4.5 PROBLEMS OF ROAD DEVELOPMENT

In our country road development programme is faced with number of problems. These problems are the hindrances in the development programmes of roads, to have a smooth development of roads, it is necessary that such problems be done away with. Some of the problems are :-

i. responsibility regarding construction and maintenance,

ii. shortage of trained personnels and construction machinery,

iii. law and order problems on highways,

iv. lack of facilities of workshops, garages and petrol-pumps,

v. lack of passengers amenities, etc.

These problems, no doubt, can be solved by taking adequate legislative measures, measures to augment the existing facilities of workshops, petrol-pumps, etc., passenger amenities and steps to train personnels in the field of highway engineering.

The very first problem of construction and maintenance of national highways rests with the Central Government. The Central Government provides all facilities of funds to the State Governments to maintain and construct the National Highways through which it passes. State PWD looks after the road at the instance of the Central Government. Rest of the roads are the liabilities of the State Government, the State Governments have transferred their responsibility to the local bodies like, Zila Parishad, Village Panchayats and Municipalities who are poor in most of the cases, incapable of meeting the expenses of their maintenance.

This type of policy has led to the development of poor roads and that too without proper planning, leading to wasteful use of money. A uniform legislative measure is necessary in this direction to unify the road development programme at State level as well as national level.

During Fourth Five Year Plan shortage of trained personnel and construction machinery was experienced. The Chief-Engineers' Conference in 1959 suggested measures to augment the existing staff of technically qualified personnel. Also,

the shortage of construction equipments like road rollers, tar boilers, concrete mixers, pumps, stone crushers etc., was visualised by them; at that time they recommended to increase the existing strength of the road construction machinery, a list of equipments required till 1980-81 prepared by the Chief-Engineers Conference is given in the table below[12].

TABLE - XXXII

"CONSOLIDATED LIST OF EQUIPMENTS"

Sl. No.	Name of Equipment	Requirements in the Ist Year	Requirements in the 20th Year
1.	Road Rollers	2400	6400
2.	Concrete Mixers	200	900
3.	Concrete Vibrators	400	2000
4.	Bitumen Mixers	500	3000
5.	Bitumen Pressure Distribution	100	1200
6.	Bitumen Boilers	700	2500
7.	Air Compressor with Drilling Equipments	300	1000
8.	Motor Graders	400	1200
9.	Motorised scrapers	125	665
10.	Rippers	350	1950
11.	Dump Trucks	1040	5770
12.	Power Shovels	125	665

contd...

TABLE - XXXII contd...

Sl. No.	Name of Equipment	Requirements in the Ist Year	Requirements in the 20th Year
13.	Water tankers, 750 gallons capacity	1150	6720
14.	Pumps	185	960
15.	Rotavation	500	2735
16.	Pulvimixers	10	20
17.	Pneumatic Rollers	40	235
18.	Sheepfoot Rollers	225	1230
19.	Dozers	55	265
20.	Mobile Repair Shops	30	130
21.	Continuous Hot Mix Asphalt Plants	10	40
22.	Cement Batching Plants	5	20
23.	Spreaders & Finishers	10	40
24.	Core Drilling Machines	15	65
25.	Launching Girders	10	40
26.	Grab Dredgers	35	170
27.	Cranes	5	20
28.	Driving Equipments	15	65
29.	Cement Grouting Machines	10	40
30.	Pile Driving Equipments	10	40
31.	Tipper trucks with gritters	70	330
32.	Drag Lines	4	2

At present heavy earth moving machinery are being manufactured by M/s Bharat Earth Movers, but the rate of production is not adequate to meet the demands. Production should be accelerated. The Chief Engineers' Conference laid stress on the training of the engineers and other semi-skilled workers involved in the road construction industry. They recommended a special two-year course for highway engineers to train the graduate engineers in the field of road building.

Law and order situation in certain states on highways is another problem. Dacoity and looting are the common phenomena, such incidents make the travel unsafe and people feel insecure. This contributes towards decreasing the popularity of road transport. Social evil of such kind need to be tackled by the State Governments; it also adds to the expenditure of the governments and is a social burden.

Facilities of workshops, petrol-pumps and other passengers amenities are lacking on the national highways. This has also been a factor for the slow rate of growth of traffic on roads. Like other countries, facilities for repairing, night halts, petrol pumps should be provided at the

National Highways and other important highways of states and districts. Godown facilities are also inadequate at the terminal points, it requires special attention of the governments.

4.6 R&D IN ROADS

Road projects are capital intensive as well as labour intensive, therefore, it is essential that its benefits and utility be found out in advance, before investing the money. In designing transport facilities in India, it is important to have a look at the whole range of technology that is available for meeting the demands. By technology here, is meant a specific consideration of productive forces such as labour, capital, energy or any other resources which can be obtained at cheaper prices, with different technologies it may be possible to provide similar results but at different prices. Country's resources are limited. To meet the challenge ahead, it is essential that a determined R&D effort must go on to find economical solutions to the important road problems at hand. Some of the research areas deserving attention are planning, application of more efficient and cheaper construction techniques, maintenance, evolution of new specifications, materials and design for the regions short of

traditional materials and better utilisation of locally available softer aggregates. If experiences of other countries can be a guide, systematic research and development can provide effective answer to these and other likely problems of future.

The need for R&D activities in road transport was felt by Jayakar Committee, it was materialised only in 1934 with the establishment of Indian Road Congress (IRC). The Indian Road Congress, since then has become a prominent semi-government body. It has a number of committees alongwith the Highways Research Board established in 1973 under the auspices of IRC which goes into the problems of soil research, road and bridge construction techniques, traffic surveys, other road research including implementation, and what is most important speedy and systematic deseimination of research findings. Highway Research Board (HRB) has identified a list of 34 problems to be taken up on top priority.

Setting up of HRB has helped in coordinating the scattered activities of research in the country. Now it functions as an effective medium for feed-back of information and thus provide a bridge between practising engineers and the research workers.

With the establishment of Central Road Research Institute in 1950, research activities were further geared up to meet the demands of heavy loads coming on the pavements. More or less the activities of CRRI are same as that of the IRC.

A new direction to R&D activities has been given by the National Committee on Science and Technology in 1971. NCST has drawn a programme for the Fifth Five Year Plan, it has come up with a programme costing about Rs. 19 crores for a package of 70 projects under 8 broad headings. Besides this, the universities are also involved in R&D activities with HRB as well as with the R&D panel set up in the Transport Ministry.

Currently, two types of pavements are in use in our country. They are flexible or black top pavement and rigid pavements. Each pavement has its own characteristics, selection of pavements at appropriate place, depending upon the utility and case of construction should require proper attention from the R&D organisation. Use of locally available material can considerably reduce the cost of construction. Proper research efforts are needed to evolve cheap highway materials. In the light of developing economy of the country,

the best suited pavement is a flexible pavement, it has one advantage of being suitable for stage construction. In our country traffic volumes and axle loads are uncertain. Thin pavements can be provided initially, as traffic increases, additional thickness can be provided. Rigid pavements being costly and requiring strict quality control is difficult and is expensive to maintain. Except where heavy traffic is anticipated in the urban areas, rigid pavements can be used otherwise flexible pavement is the right type of pavement. R&D efforts in this direction are necessary and towards these, CRRI, IRC and other state laboratories are working to find out an economically viable solution.

To cope with the problems of highway construction field laboratories are needed. At present there are such laboratories in some states who conduct field tests at the sites. Recent developments in the field of soil sciences have helped a lot in construction techniques. Trailorisation on Indian road scene will soon occupy its due position and with this heavy loads will come on the roads. Therefore, to cope with such traffic, design procedures will have to take into account the load factors, frequency of load

coming on the road. This requires adequate traffic survey and assessment of travel pattern.

For training the personnel in the field of highway engineering, the technical institutions have started extensive training courses at the post-graduate level as well as under-graduate level. CRRI conducts courses from time to time in collaboration of ESCAP to refresh the knowledge of practising engineers. Such steps are necessary and it should be extended to train the semi-skilled personnels also.

Equipments and machinery are still being imported in our country, some machinery are being manufactured but they are not produced sufficient in number. Such machinery if manufactured in India on large scale, can earn foreign exchange for the country. The only thing which is required in this direction is R&D efforts of the Government.

4.7 ROAD TRANSPORT

This second part of the chapter deals with road transport. It does not include all types of vehicles except the vehicles of public utility like buses and trucks for carrying passengers and goods only. Therefore, in the part-II, an attempt has been made to understand the problems of other aspects of road transport.

Modernisation of transport system in India took place only after the First World War. By 1938-39, commercial motor transport comprised a total fleet of 23,645 buses and 12,397 trucks. At the end of the Second World War in 1946-47, the number of trucks had increased to 40,107 and number of buses reached once again the pre-war level[14]. After independence, the number of buses and trucks grew at a faster rate and today they stand at 4,12,000[15]. This increase in popularity of road transport is because of its certain characteristics already mentioned in the earlier part of this chapter. The committee on Transport Policy and Coordination in its final report maintains,.... "Therefore, provided (a) financing arrangements are satisfactory, (b) road transport associations undertake a responsible role in the due observance of standards of service and freight and fare structures, and (c) a reasonable measure of coordination between rail and road transport is secured, private operators can undertake a considerable part of the development consistently with the overall interest of the community. This is specially in case with the movement of goods..,"[16].

By the end of March, 1974 there were 43 road transport organisations catering to the needs of

passenger traffic, this list of 43 includes the corporations, departmentally run transport services and municipal services[17]. In the public sector, there are no such services to carry the goods on large scale. Goods services are run by private operators either individually or on cooperatives basis. Number of such co-operatives is not known clearly but they own a very low percentage of commercial vehicles in the country. In 1962, there were only 172 co-operative societies owning 1,385 vehicles which was less than one percent of the total number of vehicles in the country[18].

4.8 LEGISLATIVE PROVISIONS

Motor transport was first regulated under the Indian Motor Vehicles Act, 1914. This legislation did not distinguish between different types of motor vehicles and imposed no restriction on their movement. As motor transport began to grow, the need for greater control over motor transport began to be felt from the point of view of co-ordination with railways (as road transport was involved in bitter competition with railways) as well as safety and convenience. This led to the passing of the Motor Vehicles Act, 1939. This Act created Regional Transport Authorities which were

authorised to grant permits for stage carriages and for providing rules for private and public carriers regarding routes, timings, specifications of vehicles, standards of maintenance and conditions under which holders of permits were expected to operate. This Act which was aimed at protecting the traffic on Indian Railways hampered the development of road transport. Later on, various suggestions for improvements were made in this Act in consultation with Planning Commission, the Ministries of Railways and Transport.

In 1956, the Motor Vehicles Act of 1939 was amended by the Parliament with the following objectives (i) to remove certain defects observed in the working of the earlier legislation, (ii) to ease some of the restrictions which are holding back the road transport, (iii) to provide legislative basis for nationalisation, and (iv) to provide inter-state movements of transport vehicles, (v) to empower the Central Government to set up and Inter-State Transport Commission for the development, coordination and regulation of Inter-State movement of vehicles[19]. Earlier there was no such provision. It also contained uniform provisions for the operation of road transport services by State Undertakings.

4.9 ROAD TRANSPORT IN INDIA

Facilities of road transport are woefully inadequate in India. A comparision of motor vehicles per kilometer of road length and per thousand of population for developed and developing countries shows that India is behind countries like Sri Lanka and Pakistan[20].

TABLE - XXXIII

Vehicles in use in certain Countries as on Dec. '71

Countries	Vehicles per 1000 population	Vehicles per Km. of road length
ASIA		
Japan	257	27
Thailand	24	31
Sri Lanka	12	4
Indonesia	7	10
Pakistan	3	10
India	3	1.4
EUROPE		
France	393	26
Austria	308	66
Sweden	307	25
Belgium	288	38
West Germany	284	40
Norway	274	15
Great Britain	268	44
AMERICA		
U.S.A.	551	19
Mexico	442	29
Canada	379	16
Argentina	109	13

contd...

TABLE - XXXIII contd...

Countries	Vehicles per 1000 population	Vehicles per Km. of road length
OCEANIC COUNTRIES		
New Zealand	406	12
Australia	393	6

Source : U.N. Monthly Bulletin of Statistics for 1971, Feb. 1973.

Among the developed countries in Asia, Japan has 257 vehicles per thousand of population and 27 vehicles per kilometer of road length. While, among the countries of Europe and America like France and the U.S.A., there are 393 and 551 vehicles per thousand of population, respectively.

Cause of this inadequacy requires elaborate investigation and is not so easy to point out. Among several causes, heavy taxes and dependence upon foreign know-how is definitely a constraint on the growth of road transport. Indigenisation can bring substantial relief in the cost of operation and production of vehicles.

Services rendered by private operators of transport companies as well as State Road Transport Undertakings are not sufficient to meet the demands of growing population. These undertakings and

private transport operators have their own problems like, poor management, maintenance, shortage of spare parts and tyres and harassments by local tax collecting agencies and the police department. These are definitely a disincentive for private operators. In the following table state-wise registration of commercial vehicles for the year 1974 has been given against their population; population corresponds to the year 1971. It is obvious, that during the period of 3 years population would have increased at a faster rate than the increase in the number of registration of commercial vehicles. In the light of above facts the comparision may not be accurate but still it can give some idea of the adequacy or inadequacy of the system[21].

TABLE - XXXIV

State-wise Registration of Commercial Vehicles

State	Population in '00000		Buses*	Trucks*
	Rural	Urban		
Andhra Pradesh	351	8.4	7,827	19,325
Assam	142	14.4	2,881	16,381
Bihar	507.3	56.3	6,339	23,288
Gujrat	192.6	75.0	5,228	59,762
Haryana	82.6	17.7	1,713	8,257
Himachal Pradesh	32.2	12.4	1,599	2,949

contd...

TABLE - XXXIV Contd...

State	Population in '00000 Rural	Urban	Buses*	Trucks*
Jammu & Kashmir	37.6	8.6	1,355	3,670
Karnataka	221.8	71.2	7,787	20,857
Kerala	178.8	34.7	6,345	13,208
Madhya Pradesh	348.7	67.8	4,702	17,124
Maharashtra	347.1	157.1	9,803	62,505
Manipur	9.3	1.4	250	824
Nagaland	4.6	0.5	154(A)	507
Orissa	201.0	18.4	2,538	17,199
Punjab	103.3	32.2	2,236(A)	-
Rajasthan	212.2	45.2	922(A)	-
Tamil Nadu	287.4	126.4	3,869(A)	37(A)
Tripura	13.9	1.6	108(A)	-
Uttar Pradesh	759.5	123.9	5,235(A)	351(A)
West Bengal	333.4	109.4	1,903(A)	-
Union Territories	22.9	44.1	1,549	-

(A) Corresponds to State Road Transport Corporations only.

*Source: Automobile India, Vol.XXVI, No.8, 1977, pp. 104.

4.10 PROBLEMS OF ROAD TRANSPORT

In India the road transport is faced with number of problems, which are constraints on its growth. High vehicle taxes, high taxes on petrol

and diesel, non-availability of genuine spares, obustructions in movement of vehicles due to the presence of numerous octroi and other check posts and many others.

Heavy taxes on motor vehicles in the form of excise duties, municipal taxes, registration fee and road tax make the operation of commercial vehicles a costly affair. The Keskar Committee had calculated in its report in 1967 that the annual tax element in the cost of operation of a truck comes to Rs.12,699. Assuming that its annual cost of operation was Rs.36,000 per annum. The tax element works out to 54.5% of the basic cost or 35.2% of total cost. The relative figures for passenger vehicles were 76.2% and 43.2%[22]. These were considered to be so high as to lead the Keskar Committee to inescapable conclusion, "That the tax element in the cost of operation has become a definite disincentive to the healthy development of road transport"[23]. In 1967 the tax element alone in the haulage of a tonne-km of goods by road was calculated at 6.10 paise. This is higher even than the total average cost of carriage of goods by rail which stood in 1973-74 at 5.89 paise per tonne-km[24].

International comparision of tax incidence shows that the tax element in the cost of operation

of a truck in this country was over 30% in 1960, as against 5% in the U.S.A. and 17% in the U.K. Table XXXV below gives the data relating to the average yield of tax revenue per vehicle in different countries[25].

TABLE - XXXV

Motor Vehicle Revenue International Comparison(1960)

Country	Revenue collected per motor vehicle
India	$ 470
F.R.G.	240
Burma	235
Japan	235
U.S.A.	115
Ceylon	94
U.K.	63

It is evident, that India collected the highest amount of revenue from each motor vehicle. Since these figures relate to the year 1957, the present rate of taxes will be still higher and difference between India and other countries will be still more.

Similarly, the Indian consumers of petrol and diesel have to pay the highest price for these fuels.

The taxes on both petrol and diesel are imposed today at 290 per cent and 67 per cent respectively[26].

The check-posts are meant for enforcing requirements of various enactments-central, state and even Municipal - such as Civil Supplies, Sales-Tax, Forest Department and numerous others. But the most frequent and harassing of these are the octroi posts. They also provide a fertile breeding ground for corruption. At least half a dozen commissions and committees starting with 1924 have examined the levy of octroi, and have advocated its abolition. They have suggested alternative sources of raising revenues for local bodies. But the states as well as the Central Governments have failed to take any step towards this. At present Madhya Pradesh is the only state which has taken courage to abolish it[27].

Permits on inter-state routes is not easy to get. It is not only time consuming but also a source of corrupt practices. Due to this permit system quite often goods are unloaded for transhipment in the trucks of other state on the border. Reciprocal permit-system and National permit system do not affect the major portion of traffic on the roads.

Poor road condition is another factor, which is responsible for increased cost of operation of motor vehicles. According to Keskar Committee proper road condition can reduce the cost of operation by 50%; besides the saving, there are other indirect advantages of good roads. Accidents and hence casualties are reduced. Therefore, it is necessary that good roads be maintained even if the earning from it is less than the expenditure.

According to the 'Report of The Study Group on Viable Units', road transport industry is a preserve of single motor vehicle owners most of whom do not have either the education or the resources to operate them efficiently. Such operators cannot make any sizeable investment in spare parts, provide service facilities at the starting point and terminus, and pay fair and adequate wages to the workers. It is, therefore, imperative that the units of private road transporters should be of such size as would enable them to provide services at reasonable costs. In this connection recommendations of the study group on viable units to have a unit of ten vehicles at least in goods transport and five stage carriages with a spare bus in case of

passenger transport is worth implementing. Such viable units can either be formed on cooperative basis or individual basis[28]. Such units will be able to provide services at reasonable cost and can bring about some coherence among private operators.

4.11 R&D IN ROAD TRANSPORT

There has been a tremendous growth in the road transport during the past 27 years. At present there are 43 nationalised passengers transport enterprises in India owning over 51,000 vehicles (about 42% of the total passenger road transport vehicles). It is likely to go upto one lakh vehicles by 1981. The capital investment in these nationalised undertakings, has exceeded Rs.300 crores, with a staff strength of 5 lakh workers and 500 management personnel[29]. This sudden expansion of state transport undertakings, the complex traffic and transport problems of urban cities, oil crisis, technological development etc., have brought various managerial and technical problems in transport.

Optimum utilisation of the resources is the most prudent husbandry of the capital in an industry. About 80% of the capital in any nationalised transport

undertaking is in the form of vehicles. Optimising the use of vehicles is thus a basic responsibility of management at all times. Optimum utilisation of vehicle can be introduced by reducing the number of vehicles on the road or by increasing the utility of vehicles in such a way that the routes are made longer. Both these alternatives can go against the policy of optimisation. Such problems call for effective management techniques, research and development, proper planning and operation.

Fuel consumption and personnel cost take away a major part of overall expenditure of the transport undertaking. According to the Economic Times Research Bureau personnel cost varies from 24.9% to 44.10% of over all cost. While, the fuel cost in a transport undertaking constitutes the 40% of the total cost of materials[30]. In such a case, a suitable methodology should be evolved so that the personnel cost as well as the fuel cost could be reduced. For saving fuel, modification in the design of engines, bodies, route lengths and other factors associated with it must be done at any cost.

In our country the State Transport Undertakings are least associated with the automobile

industries. They have never suggested the manufacturers to make some improvements though they will be major beneficiaries of such improvements. The result is conventional vehicles continue to come in the market. Naturally aspirated diesel engines are still in vogue. While in west turbo-charged or super-charged engine is being used. Disc brake is almost a standard equipment abroad whereas the hydraulically operated drum brakes are still being used here. The automatic transmission and synchronous mesh transmission has taken over the conventional constant mesh crash type transmission. And as such many other innovations in India have yet to appear on the scene. Without R&D efforts foundation for import of such technology is not possible.

R&D activities in the automobile industry of our country are unsatisfactory. There are three types of manufacturers' association with the automobile industries. They are (i) vehicle manufacturers, e.g., Ashok Leyland, Tata Engineering, Premier Automobiles, Hind Motors etc., (ii) large ancilliary manufacturers who cater to the needs of vehicle manufacturers and (iii) small and medium scale ancilliary manufacturer who cater to the needs of spare parts market[31]. Accordingly, the nature of R&D activities of each is different and therefore the proportion of investments in R&D also varies.

Vehicle manufacturers here do not have any R&D programme in the schedule because of their collaboration with foreign firms who supply with the technical know-how in case the need arises. Large ancilliary manufacturers also do not invest in R&D activities. From small and medium size scale ancilliary manufacturers such thing cannot be expected, because it will not be economical for them. However, to help such manufacturers in maintaining quality and standards, the Governments have made arrangements with institutions, like :

i. Central Mechanical Engineering Research Institute, Durgapur, a CSIR establishment,

ii. Vehicle Research & Development Establishment, Ahmadnagar - a Ministry of Defence establishment,

iii. Central Institute of Road Transport, Poona - an Institute run by the Association of State Road Transport Undertakings and sponsored by the Ministry of Transport & Shipping, Government of India.

In addition to these three organisations, I.I.T's also have facilities for testing the products of small ancilliary units. But no ancilliary unit

approaches them for getting their products tested. This apathy towards R&D activities and reluctance to make use of testing facilities are mainly due to dependence upon foreign know-how and location of the testing centres not within the reach of the users. Most of the small scale ancilliary manufacturers are in the Northern India while facilities of testing exist only in the western and eastern part of the country. Manufacturers avoid going to such centres with the result that the spurious spare parts come into the market. Such testing facilities should be evenly spread and it should be made obligatory on the part of manufacturers to get their products tested before sending them to market. This will help in maintaining the quality as well as encourage the manufacturers to improve the quality of their products.

In addition to research and development in automobile industry, traffic and transportation also requires due attention as it will help in planning and forecasting the future trends. Computerised system of route planning can help a lot in planning of transportation system in urban areas. Several operational research aids are now

available for planning techniques, but more research is required to fit them in Indian condition.

A co-ordinated effort of NCST, the Ministry of Transport & Shipping, manufacturers of automobiles and other research laboratories is required to bring about a cheap, efficient and reliable road transport in the country. A sustained R&D effort can only solve the problem.

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CHAPTER - V

C-O N C L U S I O N S

5.1 GENERAL

Transportation when viewed within any reasonably broader framework, represents an extremely complex system interacting with the whole society. Throughout the history of mankind, transportation has been a major factor in determining the manner in which a society has developed. Right from the development of modern cities as we know them today and the extent of international co-operation among the nations is all due to the tangible services of the transportation system which has been able to rob distance of its separatist character.

In a somewhat narrower sense, the problems of transportation could be defined as the problems of moving goods, people and ideas quickly, efficiently and more so, reliably, safely and economically within the country and among the nations. Therefore, the transportation as a source of overall development of the country cannot be left in an isolated state of affairs which would hamper the rate of economic growth of the country. In our country, after going through the whole situation prevailing in transport sector some questions eventually crop up in the

light of the above statement. Regarding transportation we must ask certain questions like : Is the progress made in the Indian transport scene adequate to meet the demands generated within the economy as well as the society ? Is it economical ? Is it conducive to further economic development of the country ? and so on and so forth. These questions must be kept in view while, formulating any policy for the future, past must be reviewed and its follies be rectified to make future plan fool-proof.

Within the last twenty-five years revolutionary changes have taken place in the transportation system of the country. Specially, with the launching of the Five Year Plans, a good progress has been made in a balanced way. For example, inland water transport continues to bear the status of poor man's transport and is losing its significance gradually after independence. The railways have made a very good progress and fruits of science and technology have borne good results. As a result of R&D efforts railways have attained self-sufficiency in many fields of railway technology and in the years to come it will continue to help the country in its economic development. Similarly, the road transport has also made a considerable progress inspite of many obstacles and has attained an important position in the transportation system of the country.

In the following paragraphs concluding remarks about each mode of transportation studied has been made.

5.2 INDIAN RAILWAYS

The Indian Railways are the biggest nationalised modes of transport in the country. Its importance as a public carrier is quite immense for the development of the industries and agriculture. Certain obligations, which it has to carry out on the directives of the central government as a public utility carrier makes it more responsible towards the society because such obligations are not binding upon any other mode of transport. Under such circumstances it is quite obvious that the railways must provide its services at an economically viable rate with the maximum operational efficiency.

Services provided by the railways are inadequate, specially in the category of passengers services. As stated in the chapter on railways, overcrowding and unpunctuality are the common maladies of which the Indian Railways are suffering. This inadequacy is due to the shortage of rolling stock and inadequate facilities available at the stations such as facilities of platforms, yards, booking of passengers' luggage, automatic signalling etc. Lack of such facilities hampers the operational efficiency of the system as

a whole. Freight services seems to be adequate, this is mainly due to the participation of road transport in carrying goods and specially, low distance freight. This participation of road transport is responsible for easing the burden on the railways. Nowadays even, long distance traffic is being carried by the road transport and this trend, if continued, one day, rail transport will loose its importance. In this direction the railway administration must pay its attention. The railways as the bulk carrier are more popular but in bulk they are carrying only the low rates freight. As a public service carrier it has to do so and has to bear loss.

Pilferages in transit and ticketless travel are two other significant sources of loss of revenue to the railways. The corrupt practices of its staff and lack of creditability for the railways among business community are responsible for the drain of crores of rupees every year. To do away with such corrupt practices the railway administration should implement the recommendations made by the Administrative Reforms Commission in its Report on Railways in 1970.

Railways loose on account of social burden also, the Railway Administration should seek

compensation in some form or the other, in those quarters where losses are found to have occured. The State Governments should also pay the railways where they insist upon the continuance of uneconomical and unremunerative railway lines within their states, because of various social, cultural and political considerations of regional nature.

Research and development activities of the railways are in a better position as compared to those in the sectors of road transport and inland water transport. It is in position to meet the day to day requirements of the railways. Efforts made towards indigenisation are encouraging, this has helped them to reduce their dependence on foreign technical know-how and reduction in the percentage of imported railway equipments.

At present the railways are working at less efficiency, rolling stocks available with the railways are either short or under utilised, this is a problem, which requires detailed investigation. Facilities like platforms, railway sidings and godowns are also limited. Lack of such facilities considerably affects the efficiency and operation of the railways. In this regard, adequate management training is required, such training facilities are quite limited and only gazetted officers of the railways are exposed to them.

To attract traffic, specially goods traffic the railways have taken no steps, market research and survey of traffic trend will help to regain the lost market of goods traffic. Data in this regard is not available with them even if there are some they do not reflect the whole picture. Absence of such data has forced the railways to revise their target of carrying goods from time to time.

5.3 INLAND WATER TRANSPORT

The inland water transport, which affords to carry goods at a much cheaper rate is the neglected and highly disorganised mode of transport, which is gradually loosing its popularity. In the pre-Independence period our alien government did much harm to it, but after Independence it lost its existence in the transport sector. It is only recently that attention has been given by the Central Government to revive this languishing mode of transportation.

During the course of study number of important points were revealed, which require immediate attention of the state and the Central Governments. There is no comprehensive Act to regulate the IWT in the country. But there are various Acts of which some are applicable to some states and some are to mechanised vessels only. The provisions of 1935 Act

do not cover number of points like : pricing policy, management of the I.W.T. infrastructural facilities, insurance policy etc. This Act of 1935 requires to be suitably amended in the development of IWT. Some Acts like Motor Vehicle Act of 1939 can also be brought to protect the traffic on I.W.T. by avoiding competition among various modes of transportation.

Nearly all of the waterways in the country are suffering from one problem i.e., silting. Silting of waterways make them useless for the operation of vessels with larger draft. The state or the Central Governments do not have the facilities, quite enough to dredge the waterways from time to time. Measures to conserve the waterways are not effective. In this regard some research is required to evolve suitable method of waterways conservancy.

Data on carrying capacity of I.W.T. in India is not available because most of the operators who run them privately do not possess such data. Some sort of government control is necessary so that such data is made available for market research which would later on help to develop I.W.T.

Lack of facilities of train personel should be rectified. Training in management of waterways,

operations of I.W.T. maintenance, design and developmental aspects of country vessels and steamers need special attention so that self-reliance in technical know-how may be achieved.

5.4 ROADS AND ROAD TRANSPORT

5.4.1 ROADS :

Roads and road transport in India had a spurt only after the First World War. But very soon it has acquired a prominent position in the transport scene of the country and with its flexibility and low investment it has become an efficient and cheap mode of transport for the short distance leads.

Road facilities in India are woefully inadequate. A large percentage of roads are fair-weather roads which become unserviceable during the rainy seasons, causing a break in communication between the villages and the rest of the country. This poor condition of roads is mainly due to the control exercised by different local bodies on them, who are not sound enough financially, to look after the repairs and maintenance of the roads. Road construction programme is capital intensive, in the absence of financial resources, local bodies go for the construction of such roads, which are cheap and just sufficient to meet the local demands.

States and National Highways, being the subjects of the State and the Central Governments, are in a slightly better position to meet the demands of heavy traffic round the year.

Research and development programme in roads construction is not adequate. There are few laboratories and field research stations in the country. Such facilities are not evenly distributed. Being under-staffed, laboratories like the Central Road Research Institute and organisations like the Indian Road Congress are not able to meet the demands of the technical advice of various states. Heavy earth moving machinery are still being imported from foreign countries. R&D efforts in this direction is need, it will help to reduce the import of technical know-how as well as saving of foreign exchange. Use of locally available materials for road construction also requires research efforts, in this direction steps must be taken. In this area co-ordinated efforts are needed to conduct research on whole specturm - economical, system engineering studies, equipment development, manpower training to help deployment of available efforts and to knit together the various programmes.

In the near future demand of road transport is going to increase and with this increase in demand, the nature of loads coming on the roads will also change, necessitating a change in the design procedures of the pavements. Collection of data to assess the pattern of traffic is needed, on the basis of which a suitable road construction technique could be evolved.

5.4.2 ROAD TRANSPORT

Road transport is being faced with number of problems like: shortage of genuine parts, heavy taxation, poor conditions of roads giving rise to high operation cost, control on movements etc. It is necessary that such obstacles be minimised so that this mode of transport may be able to serve the nation in a better and efficient way.

Heavy taxes in the form of central excise, state excise, toll road taxes and income tax are burdens on the road transport. Particularly the toll tax levied in states from place to place is a hindrance in the fast movement of vehicles and goods carrying transport. In addition to this, local police, excise department persons and sales tax department people are also the persons who obstruct the movement of trucks and buses and are responsible for corrupt practices.

Poor financial condition of transport operators prevent them from providing adequate facilities to the customers. It is very essential to evolve the concept of viable units for the healthy growth of road transport. Persons having one or two buses or trucks should be asked to form a cooperative or association.

In the public sector most of the services cater to the needs of passenger traffic. They are inadequate at present. Poor maintenance and mismanagement is responsible for their sorry state of affairs.

At present there are number of manufacturers who manufacture buses and trucks for the public utility, which are dependent upon medium and small ancilliary units who cater to their needs of spare parts for buses and trucks. These manufacturers of automobile do not have any R&D programme in their schedule. They are totally dependant upon foreign collaborators in this regard. Smaller units and medium size units are not in a position to invest in R&D. However, arrangements have been made by the government for these small units to test their products and to guide them to further improvement of their products. It is reported that none of the such ancilliary units is taking advantage of these

facilities. R&D activities need to be geared in the automobile manufacturing industries to do away with foreign dependence.

5.5 CONCLUDING REMARKS

In the light of observations made above, it is essential to review the transportation system of the country with due consideration on the cost, performance, development impact of alternative methods of transport, geography and the availability of resources. While planning transport requirements, besides weighing the transport aspects of activities on other sectors. Furthermore, scientific innovations are rapidly introducing new materials, new energy sources, new industries and new approach to development. Therefore, while looking for a transport policy, we must coordinate other policy issues like, industrial, urban, science and technology, energy etc., which affects the transport system from the outset.

Energy Policy :

Energy resource policy of a nation has now become an important issue because the energy crisis which plagued the nations in the world and till some alternative source is discovered scarce sources of energy should be utilised in a disciplined way. Transport industry is a big consumer of fossil and mineral fuels especially. In our country, railways

consume a large tonnage of coal. Electrification and dieselisation can greatly reduce the consumption of coal by railways which would be used for more urgent requirements. Further research development in nuclear power and gas power can result substantial savings in equipment requirements and railway congestion. The economic trade-offs in the field of energy resources and transport are in any event formidable and the pay-offs promised by combined planning are obvious.

Localisation of Industries :

Keeping in view the transport requirements, the policy makers have an opportunity to locate factories and other industrial establishments [illegible] whereby unnecessary transport burden can be avoided. Heavy industries can be established where the water-ways have easy access and industrial sites can be selected to balance the flow of railway traffic. Demands of such industries for transport are of different nature because they require bulk carriers to supply them with raw materials and despatch the finished products. Similarly, demands of transport agricultural sector are also sensitive to season. During harvesting period demands of transport will grow exponentially. To cope with such problems of mobility, planning at Central Government level is

essential. Congestions in major rural and urban production centres are harmful for economic development and India can learn lessons from the better experiences of western industrial countries who have permitted uncontrolled growth of cities. Proper analysis of impact of urbanisation and industrial location is, therefore, necessary for planning transport requirements of the country.

Transport Technology :

India is a developing country and it is possible for her to choose the appropriate transport technology keeping the following factors in the forfront: the trend of transport methods today; comparative transport costs and capabilities; the broader influences of transport costs on production and distribution costs; the net effects on development of several methods of transport; and the further potentials of transport innovations that may alter the cost and quality of the several methods of transport in foresecable future. All these factors need to be weighed in arriving at choices of transport methods to promote maximum economic progress.

The world is on the threshhold of a new revolution in transport technology, and for the first time in the 5000 years, the wheel is being desplaced

as the symbol of transport progress. Ground reaction vehicles, gas turbine car engines, electric propulsion vehicles and other innovations in the field of transport technology have brought new hopes which will further reduce the cost of operation and increase in payloads. But for countries who are in the initial stage of development cannot try their hands on such latest models. For them it will be wise to go for extensive R&D efforts to find out the economically viable and efficient mode of transportation system to suit their economic, social and cultural background of their country.

Developing countries should go for improving their highway construction programme to reduce transport cost. Such programme may be accelerated by greater use of local materials by improving techniques for soil stabilization, using sand-clay and soil cement mixture as well as the oil and chemical binders. Duplication of efforts in the direction of R&D should also be avoided. This will require a clear policy on scientific and technological research in the country.

India is an agricultural land where a majority of population live in villages spend their time in

farming and other cottage industries. It is necessary that transport requirements of such a large population should be met with greater priority and to solve their problems the road transport is the only solution. Railways and water transport as bulk carrier s are cheap for long distance haul, but the road transport continues to be the most rapidly expanding method of transport. Specially for short hauls, high value commodities, perishables and small consignments road transport affords the best means of providing access to land and other resources, and affects the lives of the largest number of people. The fact that road transport comprises a much larger network of routes than either rail or water transport makes, it the universal method of movement.

The role of road transport cannot be under estimated if the objective of providing an access to every nook and corner of the country is to be fulfilled. Attempts to frustrate the development of road transport in the country to save the railways will bring a set-back in the development of rural areas. On the contrary, efforts are needed towards rail-road coordination so that one mode may act as a complementary to the other.

Now we must understand more clearly the need to establish national goals to formulate transport policies and programmes on the basis of these goals and to look at the transport network as an integrated system. National objectives will not be achieved if transport is either overemphasized or under-emphasized to the detriments of education, housing, urban renewal and other economic and social goals.

The task of overcoming poverty is global one and the scientific and technological means of achieving abundance are at hand to meet the challenge. One of the pre-conditions for success is a well conceived attack on transport aspects of the problem. What is required is a coordinated programme of development at the national level that will create the standards of mobility on which the rest of the development efforts depend.

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A P P E N D I X

APPENDIX - A

20-Year Road Plan Formulae :

These five formulaes are given below :

(i) National Highway (km) $= \frac{A}{64} + \frac{B}{80} + \frac{C}{96} + (32K + 8M) + D$

(ii) National Highways + State Highways (km) $= (\frac{A}{20} + \frac{B}{24} + \frac{C}{32}) + (48K + 24M + 11.2M + 1.6P) + D$

(iii) National Highways + State Highway + Major District Roads (km) $= (\frac{A}{8} + \frac{B}{16} + \frac{C}{24}) + (48K + 24M + 11.2N + 9.6P + 6.4Q + 2.4R) + D$

(iv) National Highways + State Highways + Major District Roads + Other District Roads (km) $= (\frac{3A}{16} + \frac{3B}{32} + \frac{C}{16}) + (48K + 24M + 11.2N + 9.6P + 12.8Q + 4R + 0.8S + 0.32T) + D$

(v) National Highways + State Highways + Major District Roads + Other District Roads + Village Roads i.e., all roads (km) $= (\frac{A}{4} + \frac{B}{8} + \frac{C}{12}) + (48K + 24M + 11.2N + 9.6P + 12.8Q + 5.9R + 1.6S + 0.64T + 0.2V) + D$

where

A = Developed and agricultural area, km^2

B = Semi-developed area, km^2

C = Undeveloped and uncultivated area, km^2

K = Number of towns with population over 1,00,000

M = " " " range 1,00,000 - 50,000

N = " " " " 50,000 - 20,000

P = " " " " 20,000 - 10,000

Q = " " " " 10,000 - 5,000

R = " " " " 5,000 - 2,000

S = " " " " 2,000 - 1,000

T = " " " " 1,000 - 500

V = " " " " below 500

D = Allowance of 5 percent for further development and other unforseen factors.

APPENDIX - A

Nagpur Plan Formulae :

The total length of first category roads and National and State Highways and Major District roads in km is given by the formulae :

$$NH + SH + MDR \text{ (km)} = \frac{A}{8} + \frac{B}{32} + 1.6N + 8T + D - R$$

where

A = Agricultural area, km^2

B = Non-agricultural area, km^2

N = Number of towns and villages with population range 2001-5000

D = Development allowance of 15 percent to be provided for agricultural and industrial development during the next 20 years.

R = Existing length of railway track km

The total length of second category roads for other District Roads and Village Roads in km is given by the formulae :

$$ODR + VR \text{ (km)} = 0.32\,V + 0.8Q + 1.6P + 3.2S + D$$

where

A = Number of villages with population 500 or less

Q = Number of villages with population range 501-1000

P = Number of villages with population range 1001-2000

S = Number of villages with population range 2001-5000

D = Development allowance of 15 percent for next 20 years.

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