

**PRICING AND COSTING OF RAILWAY SERVICES  
WITH SPECIAL REFERENCE TO INDIAN RAILWAYS (A REVIEW)**

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Pricing and Costing of Railway Services  
with Special Reference to Indian Railways  
(A Review)

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## C O N T E N T S

	<u>Page</u>	
ACKNOWLEDGEMENTS	(i)	
LIST OF TABLES	(iii)	
 <u>Chapter</u>		
I	INTRODUCTION	1
II	PRICING OF TRANSPORT SERVICES - SOME THEORETICAL INSIGHTS	15
III	COST-PRICE RELATIONSHIP IN GOODS TRAFFIC	47
IV	COSTING AND PRICING OF PASSENGER TRAFFIC	80
V	SUMMARY AND CONCLUDING REMARKS	106
BIBLIOGRAPHY		113

LIST OF TABLES

<u>Table No.</u>		<u>Page No.</u>
1.1	Growth of Freight and Passenger Traffic	6
1.2	Utilisation of Wagon since 1950-51	8
1.3	Financial Performance of Indian Railways	10
1.4	Trends in Earnings and Staff Cost	12
2.1	Classes of Output Related Units, their Technical Forms and Conventional Averages	20
2.2	Cost Data for Transport Undertaking with Cost Discontinuities	37
3.1	New Freight Structure Adopted with Effect from 1.10.1948	49
3.2	New Freight Structure Adopted since 1.10.1948 for Wagon Loads	50
3.3	Freight Structure Adopted with Effect from 1.10.1958	54
3.4	Base Scale of Class 100 Suggested by RTEC	58
3.5	Distance Blocks for Computation of Freight Charges	58
3.6	Base Scale (Class 100) Adopted by Government with Effect from 1.4.1983	59

<u>Table No.</u>		<u>Page No.</u>
3.7	Minimum Weight Conditions for Bulky Commodities for Wagon Load and Train Load and their Average Lead	75
4.1	Growth of Passenger Traffic from 1950-51 to 1985-86	81
4.2	Growth of Passenger Kilometres During 1950-51 to 1985-86	82
4.3	Composition of Passenger Traffic	83
4.4	Average Distance Travelled by a Passenger (Average Lead)	84
4.5	Basis of Charges for Mail/Express Trains from 1.4.1948 to 1.4.1951	87
4.6	Basic Class 100 Scale with Effect from 1.4.1983	91
4.7	Distance Blocks Adopted	91
4.8	Indices for Various Classes in Relation to Class 100 Base Scale	92
4.9	Percentage of Passengers Travelling with Season Tickets and with Single Journey Tickets	96
4.10	Unit Cost and Unit Revenue Per Passenger Kilometre	103

## CHAPTER I

### INTRODUCTION

#### Background

The Indian railways are the principal mode of transport in the country and the world's second largest railway system under one management. With an investment of Rs. 13307 crores and employing nearly 1.6 million persons, the railways are the largest nationalised undertaking in the country.

When on 16.4.1853, the first railway ran along for 21 miles from Bombay V.T. to Thana, it all started as a commercial enterprise. In 1920, there were as many as 175 separate (private) railway systems, some of the more important companies being G.I.P., B.B. & C.I., East India etc. Naturally the objective of these private companies was profit making. After the First World War, the government entered the rail business in a significant way by terminating the contracts of most of these private companies. This process continued till 1950, when 42 railway systems were merged and 'Indian Railways' as a public sector undertaking came into existence. The administration of the Indian railways gradually gained in dimensions and was turned into a separate department with the

'Railway Board' as the top executive authority, which later evolved as the 'Ministry of Railways'.

In the British period, the railways were introduced for political and commercial purposes. But with independence and nationalisation of railways, the railways role in the economy became significant. "Before independence, the transport system comprising mainly railways and roads was developed primarily to provide communications with the major ports and large cities, keeping in view the administrative, strategic and trade imperatives of that time. The focus changed after independence as, along with rehabilitation of railways and construction of high ways, which were damaged or neglected during World War II, concern was simultaneously shown for the first time for rebuilding the transport network and linking it with developmental needs of the economy. With the initiation of industrial development programme, however, the main objective underlying the planning of transport system was a systematic movement of raw material to plant sites and of finished products to the point of consumption, particularly in respect of steel, power and heavy industry. Further the needs of the inter city and urban passenger movement were brought into focus."<sup>1</sup>

After independence was achieved, the entire approach to the governing of the country was changed. The concept



of the welfare state gained ground. For the state, the directive principle was to promote welfare of people by securing social order in which social, economic and political justice will prevail. Naturally in such a situation, the role of railways as a public undertaking was to aid in the development of major industries, to prevent bottlenecks in the production process as far as movement of inputs and products were concerned, to contribute to the development of backward areas and above all, to ensure an efficient transport system. Therefore, the development of the railway system went side by side with industrial progress in many regions. Increase in goods traffic was due to industrial expansion and railways have had a significant share in the movement of ore and minerals, iron & steel, coal, fertilisers, food stuffs, POL products, heavy machinery etc. It would perhaps not be an exaggeration to say that some of the major industries e.g. cotton mills in Bombay, jute industry in West Bengal, tea industry and POL products in Assam, coal and steel industry in Bihar & Orissa etc. have been able to develop primarily because of the support provided by the railways.

Along with India's planned development, the Indian Railways also progressed and have passed through three main stages. In the first stage confined to the first two Plans, the railways were mainly concerned with

rehabilitation and replacement of assets. During this period, the foundation was laid for achieving self-sufficiency in rolling stock and other equipment by setting up factories. The rehabilitation and modernisation of railways assets was undertaken with a view to increase the line capacity and rolling stock so as to meet the growing demand for rail transport arising as a result of planned investments in core industries such as coal, iron ore, iron-steel, cement, fertilisers etc. The second stage beginning with the third plan was marked by an emphasis on the development of sufficient capacity to support the expanding industrial and agricultural activities. In this stage, a beginning was also made in the modernisation of traction through dieselisation, electrification and improvement in signalling etc. Since then in the third stage i.e. in the corporate plan from 1975-85, the main thrust has been to increase the capacity of goods traffic by improved utilisation of existing assets and achieving better performance. Though these efforts have led to considerable growth of the railways by way of expansion of the rolling stock, modernisation of operational techniques, thereby leading to increase in traffic, the supply of railway services has been lagging. Moreover, there is also a widespread feeling that the railways have not enlarged their network to take care of increased regional specialisation that is taking place

and the need to develop alternative routes to the more congested ones. The revised corporate plan (1985-2000) envisages, among other things, further augmentation of capacity both for passenger and freight traffic by providing for technical upgradation of the system, reduction in operational cost, complete conversion from steam to diesel/electric traction and expansion of the network to link backward areas.

#### Operational and Financial Performance of the Railway System

Since 1950-51, the absolute share of traffic on the Indian Railways has been increasing. The growth of freight traffic in terms of the originating tonnage and tonne kilometres and passenger traffic in terms of passenger originating and passenger kilometres are given in Table 1.1.

It is observed that freight traffic in terms of originating tonnage increased from 73.2 million tonnes in 1950-51 to 277.8 million tonnes in 1986-87 and during the same period tonne kilometrage increased from 37,565 to 2,14,096 millions; while the originating tonnage increased four-fold, tonne-kilometrage increased by six times thereby indicating greater leads of traffic flows, as can be also observed from Table 1.1. Such a trend is also noted in the case of passenger traffic though the growth in lead has been relatively slower. But since

**Table 1.1 : Growth of Freight and Passenger Traffic**

Year	Goods traffic (in millions)		Passenger traffic (in millions)		Average lead (kilometres)	
	Tonnes origi- nating	NTKMS*	Passen- gers origi- nating	PKMS**	Frei- ght	Pass- engers
1950-51	73.2	37,565	1,284	66,517	470	51.8
1955-56	92.2	50,435	1,275	62,400	510	48.9
1960-61	119.8	72,333	1,594	77,665	561	48.7
1965-66	162.0	98,978	2,082	96,294	576	46.2
1970-71	167.9	1,10,696	2,431	1,18,120	648	48.6
1975-76	196.8	1,34,874	2,945	1,48,761	664	50.5
1980-81	195.9	1,47,652	3,613	2,08,558	720	57.7
1986-87	277.8	2,14,096	3,580	2,56,468	726	71.6

\* NTKMS = Net Tonne Kilometres i.e. total distance travelled by goods traffic

\*\* PKMS = Passenger Kilometres i.e. total distance travelled by all passengers

Source : Government of India, Ministry of Railways, Annual Reports & Accounts 1986-87.

1983-84 the number of passengers has been slowly reducing while passenger kilometres have increased. It can be inferred that short distance passengers have been diverted to roads while the railways are catering to more long

distance travellers. In the case of freight traffic, it is observed that "Rail traffic of high valued commodities for which freight rates are generally higher than the rates charged by the road hauliers exhibited a declining trend. But the proportion of bulk commodities which have comparative low unit values and for which rail freight is relatively low, has been on increase."<sup>2</sup> This is substantiated by the fact that the share of bulk commodities in total freight traffic has increased from about 55% in 1950-51 to 90% in recent times.

As a result of modernisation programmes and upgradation of technology, the performance the Indian Railways has been gradually improving in the eighties. High capacity wagons are being hauled with powerful locomotives to boost productivity. The figure 'wagon kilometres per wagon day' which is the efficiency indicator for utilisation of a wagon shows the mobility of a wagon on an average during a day. But a more comprehensive index of wagon utilisation is 'net tonne kilometres per wagon per day' which indicates not only mobility of wagons but also their pay load. Figures of different indices of wagon utilisation since 1950-51 are given in Table 1.2.

However, the improvement in the wagon usage was very marginal upto 1980-81 on both gauges. But from 1981-82, it has been significant. NTKM per wagon a day on BG and

Table 1.2 : Utilisation of Wagon since 1950-51

Year	Wagon kms per wagon day		NTKM per wagon a day		Turn around time of a wagon	
	BG	MG	BG	MG	BG	MG
1950-51	62.3	52.2	710	304	11.0	NA
1960-61	76.9	51.6	998	405	11.2	7.2
1970-71	73.4	58.4	908	524	13.3	10.1
1975-76	76.8	56.4	982	545	13.5	11.6
1980-81	73.4	47.3	986	522	15.2	15.3
1982-83	86.4	50.4	1,123	576	12.8	13.8
1983-84	88.7	49.7	1,112	577	13.0	14.2
1984-85	90.8	50.3	1,150	565	12.8	14.8
1985-86	97.8	58.8	1,296	677	12.0	14.3
1986-87	106.6	64.4	1,420	703	11.6	12.7

Source : Ministry of Railways Year Book 1986-87.

MG has almost doubled as compared to corresponding figures in the fifties. However, there has been no reduction in the turn around time of a wagon\* which is also a composite index of efficiency, increase in which can cause shortage of wagons by permitting lesser number of trips within a specified period of time.

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\* Average time lag between two successive loadings of a wagon.

Though the absolute share of Indian Railways in transportation of freight and people has increased, their relative share, it appears, has been continuously declining. The percentage share of railways in carrying freight traffic has declined from 89 per cent in 1950-51 to 68 per cent in 1977-78.<sup>3</sup> During the same period the percentage share of passenger traffic has also reduced to 41 per cent in 1977-78 as compared to 74 per cent in 1950-51.<sup>4</sup> According to the corporate plan of the Indian Railways (1985-2000) the rail share of freight traffic in 1984-85 has fallen to 58 per cent.

#### Financial Performance

Before 1924, railway finances were a part of general finances of the Central Government. In 1924, on the recommendations of the Acworth Committee, they were separated from general finances. The Government of India, being the sole shareholder of the railway system in India, invests in it for which the railways have <sup>to</sup> pay a dividend which is determined by the Railway Convention Committee constituted by parliament from time to time.

The railways are expected to meet their operating expenses, provide for maintenance of assets as also renewals and replacements. In addition, they must earn a surplus to provide for dividend contribution, other commitments such as Development Fund, Pension Fund etc.

Figures relating to railway finances are given in Table 1.3.

Table 1.3 : Financial Performance of Indian Railways

(Crores)							
Year	Total earnings	Total expenditure	Net earning	Dividend to GR	Surplus (+) Deficit (-)	Operating ratio (%)	Capital investment
1950-51	263	215	48	33	+15	81.00	855
1955-56	316	266	50	36	+14	81.93	1,102
1960-61	460	373	87	55	+32	78.75	1,869
1965-66	734	599	135	116	+19	78.30	3,255
1970-71	1,007	862	145	165	-20	84.13	4,099
1975-76	1,775	1,638	137	198	-61	89.32	5,345
1980-81	2,703	2,576	127	325	-198	96.07	7,448
1986-87	7,683	7,002	680	578	+102	92.20	13,306

Source : Ministry of Railways, Annual Reports & Accounts, 1986-87.

It is observed that the financial performance of the railway since 1950-51 has been quite disappointing. While in the first fifteen years, they were able to generate a net surplus after provision for depreciation and dividend payment, in the next decade they were not even able to meet the dividend liability. The performance in



the last decade has, however, been better with the later years showing reasonable surpluses. In terms of returns to the capital invested, the net surplus averaged just about 4.5 per cent over the entire period. It must be noted that low contributions to the Depreciation Reserve Fund in a number of years have been responsible for surpluses. This was pointed out by the Rail Tariff Enquiry Committee (1980).

The main reasons for the adverse financial position of the system are (1) obligation to run uneconomic lines, (2) tariff fixation at unrealistic levels and (3) operational inefficiencies on the system. In regard to operational performance, a study of Productivity Trends on the Railways indicated that despite improved operational efficiency between 1960-61 and 1972-73, the financial position of the railways deteriorated to a considerable extent. This was mainly attributed to the failure of tariffs to keep up with cost increases. In fact, according to the Corporate Plan of the Railway (1976) tariffs in 1975-76 were only 67 per cent of what they were in 1960-61 when adjusted for price changes which meant, essentially, an average annual reduction of tariff in real terms of 2.5 per cent as against an estimated annual average increase in productivity at the rate 2 per cent. The growing gap between increases in earnings and a

enhancement of costs (staff expenses) can be seen clearly from Table 1.4.

Table 1.4 : Trends in Earnings and Staff Cost

	1950-	1955-	1960-	1965-	1970-	1975-	1977-	1978-
	51	56	61	66	71	76	78	79
Average earnings per pass. km.	100	115	116	154	169	234	238	303
Average earnings per tonne km.	100	111	122	145	172	257	273	278
Average cost per railway employee	100	117	142	185	269	481	512	541

Source : V. K. Sthanunathan, Railway Economics, p. 78.

To be financially viable, it is necessary to ensure that tariffs are adjusted suitably to compensate for increases in the cost of operations. Moreover, in the context of development plans, it is very essential for the railways to generate adequate funds for investment. To ensure this, there is need for an appropriate pricing strategy. It is in this context that an attempt is being made in this thesis to review pricing policies in regard

to railway services as they evolved since the early fifties taking into account the recommendations of the various Expert Committees that have been appointed from time to time to examine the tariff structure from the point of view of the desirable aspects as well as weaknesses of these policies.

Our study has in its ambit data pertaining to the figures of railway statistics from 1950-51 to 1986-87. This scattered data have been collected mainly from annual reports and accounts of railways, reports of the freight and fare revision committees, literature on railways and some information collected from the Railway Staff College, Vadodara.

This study is divided into five chapters. In the chapter that follows an attempt is made to gain some theoretical insights from the literature concerning the determination of level of output and prices in a transportation firm with special reference to railways. In the third chapter, a detailed study of tariffs in regard to freight transport in the Indian Railways is set forth as it evolved over the past three decades, while the fourth chapter deals with the pricing of passenger services on the system. The final chapter provides a summary of our study and some useful observations on it.

References to Chapter I

- 1 Government of India, Report of NTPC 1980, p. 1.
- 2 T. V. S. Rammohan Rao & S. Sriraman, Disequilibrium in Rail Freight Services, p. 6.
- 3 Government of India, Report of NTPC 1980, p. 17.
- 4 Ibid., p. 18.

## CHAPTER II

### PRICING OF TRANSPORT SERVICES - SOME THEORETICAL INSIGHTS

Prices play a key role in economy as they aid in allocating resources between various sectors of the economy. They assume particular importance in the transport sector as transport is an intermediate good and is used in the production of almost every commodity in the economy.

In this chapter, the pricing of output of transport firms is discussed in general with particular reference to the pricing of railway services.

In economics, the 'theory of the firm' tells us about the structure and behaviour of the firms operating under a special set of environmental condition known in aggregate as a market economy. If the market for a commodity is perfectly competitive, then the firms supplying that commodity would be passive as far as price determination is concerned. The price of the product will be determined by the market itself through interaction between demand and supply for the commodity. The firm in such situation is a 'price taker' and the decision regarding price fixation is solved by the market. On the other hand, if market is not competitive, and there are

imperfections in it, i.e. monopoly, monopolistic competition, oligopoly etc. the firms have freedom to fix the price. In this case, the firm is a 'price maker'.

According to theoretical pricing models, the price of a commodity basically depends upon five factors, namely (i) demand for the commodity, (ii) its cost of production, (iii) the objectives of the producers, (iv) nature of its competition in the market, (v) government price policy towards the commodity. This theory presumes, by and large, the goal of profit maximisation for the firm. The conditions for profit maximisation prescribed are:

- (i) Price = Marginal cost for perfectly competitive market
- (ii) Marginal revenue = Marginal cost for imperfect markets

But newer models of the behaviour of large corporations and undertakings have included a variety of assumptions regarding business motivation and non-maximising behaviour in the traditional framework. These have paid attention to the nature and determinants of the forces governing the size and growth of the companies of which they are composed.<sup>1</sup>

As transportation firms compete in money and capital market with other firms, models of firms behaviour can be applied to transportation industries. Other possible strategies pursued by firms are briefly spelt out below with the help of graphs wherever possible.

Firstly short run profits are maximised when the difference between RR (RR means total revenue =  $P \times Z$ ) and CC (total cost of each alternative level of output) is maximum. At output level OA,  $MC = MR$  and hence the profits are maximum.

For a transportation firm, the revenue curve derived from the demand function and cost curve derived as a function of output are shown in Figure 1.

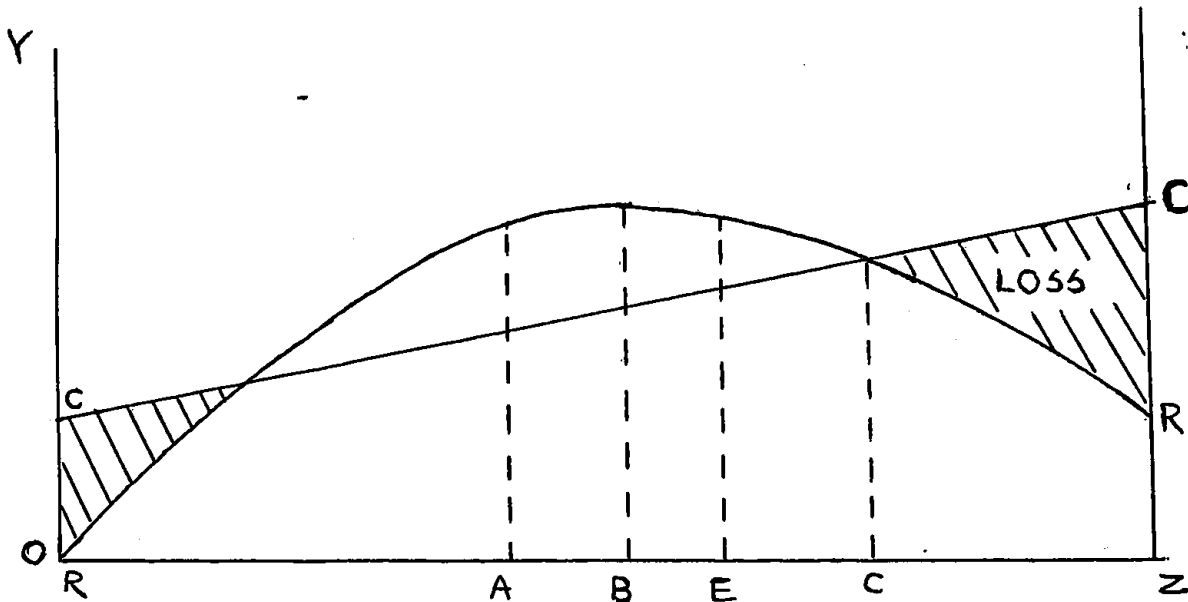


FIG. 1

Secondly, revenues are maximised at point B when explained with the shape of present RR curve (Figure 1). At this point  $MR = 0$ .

Thirdly, as shown in Figure 1, if passengers/freight are carried to the extent of break even point C,

the sales can be maximised. Here the firm is not interested in profits but attracting more customers on no profit no loss basis.

Fourthly, volume maximisation occurs when the firm is motivated by the objective of carrying as many customers as possible and to exploit all available resources/capacity though there are short run losses (Point D in Figure 1).

Fifthly, being extremely cost conscious, some firms pursue the objective of cost minimisation and fix volume of output where average cost is minimum or  $AC = MC$  (As shown in Figure 2 at Point E). This objective is pursued for minimising risk.

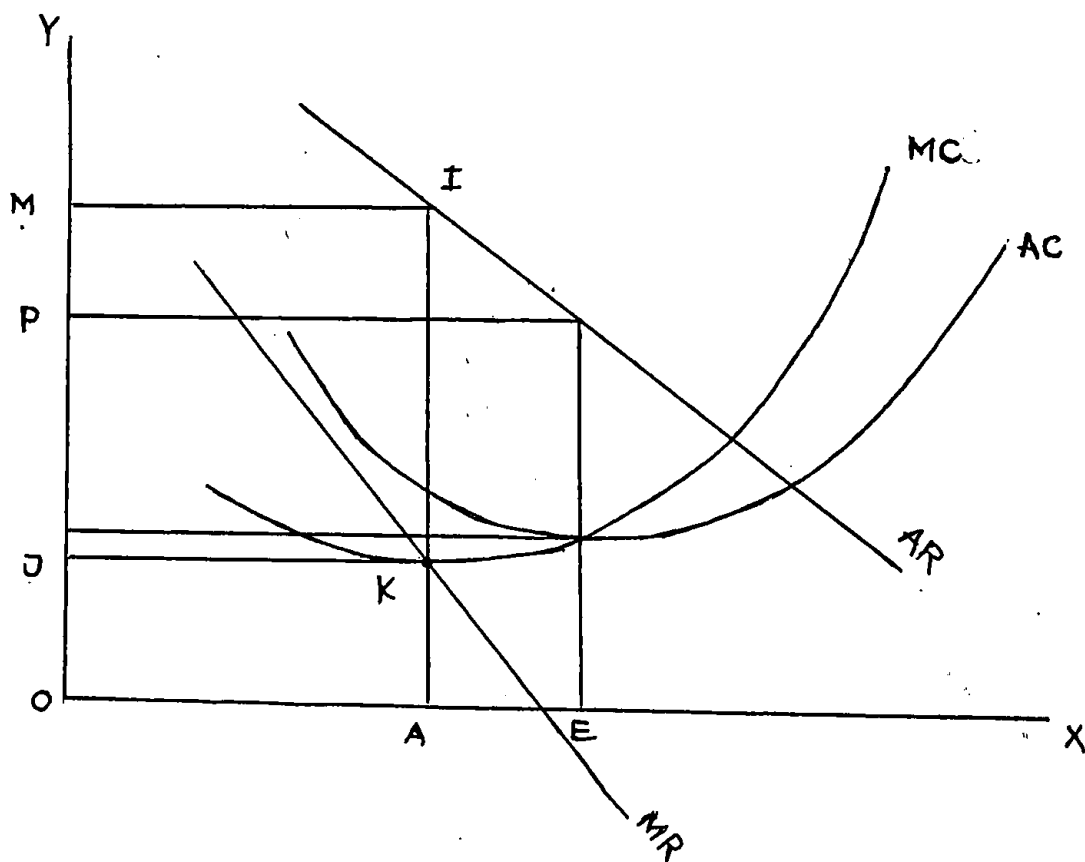


FIG. 2



Sixthly, many times, firms desire to maximise sales subject to the condition that profits do not fall below some specified minimum value. In such case, the firm would determine the level of output of Point E or any other point between A (maximum profits) and Point C (no profit no loss) as shown in Figure 1.

Numerous other objectives could be pursued by firms in practice. These are mainly maximisation of firms utility function, of its rate of growth of output, management's own security and stability etc.

At this stage it would be useful to digress a bit and consider the cost dimensions of output in transport.

#### Some Cost Relationships (With Special Reference to Railway Services)

From economic theory, we get the terms fixed, variable average and marginal costs and the concept of increasing and decreasing costs. These costs are ultimately related to the unit of output. In transportation, the unit of output is the ton mile/kilometre or the passenger mile/kilometre.

In the context of cost relationships, there is a problem of the exact definition of output unit or commodity unit. With the change in the definition of output, cost calculations also change. Similarly, cost calculations change in the short run or in the long run

situations or any sequence of time periods, when associated critically with selection of output units. However, in the context of railways, ton mile/kilometre or passenger mile/kilometre is considered as the selling or market unit.

In transport, in order to simplify cost analysis, output units can be attributed to several classes which are distinguishable from each other but still are related in the whole production process. For the railways, technically speaking, five classes of units can be chosen : line unit, hauling equipment unit, movement unit, load and consumer units (Table 2.1).

Table 2.1 : Classes of Output Related Units, their Technical Forms and Conventional Averages

General class of unit	Railway : Technical form	Common denominator
1. Line	Right of way, main track	Line mile
2. Hauling equipments	Terminals, rolling stock engines	Equipment mile
3. Movement	Train	Train mile
4. Load	Car load	Load mile
5. Consumer	Shipment Passenger	Ton mile Passenger mile

Source : Troxel Emery, Economics of Transportation, p. 95.

The above order is associated with the technological character of the production process. Line and hauling equipments are required before movement units, along with load units and consumer units which are the ultimate technical forms. Though total, variable and incremental cost can be conceived for each unit types, cost of one sort of output unit extends to further kinds of output units in the production process. That means the cost of output units are not exactly divisible between them. Even if cost-output relations are not directly divisible among unit types, the production process still contains a set of output forms that fit together necessarily in a larger aggregate called 'transportation'.<sup>2</sup>

All these units have interrelation in cost behaviour e.g. line and equipment units are formed considering eventual load and consumer units. It is obvious therefore that the cost of <sup>a</sup> particular class of unit cannot be subdivided directly amongst units of that class only, but has to be spread over further eventual output units.

Given the above configuration, we now discuss the cost relations within a particular class of unit and then arrive at the total cost.

#### Cost of Line Unit

Some inferences can be drawn from evidence of increasing or decreasing cost relations of the line unit.

1) Average cost of line unit can be varied according to the number that are grouped together in the construction process. In the construction of the line unit, cost per mile/kilometre reduces as the length of contracted line increases. But this advantage is only upto a certain length of the line unit. Beyond that limit, the average cost increases.

ii) Changes in terrain, differences in surface may increase cost of the line unit. Hills, trees, mountains, slopes rocky soil etc. increase the cost of road-bed.

iii) Variations in weather, temperature, floods, storms, snow falls etc. are also sources of differences in line unit cost.

iv) Terminals which are a part of the line unit need separate attention. A terminal is a place where movements of the line segment are organised-where they begin and end. The terminal area provides for organisation of trains, load transfers, in-terminal movement of goods, storage of hauling equipments etc. Capacity size of a terminal is considered by movement of trains. As the number of trains increase, additional land at increasing cost is to be purchased causing increase in cost. If the quantity of loading and unloading increases beyond limit, the railways can provide for mechanical equipment which would substitute labour and render some economies of

technical size. But other cost effects occur viz. requirement for more storage space, congestion of operation, etc.

### Haulage Equipment Unit

The cost of haulage equipment is incurred before actual movement and therefore is investment cost. The units are primarily motive power and wagon equipment units. The economies of technical size, appearing as decreasing average cost per unit of potential output, can occur only when size of equipment unit increases.

Economies can be realised by providing for least cost designs for successively larger capacities per equipment unit. If wagons are built to maximum capacity sizes, the cost per year, per space, per weight <sup>unit</sup> will decrease. Engines of higher tractive power means decreasing average cost per unit. Line conditions, gradients, curvature, solidity of surface also affect the potential output of equipment units. Further, low temperatures decrease the maximum output capacity of motive power units.

### Load Movement Units

Movement unit is the arrangement of equipment units that are intended to operate over an available line. Movement cost is mainly variable cost of the railway movement unit-trains-largely consists of fuel, train

staff or any other in-terminal costs. If the speed of a train increases, there are some economies and diseconomies. Fuels cost are variable relative to train speed. "Starting from a no-speed or standing position, a railway locomotive has decreasing fuel costs per distance unit as it gathers speed. Then after a least cost position of fuel consumption is reached at some speed rate, the locomotive shows an increasing fuel cost per mile as the rate of speed increases."<sup>3</sup>

The diseconomies resulting from high speeds are increasing wear and tear of rails, road bed and possibilities of accidents. Movement costs depend upon the number of stops. With the increase in number of stops, the train movement cost increases. Within a certain line segment, movement cost varies with number of trains. If there is congestion the problem of labour supervision and direction arises. When two or more trains run on the same track in the same direction, slow down of leading trains slows down others also. On a single route, when the number increases in both directions, there are increasing number of meetings and passings. In such cases, there are possibilities of side tracking or accident which both cause increasing cost conditions.

#### Back-haul Cost of Movement Unit

Many times, transportation involves a round trip

movements. In case of the railways, if a train is scheduled to go one way and is to be returned empty to its original point the additional cost of return journey is back-haul cost. This cost can be zero or sometimes negative when back-haul movement fetches revenue more than the cost incurred. When a train has already finished its trip from A to B and now carrying load back to A, the back-haul cost would be

$$TC_{ba} + (TC_d - TC_e) + TC_h^t$$

where

$TC_{ba}$  : Handling cost in picking up and unloading the back haul traffic

$TC_d - TC_e$  : Difference between movement unit cost of returning B to A loaded and empty

$TC_h$  : Crew and maintenance cost during h period of time

h : Amount of weighing and loading time at B and unloading at A

It is also likely that there may be loss of net revenue by waiting at B instead of returning immediately to A. In this case, the back haul cost becomes

$$TC_{ba} + (TC_d - TC_e) + TC_h + (TR_n - TC_n)$$

where

$TR_n$  : Chances of getting probable revenue with the same movement unit by carrying traffic from A to B during h period of time.

TC n : The most probable cost that is to be expected to be incurred to move from A to B during h period of time.

### Consumer Unit

Once costs are incurred for lines, equipment units, movement units and load units, consumer unit costs are incurred for in-station services for travellers, printing and selling of tickets, way billings and other office costs.

Having discussed separate cost-price relationships of output units, the next problem is to fit together the cost structure of these classes of units into a whole transportation process.

One approach is to figure out the minimum cost of transport for a certain volume of output. Then, for each divisible quantity of load or consumer units, the minimum total cost is calculated by varying factor proportions, the plant unit designs, and number of equipment units or the number of movements, by varying the relationship that further minimises the aggregate cost of each quantity. Thus the cost schedule of different volume of output is constructed. In this aggregative approach, the cost relationships of individual classes of output are ignored.

In the next approach, marginal and average cost relationships are established for different classes of output units.



The marginal cost approach is discussed in detail in the next section.

### Fixation of Tariffs

#### Some Cost Concepts

Resource cost of a product or service is the cost to the economy or society of actual resources utilised in its production. Resource cost includes three components which are as follows:

i) Cost to the operator which is borne by the transportation firm in operating a transport network, i.e. maintenance, repairs, and operating cost of rolling stock, overhead cost and investment cost for generating additional capacity.

ii) Cost to the user which includes specific cost borne by exclusively by the user, i.e. charges incurred for home to station trip, cost of time spending in travelling and waiting, degree of comfort etc.

iii) Social Costs - These are borne by society or community and of two types (a) infrastructural cost of provision of roads, ports etc. (b) cost involved in externalities such as accidents, pollution, congestion etc.

The concept of resource cost is useful in transport pricing from society's view point but a particular transport firm considers operator cost rather than resource cost.

### Fixed and Variable Costs

The dichotomy between two types of costs is related to the fixed and variable nature of the factors of production. In the short run, some factors are fixed while others can be varied with change in output. But over a longer time, every factor is regarded as more or less variable.

### Fully Distributed and Marginal Cost

Fully distributed or average costs are distributed over larger output which decrease upto a point with expansion of output and then increase. The concept of average cost is useful where prices are fixed on cost plus basis. But in transportation, a firm's investment is guided by long run marginal cost rather than average cost. That means, for operating a service, efficiency criterion requires incremental cost be equal to incremental revenue. Thus marginal costs are relevant to decisions regarding both output level and pricing. The average cost helps in determining mark-up over marginal cost especially where policy aim is to generate internal resources.

### Specific, Common and Joint Costs

In the case of a multiproduct, transportation firm like the railways, other cost concepts such as specific, common and joint costs are important.

Specific costs are incurred in production of a particular product which with due notice can be avoided by ceasing to make a product, i.e. cost of wagons and coaches can be attributed to freight and passenger traffic.

Common costs are incurred in the production of two or more products where it is cheaper to produce them together than separately. The level of common cost would decline if production of one of the product would cease that means the level of common cost is responsive to changes in the required level of output in any one of the product i.e. if a freight traffic is withdrawn from a particular route, the cost of track maintenance signalling boxes etc. would decline.

Joint costs are those costs incurred for the production of two products the level of which will not change with the abandonment of any of the separable outputs.

An explanation of these cost concepts in the context of railway operations could be as follows:

To have a railway route open for traffic, there must be necessary earth work and one line of permanent way. The cost of maintaining earth work and providing one line of permanent way is fixed as long as a route is open to all and is joint to all traffics which use the route. This is a joint cost.

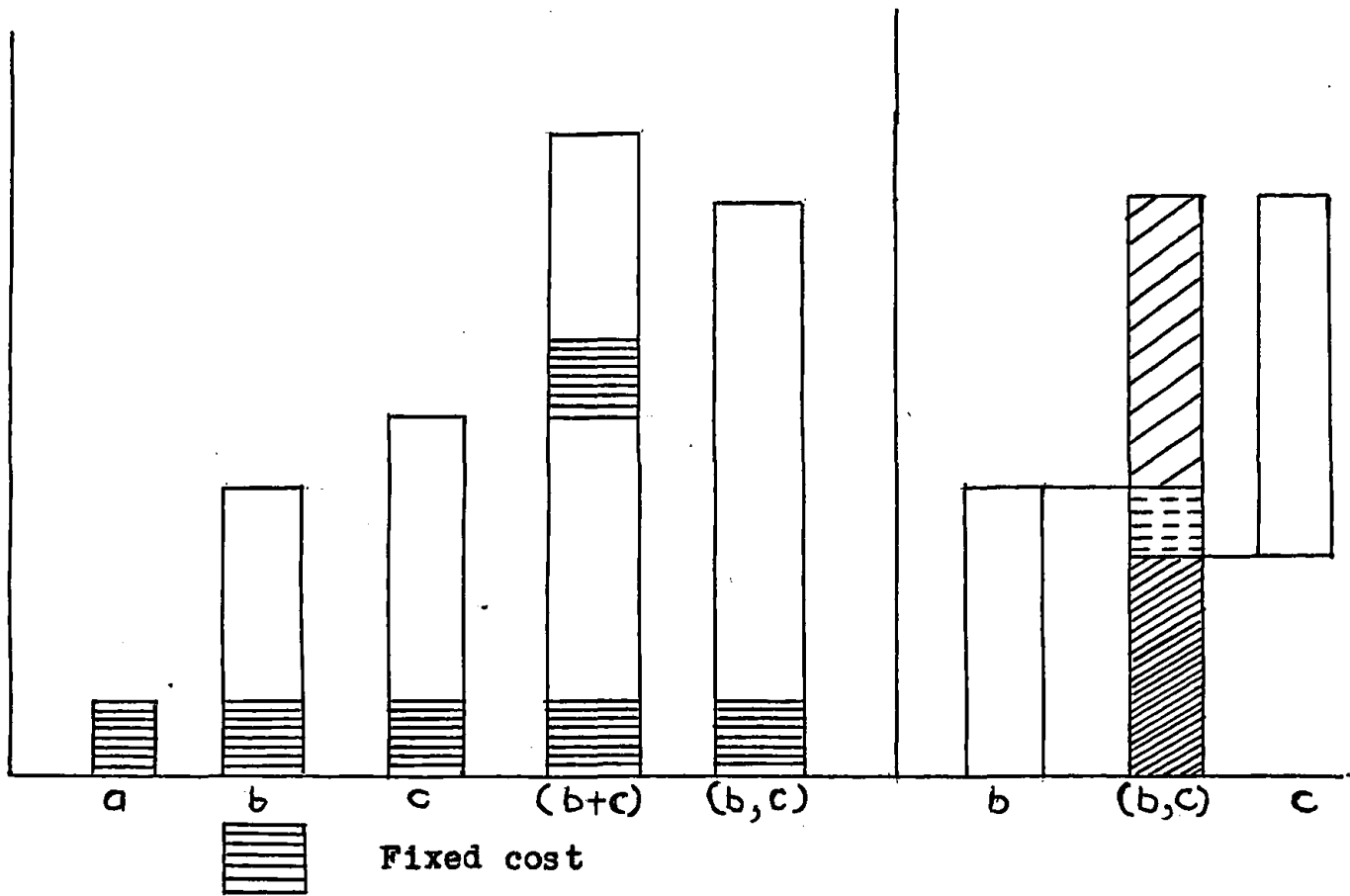
If <sup>a</sup> route is to be worked by more than one train at a time, it will require signalling facilities and crossing loops and multiple track. Cost of these fixed facilities in excess of earth work and minimal maintenance of single track is common to both traffic if route is used by passengers and goods traffic. Its level will be determined by aggregate requirements and the degree to which their requirement is complementary.

The specific cost of the route is the cost of actual wear and tear caused by passage of trains and any signalling operation cost which would be avoided if a particular train did not run.




From Figure 3 (costs shown are imaginary) it is obvious that the pure (fixed) joint costs and de facto (common) joint costs form a far smaller portion of the total cost. The remainder, being caused by individual traffics, can be avoided by varying the traffic concerned. The study of these costs is also useful to identify whether net revenue (after covering specific cost) of a particular traffic is adequate to cover the fixed and joint costs and if not, to what extent, one type of traffic is bearing the losses caused by another.

In this context, it would perhaps be useful to touch upon the controversy on the role of joint costs in the context of the railways. According to one view, it is felt that expenses on railway services are incurred

Figure 3



**Legend**

- |   |   |
|---|---|
| <p>a - Route open</p> <p>b - Route open, passenger traffic only. Fixed cost is a + extra facilities for passenger traffic.</p> <p>c - Route open, freight traffic only. Fixed cost a + extra facilities for goods traffic</p> <p>b+c - Total cost if passenger and goods traffic is moved separately</p> <p>(b,c) - Total cost if passenger &amp; goods traffic combined on one route</p> | <p> To be recovered from freight traffic</p> <p> To be recovered from passenger traffic</p> <p> Common cost + fixed cost to be recovered from both traffic</p> |
|---|---|

Source : S. Joy, Pricing and Investment in Railway Freight Services

jointly, a typical illustration being the production of a number of outputs by a single plant simultaneously at joint and indistinguishable cost. Accordingly, joint costs have a dominant role to play. On the other hand, it has been suggested that it is difficult to accept the plea of joint supply of railway service in the primary sense that production of one output does not necessarily results in the production of the other. By definition, a characteristic of joint products is that they have a common origin and one of the products cannot be produced alone. In certain aspects of railway transport, joint costs do prevail. Backloading provides a typical example. When demand is not sufficient to remunerate even the technically minimum sited railway plant, then goods and passenger traffic are jointly produced. In the light of the above discussion, it does appear that it is the common nature of cost rather than joint cost which emerges as a formidable problem in the whole process of rate making.

#### Marginal Costs and Floor Price for Rail Services

Increasing competition in the transportation business necessitates an enunciation of principles which should guide the determination of any floor below which particular rail charges would not be permitted to fall. Similarly there is a debate on the issue whether railway

rate should be cost or market oriented. Considering the role of cost in pricing it shows that rate should be both cost and market oriented.<sup>5</sup>

In discussing fixation of tariffs, the first factor to consider is the nature of the cost structure involved. We have already discussed above the various categories of costs associated with railway operations. The preponderant proportion of fixed costs reveals an essential characteristic of the railway system. This provides the incentive to expand the volume of output in order to benefit from increasing returns available from the existing plant. Historically, the adoption of the value of service principle in rate making has helped in achieving greater utilisation of capacity. The essence of the meaning of the value of service principle is that the railways charge a rate on each commodity that makes the largest contribution to fixed or overhead costs, giving proper consideration to the volume of traffic. In other words, demand factors are explicitly taken into account, in the sense, that rates are proportional to what the shippers can afford to pay which ultimately depends on price that the good seeking transport service would fetch in the market. This principle constitutes the basis for price discrimination by the railways. This aspect will be taken up for discussion a little later. However, the emergence of other modes as competitors to

rail transport has, over the years, diverted high valued items from the railways as a result of which many railway systems have been attempting to charge services on the basis of the cost of service principle as opposed to value-based pricing. Such a task is complicated since it is difficult to determine cost basis as a result of the inability to ascertain the cost of any particular service. Essentially, the problem is one of not being able to arrive at a definite allocation cost between services thereby implying the impracticability of such a principle. Given this background, it is often felt that neither one of these principles can independently serve as an adequate basis for rate making and that both need to be kept in mind while fixing tariffs.

Theoretically while fixing railway charges, it is to be borne in mind that the railways have a high proportion of fixed costs. Thus, rates should encourage a large volume of traffic since fixed costs are spread over a larger output. Because of the long and varied lives of their facilities and inherent uncertainties of forecasting, adjustment of railway capacities to changing requirements is difficult. Unused railway capacity is a chronic problem which necessitates effective steps to retain existing traffic and to attract additional traffic. Moreover, in recent years, the investment on modernisation



of the railways has created increased capacity. In such a situation, choice is to be made to select either fully distributed/average cost or incremental/marginal cost as a guide to determine the price floor of railway services or any other transport industry.

Fully distributed cost derived by apportioning unallocable cost have not economic significance in determining rate floors for particular railway services. The application of such criterion would force the railways to maintain rates above the level which would yield maximum contribution to net income but at the same time would deprive them of much traffic for which they can compete economically.

Marginal cost, on the other hand, provides the best guide for determination of the price floor. The increase in total cost resulting from an expansion of firms output or volume of business is commonly known as incremental or marginal cost. This cost is of vital economic importance for the firm as it provides an essential guide to its pricing policy and level of production. If price of a product or service is to be reduced, one must know whether increase in total revenues from greater volume will more than cover the additional cost that will be incurred. For the whole economy also it is incremental (not fully distributed) cost, <sup>which</sup> is the relevant cost guide to know how much of what shall be produced and how much

should be invested in various lines of production. So incremental cost in comparison with incremental revenue indicate whether output of any commodity is worth producing. For railway also, if pricing is based on incremental cost, it can foster more efficient use of railway resources and capacity and at the same time encourage lower costs and rates.

There are some difficulties of using marginal cost pricing especially where there are discontinuities in the production process and output can be expanded only in indivisible lumps. Closely linked with this difficulty is the problem of choosing between short run and long run marginal cost as a basis for pricing. It will be clear from the following imaginary example. (Table 2.2)

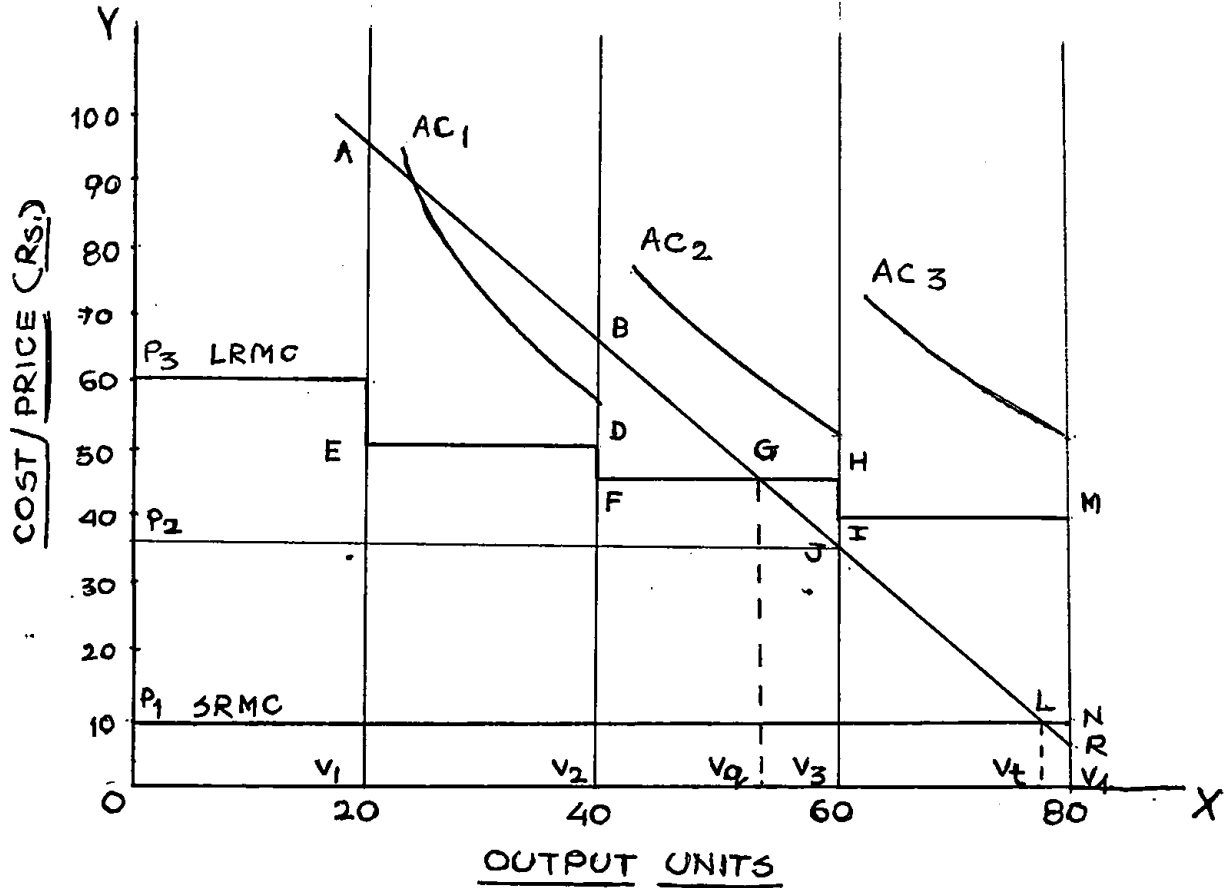
As shown in Figure 4, transportation firm increases output capacity by indivisible lumps of 20 units. It is assumed that long run marginal costs are falling and short run marginal cost is constant. Lines are marked for LRMC and SRMC, average revenue and demand curve is AR and average cost curves are  $AC_1$ ,  $AC_2$ ,  $AC_3$ . Social surplus would increase by expanding productive capacity from  $OV_1$  to  $OV_2$ . Since the gross revenues  $ABV_2V_1$  is greater than cost increase  $EDV_2V_1$ , creating net gain  $ABDE$ . The demand and LRMC curve intersect within the next possible output range at point 'G' at optimum capacity  $V_q$  which is

**Table 2.2 : Cost Data for Transport Undertaking with Cost Discontinuities**

Out-put	LRMC of infra-structure	LRMC per unit of output range	SRMC(running cost per unit	Total cost	Average cost
1	1000	50	10	1010	1010.0
20	0	50	10	1200	60.0
21	800	40	10	2010	95.7
40	0	40	10	2200	55.0
41	700	35	10	2910	71.0
60	0	35	10	3100	51.7
61	600	30	10	3710	60.8
80	0	30	10	3900	48.7

**Source :** C. H. Sharp, Transport Economics, London, Macmillan, 1973, p. 42.

Figure 4



practically unobtainable. Therefore choice is to be made between 40 units (under capacity at  $V_2$ ) or 60 units (over capacity).

If output is expanded to  $OV_3$ , the gross increase in revenue  $BJV_3V_2$  is greater than cost increase  $FHV_2V_3$ , and total surplus  $BGF >$  cost increment  $GHJ$ . The optimum capacity should not be extended to  $OV_4$  as the revenue increase  $JRV_4V_3$  is less than cost increase  $IMV_4V_3$ .

At the optimum capacity  $OV_3$ , price is  $OP_2$  which is less than LR marginal cost  $OP_3$  but greater than  $OP$ , i.e. SRMC.

If a wrong investment decision has been taken or there is a fall in demand and if the undertaking had increased capacity to  $OV_4$ , the optimum price would be  $OP_1$  with surplus capacity LN unused.

Thus if demand curve happens to intersect the LRMC exactly at a point where the capacity produced by the last unit of investment, the optimum (floor price) will be equal to LRMC. If there is excess capacity, it would be between LRMC & SRMC. Thus average unit cost of incremental output (due to installation of capacity to produce successive blocks of output) is consistently below the average total cost shown by  $AC_1$ ,  $AC_2$ ,  $AC_3$ .

Thus though marginal cost pricing involves some difficulties, there is no any appropriate/alternative method which is more suitable than it. Therefore it can be said that

"No transport service should be priced at less than marginal cost. If demand for transport services may be expected to grow, this should construed to mean long run average cost."<sup>6</sup>

#### Market Demand for Transportation

The demand for transportation is a derived demand.

In the case of freight, it depends upon the final demand of the commodities hauled and for passengers, it is based on the potential and economic character of the travellers. The demand for a particular mode like rail services is a function of demand for transportation service and the cost and service characteristics of rail vis-a-vis alternative transport modes.

A) Demand for Commodities : Demand for transportation is affected by the final demand conditions for commodity and passenger movements. Economic base of communities and structural changes in economy affect the demand for rail services also.

B) Level of Service : Improved levels of service can make railway more competitive and can attract many shippers and passengers. Several factors determine level of service. They are mainly:

i) Train Performance - Operating expenses are affected by the terminal operating policies for holding a train for additional tonnage, train length, tractive power of locomotive, train speed etc.

ii) Wagon Utilisation - The extent to which the railways can meet the demand for wagons depends upon number of wagons, their capacities, movement of empty wagons, their turn around time, loading and unloading of wagons, etc.

iii) Track and Road-bed Condition - Track and road-

bed conditions also determine the nature of rail services. Replacement of old track, additional new tracks, conversion from meter/narrow gauge to broad gauge, signalling system improve the track condition and capacity. Good track conditions permit high speed for train with less derailment possibilities.

C) Intermodal Competition : This is an important factor /which has affected the railways especially in the later half of 20th century, with the rapid progress of other modes of transport. Among them, the most pervasive competition comes from road transport. Fast, reliable door-to-door service, less possibility of loss or damage by road transport has taken away most of the traffic of high-valued goods for short distance, say, 500 kilometres from railways.

D) Demand for Passenger Transport is determined mainly by fares, travel time, length of travel, population of the cities and individual choice of the mode.

#### Price Discrimination in Railway Charges

Generally, the concepts of 'price discrimination' or 'price differentiation' in economics are used in transport by the terms 'value of service' or 'what traffic can bear'. But they do carry the same economic meaning i.e. to charge different prices for same product/service.

In economic theory, the policy of discriminatory

pricing is a special case of monopoly pricing. A single seller or a managerial centre for selling group makes two or more price calculations instead of charging one single price, differentiating among buyers or buyers group, the discriminatory seller anticipates increment in net revenue than that can be obtained with uniform price for the buyers.

Here the sellers' attention is towards demand differences. Demand differences occur due to different elasticities among buyers. Therefore the seller is guided by demand conditions. He increases the price where demand is price inelastic and reduces them where price is demand elastic. Or he makes such price changes so that he can have largest increment in revenue from each price choice and he maximises total or net revenue.

Price discrimination is a special case of monopoly. In simple monopoly the condition for equilibrium is

$$MR = MC \text{ or } P \quad MR \text{ or } MC$$

Among the essential conditions for price discrimination are market control, different price elasticities of demand among the buyers, non-transfer of goods and services by the purchasers and workable classification of buyers.

If two or more demand differentiated groups exist, seller has choice to charge separate price for each group.



But at the same time  $MR = MC$  and  $P$  MR or MC relations are maintained. But as the prices are different price discrimination can be expressed as

$$\frac{P_1 - MC_1}{P_1} \neq \frac{P_2 - MC_2}{P_2} \neq \dots \neq \frac{P_n - MC_n}{P_n}$$

Where the subscripts 1, 2, ... n refer to several buyers groups.

To have a pattern of discriminatory pricing, the seller must have an interest in additional net profit. But this principle applies also to the sellers who has net losses. Thus price discrimination is also a way to minimise losses or at least to reduce some losses.

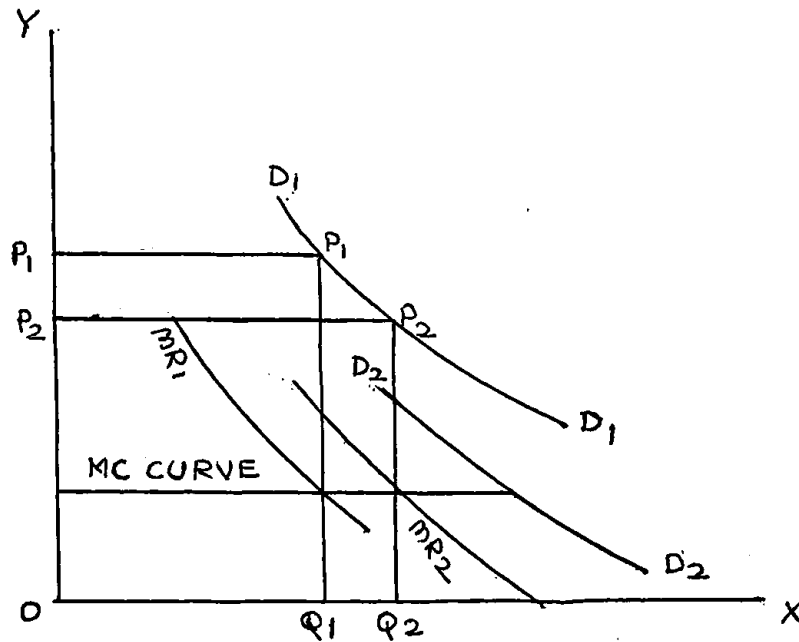
#### Cases of Price Discrimination

A) No Differences in Cost : If a monopolist can classify buyers on the basis of their demand elasticities and if production cost of the products or services is alike, he can maximise his profits by selling the different quantities of commodities at different prices while retaining the same condition i.e.  $P = MR = MC$ .

In Figure 5 marginal cost is the same for the produce but demand and therefore marginal revenue curves are different. The seller will charge  $P_1$  price for  $Q_1$  and  $P_2$  for  $Q_2$  commodities. But in such<sup>a</sup> case, though price is higher than marginal revenue in both cases.

$$MR_1 = MR_2 \dots \dots MR_n = MC$$

Figure 5



B) Differences in Marginal Costs : If a seller faces different demand functions and at the same time, the marginal cost of producing and supplying output are different, he will equate MR and MC in each case and charge different prices. In this case he determines  $P_1$  by  $MR_1 = MC_1$ ,  $P_2$  by  $MR_2 = MC_2$  and so on. Some of the differences in  $P_1$  and  $P_2$  can be explainable now by the differences in  $MC_1$  and  $MC_2$ .

Thus buyers differences in price elasticities of

demand are the critical conditions for price discrimination. In the absence of these differences or without being able to identify them, <sup>the</sup> seller does not find himself in the situation where profitable price discrimination can be practised.

A transporter can separate buyers in different groups whereby each group has the same elasticity of transport demand. For example, railways do this by defining and classifying the commodities, prescribing specification of origin and destination, charging different rates for smalls and wagon load, differentiating passengers by travelling by different classes, differentiating rates according to speed, comfort etc.

Segmentation of market is helped by some other features of travel; as a commodity it is both perishable and nontransferable. An empty seat once carried is gone for ever. Similarly customers cannot buy travel at cheap times or rate and save it for subsequent use. Being a personal service it is unexchangeable.

Thus the railway situation is that of an industry with relatively high fixed cost, selling perishable and nontransferable products in a market where identifiable groups of passengers or shippers have differing demands and having monopoly power. In order to take full advantage of the situation and to avoid losses, railways adopt policy of price discrimination for which there are no apparent legal constraints.

References to Chapter II

- 1 James T. Kneafsey. Transportation Economic Analysis, p. 47.
- 2 Emery Troxel. Economics of Transportation, p. 95.
- 3 Ibid., p. 109.
- 4 Ibid., p. 114.
- 5 W. J. Baumol. Cost and Rail Charges, Transport Selected Readings, p. 117.
- 6 James R. Nelson. Pricing Transport Services, p.206.

## CHAPTER III

### COST-PRICE RELATIONSHIP IN GOODS TRAFFIC

#### Background

Around 1853, rail freight charges were stipulated in the agreement of the private railway companies, contracted at the time of setting up of railway lines. The rates were to be fixed with the approval of the government subject to a maximum profit not exceeding 10 per cent of the capital outlay. In 1868, maximum rates were fixed and companies were free to fix their rates within these ceiling limits. In 1883, the government laid down general principles for fixation of rates, for example, the maximum limit being 'what the traffic can bear' and the minimum being 'the cost of carriage'. In 1887, the government fixed maximum and minimum rates for the existing 5 classes. Though a uniform classification of goods over all railways was evolved by the Traffic Simplification Committee in 1905, the practice of price discrimination by individual companies within the maximum and minimum limits was continued. In 1922, the Indian Fiscal Commission highlighted the need for quoting special rates to help the growth of Indian industries. Accordingly, the

number of classes were raised to 10 and <sup>a</sup> policy of selective protection to Indian industries was accepted in 1923. In 1936, 6 more classes were interpolated amongst the then existing 10 classes.

The railway freight tariff structure prior to 1947, was complicated and had several shortcomings. Some of these were as follows:

i) In addition to class rates (per maund per mile) different railways had scheduled rates with weight conditions.

ii) Classification for a particular commodity varied from one railway to another.

iii) As there was a wide margin between maxima and minima rates, railways could vary rates at their discretion.

iv) Terminal charges were fixed arbitrarily and varied from railway to railway.

In order to remove the defects in the old rate structure and to suggest a new rate structure for the consolidated Indian Railways, a One-Man Committee headed by Mr. K. L. Crawford in 1948 was appointed by <sup>the</sup> Railway Board.

The committee recommended a new freight structure which was telescopic in nature and was accepted with effect from 1.10.1948. The new structure is given in Table 3.1.

Table 3.1 : New Freight Structure Adopted With Effect from 1.10.1948

Class	Basis for tele- scopic class rates (pies per maund per mile)			Minimum pie per maund per mile	Maximum pies per maund per mile	Maximum rate per maund excl. of ter- minals, transhipment and other extra charges Rs. A. P		
	For 1st 300 miles	For next 300 miles	For dis- tance beyond					
1st	.49	.45	.40	.16	.49	3	4	0
2nd	.54	.49	.45		.54	3	10	0
3rd	.58	.54	.49		.58	4	0	0
4th	.63	.58	.54		.63	4	6	0
5th	.68	.63	.58		.68	4	12	0
6th	.73	.68	.63		.73	5	2	0
7th	.78	.73	.68		.78	5	9	0
8th	.84	.78	.73	.20	.84	6	0	0
9th	.90	.84	.78		.90	6	7	0
10th	.97	.90	.84		.97	6	14	0
11th	1.04	.97	.90		1.04	7	6	0
12th	1.11	1.04	.97		1.11	7	14	0
13th	1.18	1.11	1.04		1.18	8	8	0
14th	1.41	1.18	1.11		1.41	9	4	0
15th	2.11	1.41	1.18		2.11	11	0	0

Source : Government of India, Report of Railway Freight Structure Enquiry Committee 1955-57, p. 17.

Apart from these class rates, there were also the wagon load scales applicable to wagon load consignments only (Table 3.2).

Table 3.2 : New Freight Structure Adopted since 1.10.1948 for Wagon Loads

Wagon load scale	Pies per maund per mile
WL - A	0.25/100 miles + .20/300 miles + 0.15 beyond
WL - AR	0.30/100 miles + .25/300 miles + .20 beyond
WL - B	0.48/100 miles + .32/300 miles + .23 beyond
WL - C	0.34/150 miles + .31/150 miles + .17 beyond
WL - CR	0.41/150 miles + .38/150 miles + .24 beyond
WL - D	0.38/300 miles + .28/300 miles + .18 beyond
WL - DG	0.38/150 miles + .28/150 miles + .15 beyond
WL - E	0.43/150 miles + .32/150 miles + .17 beyond
WL - F	0.43/300 miles + .32/300 miles + .21 beyond
WL - G	0.48/300 miles + .34/150 miles + .19 beyond
WL - H	0.48/300 miles + .35/300 miles + .23 beyond
WL - HO	0.48/150 miles + .34/150 miles + .19 beyond
WL - I	0.43/300 miles + .23/200 miles + .15 beyond

Source : Government of India, Report of the Railway Freight Structure Enquiry Committee 1955-57, p. 17.



The Committee essentially attempted to simplify, rationalise and reorganise the rating policy on a country-wide basis by suggesting the introduction of through telescopic rates and wagon load scale rates, fixation of standard minimum weight conditions, terminal and transshipment charges and the withdrawal of a large number of existing station to station rates.

Thus "after practically a century of experiments and different practices, the freight structure of Indian Railways was assimilated and great step forward was taken in evolving a rationalised freight structure to secure the interest of the community as a whole."<sup>1</sup>

While making some general observations on the recommendations of the Ackworth Committee, the Indian Fiscal Commission suggested that the railways might examine the possibility of introducing concessions aimed in assisting local or regional processing of agricultural and mineral products and the decentralisation of industries. It also suggested delegation of powers to regional officers in order to quote special rates. Similar suggestions were made by the Taxation Enquiry Committee in 1953-54. Considering the growing role of the railways in the context of planned economic development, the government appointed the Railway Freight Structure Enquiry Committee (Mudaliar Committee) in 1955 to suggest a new tariff structure taking into account emerging needs.

According to this Committee the revised freight structure as suggested by the Crawford Committee contained a number of anomalies and defects. These mainly related to

1) the absence of any relationship between 15 class rates and 13 wagon load rates and the

2) inadequacy of the proposed 28 rates when one considered the number of commodities carried on the railways. Moreover, the coverage of the first leg being 300 miles would deprive many more <sup>the</sup> benefit of telescopic rates.

The Mudaliar Committee recommended that the existing classification, including wagon load scale should be replaced by classes which would be specified percentage of a standard class 100 at every corresponding distance. Instead of 15 class rates and 13 wagon load rates having different tapers, the Committee recommended 31 integrated class rates (merging terminal, short distance and transshipment charges) having a common rate base to be called class 100 rate and other classes to be a percentage of the basic class 100 rate. The increase from <sup>the</sup> lowest class rate to the highest class rate being provided by a regular and progressive increase through a percentage system. This percentage system gives an idea of the level of any rate of a commodity in relation to <sup>the</sup> other and lends itself easily to the adoption of intermediate

classes as and when it was found necessary. It appears that such a practice was already in vogue in the U.S. and Canada.

The taper recommended by the Committee was steep over short leads but over longer leads, it involved reduction or sacrifice of revenue. It was felt that the freight burden was heavy over long distances and that it should be a deliberate policy to discourage short-distance traffic by rail.

In partial modifications of the Mudaliar Committee's recommendations the government decided to replace the single scale by 2 scales, 100-A & 100-B, the former having a sharp taper being for wagon loads while normal classes were related to the 100-B scale.

The two scales adopted by government with effect from 1.10.1958 were as shown in Table 3.3.

The above rate structure had 45 classes (14 for 100-A scale & 31 for 100-B). The lowest class being 22.5A and highest class 57.5A of basic class 100-A while 52.5-B and 180-B were the lowest and highest classes respectively for the 100-B scale. If the two basic rates are compared, it is seen that a wagon load was costlier upto 120 km beyond which it was cheaper than normal classes. A surcharge of 10 per cent was to be levied on small consignments weighing less than 10 maunds.

Table 3.3 : Freight Structure Adopted with Effect  
from 1.10.1958

Distance (kms)	Basis per quintal per km	
	Class 100-A (paise)	Class 100-B (paise)
1 - 40	3.126	2.259
41 - 120	1.218	1.088
121 - 240	0.958	1.019
241 - 480	0.871	0.958
481 - 800	0.741	0.871
801 - 1290	0.610	0.697
1291 - 1930	0.524	0.636
1931 - 2410	0.437	0.480
2411 & above	0.133	0.133

Source : R. N. Saxena, Rail Transport Pricing in India,  
p. 37.

The Committee also made a number of other suggestions a prominent one being that the wagon load as a unit should be prescribed for almost all commodities. According to them, "conditions are rapidly changing and with the intensification of industrialisation and the adoption of modern methods of packing and transportation in bulk, we feel that more and more commodities

will move in wagon load, we come to the conclusion that practically all commodities should have wagon load rates."<sup>2</sup>

The higher rate for smalls traffic as compared to wagon loads could be justified on the ground that wagons carrying smalls necessarily move slower than fully loaded wagon and expenditure for handling smalls is greater than that of wagon load. Traffic in smalls requires unloading at different points, sorting and fresh loading. Moreover, average load per wagon in case of smalls traffic is also generally lower than that of wagon load. However, it must be noted that the committee had no firm basis for this justification as can be gauged from their observation. "We have been considerably handicapped by the lack of information regarding the comparative cost of transportation of commodity in small and wagon loads. In the circumstances we had no alternative but to adopt a rough and ready basis for fixing the relationship between the rates for smalls and wagon loads."<sup>3</sup>

The "freight structure evolved on the recommendations of Mudliar Committee was truly a national freight structure in which the interest of the railway, general public and the trade looked after in a balanced manner, without giving undue emphasis to any one of them. It is because of this balanced approach the report of committee was generally found to be acceptable and the freight

structure based on their report stood the test of the time and remained in force with only minor modifications right from 1958 to 1983."<sup>4</sup>

But the fact that far reaching changes had taken place in country's economy in the two decades since the Railway Freight Structure Enquiry Committee submitted its recommendations could not be overlooked. During the sixties and seventies, inflationary pressures affected the railways as there had been sharp increases in the cost of energy and other major inputs used by them. As a result, costs had risen sharply, while revenues had not. Such a situation led to rapid deterioration in the financial position of the Indian Railways. Against this background, it was felt that there was a need for rationalisation of the tariff structure vis-a-vis the cost of services provided by railways. The Rail Tariff Enquiry Committee (henceforth referred to as RTEC) was therefore appointed in 1977 and directed to make a detailed examination and recommend revised freight rates and fares, keeping in view the cost of providing the various services. At the same time, it was expected to bear in mind the interests of the common man, the requirements of the developing economy, the importance of making the railways financially viable and the possibility of increased operating efficiency.

Using the available cost data, the RTEC remarked that in 1980-81, the cost of moving the level of traffic achieved in 1976-77 (considered by the Committee as the year of best performance), the Indian Railways would require additional revenue to the extent of Rs. 770 crores. The revised freight structure suggested by RTEC has been accepted with effect from 1.4.1983 with some suitable modifications.

The RTEC retained the principle of having a base scale of class 100, which existed earlier. All rates for goods haulage for other classes continued to be determined as percentage above or below the base scale class 100 rate. All the supplementary charges introduced during the past few years on the basis of percentage increases have been incorporated into the revised freight structure.

The following base scale of class 100 for wagon loads was suggested (Table 3.4).

For the purpose of calculation of freight charges, distance blocks are suggested as shown in Table 3.5. Freight charges were to be calculated for these blocks of distances, the highest kilometre of each distance block being taken for the purpose of calculating the rate for that distance block.

Table 3.4 : Base Scale of Class 100 Suggested by RTEC

Distance block	Paise per quintal per km	Degree of taper %
1 - 100	2.3500	100
101 - 200	1.4100	60
201 - 300	1.1750	50
301 - 500	0.9635	41
501 - 800	0.8930	38
801 - 1200	0.8225	35
1201 - 1600	0.7520	32
1601 - 2000	0.6815	29
2001 - 2500	0.6580	28
2501 & above	0.6345	27

Source : RTEC Report 1980, p. 263.

Table 3.5 : Distance Blocks for Computation of Freight Charges

Kilometre	Block
1 - 50	One block
51 - 250	5 kms block
251 - 800	10 kms block
801 - 2400	25 kms block
2400 & above	50 kms block

Source: R.N.Saxena, Rail Transport Pricing in India, p.83.



The base scale (i.e. class 100) adopted by government is given in Table 3.6.

Table 3.6 : Base Scale (Class 100) Adopted by Government with Effect from 1.4.1983

Distance (kms)	Paise per quintal per km	Degree of taper %
0	75 paise	-
1 - 100	2.35	100
101 - 250	1.65	70
251 - 500	1.53	65
501 - 1000	1.41	60
1001 - 1500	1.18	50
1501 - 2000	0.94	40
2001 - 2500	0.82	35
2501 & above	0.71	30

Source : R. N. Saxena, Rail Transport Pricing in India, p. 86.

The RTEC proposed a classification ranging from class 65 to 300. In doing so, the then existing classes were doubled i.e. classes 32.5, 50, 150 became 65, 100, 300 respectively. The commodities affecting the budget of the common man or developmental expenditure were placed in lower classes, while commodities which are

highly inflammable or involve empty return haulage of wagons were placed in higher classes. In addition to class rates, a fixed charge of 75 paise per quintal was levied as terminal charge.

The increase in rate per tonne per kilometre envisaged in respect of commodities like foodgrains, salt, gypsum, oil cake etc., the average lead of which was around 1000 km. was 1.3 paise to 2.3 paise. But for commodities like coal for washeries, sugarcane, limestone etc. having an average lead of less than 750 km., the increases per tonne per km. ranged from 4.4 paise to 8 paise. Thus, the revised freight structure imposed relatively more burden on commodities moving over short hauls.

With effect from 15.4.1985, supplementary charge of 10 per cent has been levied on all goods traffic including live stock beyond distance of 500 km. As the lowest classes in freight structure i.e. class 65, 70, 75 were uneconomical, their classification was raised to class 80. Thus from 15.4.1985, the lowest and highest classes are 80 and 300 respectively and minimum distance charged is 100 km.

#### Pricing Policies since Independence : An Overview

Pricing of railway services is the art of determining railway rates and fares for the transportation

services rendered by railways. Fixation of price or railway rate involves assessment of cost and value of conveyance of passengers and goods and determination of price on that basis.

The Indian Railways carry a number of diverse goods, raw materials, finished products, perishable goods, goods in bulk and bag, liquids, articles of high and low value, dangerous goods, medicines, chemicals and drugs, clothings, etc. To fix charges for transportation of such a variety of goods over different distances and under different conditions is clearly a matter of great complexity and cannot be reduced to an exact scheme. However, there are broad principles of determining not only charges but to fix general level of rates for various commodities. These principles determine the freight rate structure of Indian Railways.

The Value of Service Principle : Such a principle is also known as 'what the traffic can bear' essentially involves fixing the charge for each good according to its ability to pay for transportation. The value of service enables the railways to try to realise as much as possible out of margin resulting from the conveyance of certain articles thereby making up losses on others.

A second principle in the pricing of railway services is the 'cost of service' which provides for rate

making on the basis of actual costs incurred. In a way, the cost of service principle serves as the floor for pricing while the value of service principle fixes the ceiling, as ability to pay depends largely upon the value of commodity. In this context, it is useful to remember that the availability of alternative modes prevents the railways from charging the maximum that the user can bear but go only upto the limit that he is willing to bear.

Once the cost of service is accepted as a basis for pricing, the railways have to consider costs not only in terms of short run but long run marginal costs. Taking the railway system as a whole, it is expected to cover long run marginal costs including a fair return on capital invested. Every stream of traffic at least should cover its direct cost including depreciation as well as minimum rate of return. This may not be so in the short term or in case of certain commodities. Therefore, there must be a stream of other traffic which can bear the incidence of charge which would provide adequate surpluses. This type of cross subsidization is possible for railways. This is the reason why railways classify the commodities and impose low charges for essential, heavy and bulky commodities and high rates for other valuable items.

Though theoretically sound, the application of the cost of service principle faces formidable problems due to some historic and other reasons as follows:

i) In India, there are mainly three gauges, broad, meter and narrow gauge. The cost of providing service varies according to gauge. The services on the broad gauge are better, faster and cheaper to provide, while on the other gauges they are relatively costlier and poorer. Similarly, there are three types of traction-steam, diesel, and electric. Electric traction is relatively more efficient and thereby less costlier. If certain sections or regions have railway network of MG and NG gauges or steam and diesel tractions and if users are accordingly charged higher rates (due to higher cost of operation), the railways would be accused of discrimination because it is not their choice or fault to be hauled by steam diesel traction or on MG/NG routes.

ii) Another difficulty arises when there are different densities of traffic. The routes having high densities of traffic would have lower cost of service than that of low density routes. The issue is whether to charge more on low density routes thereby reducing traffic, and causing further rise in rates.

iii) Another problem which arises while calculating the cost of service is that relating to joint costs. Some expenses are incurred jointly and it is virtually impossible to allocate these between various services.

The above discussion sufficiently illustrates the

complexity involved in tariff making in a railway with its own history, public and political pressures as well as economic considerations which render the cost of service principle difficult to apply.

An important factor which is to be considered while fixing tariffs is the competition from other modes especially road transport. Cross subsidisation between different streams of goods traffic in the railways is possible only when the goods which can bear high incidence of tariffs have no other alternative means of transport. In recent years it is observed that the high valued commodities which could bear high tariffs and were traditionally being carried by the railways have begun to move by road transport where there is no such tariff discrimination. This has happened in a number of countries. The railways are now mainly involved in carrying heavy, bulky and low valued commodities. These bulky commodities constitute as high as 93.3 per cent<sup>5</sup> of total goods traffic on the railways and are in the nature of raw material or intermediate products. The problem for Indian Railways is therefore how to generate surplus from such a small proportion of high valued commodities to make up the losses made by large number of bulky commodities (only after restructuring of freight rates based on cost studies in accordance with the recommendations of RTEC and Railway

Reforms Committee, the Indian Railways have enjoyed surplus of Rs. 178 crores and Rs. 102 crores in 1985-86 and 1986-87 respectively.<sup>6)</sup>

Regarding the pricing policy, it appears that till the early sixties, the cost of service principle was not strictly followed<sup>7</sup> as can be noted from the remarks of the Railway Freight Structure Enquiry Committee that "the time has come when Indian Railways must make a sustained efforts to ascertain as far as possible the direct cost of services and take note of this in determining the appropriate rates for individual commodities. They should not be generally carried below the direct cost of services."<sup>8</sup>

The RTEC (1980) also comprehensively went into this aspect and observed "if the Railways have to pay their way a large part of the cost of running them has to be borne by its major users, a small number of bulk commodities on the goods side and the second class (ordinary) passengers on the other."<sup>9</sup> As the percentage of high rated commodities and upper class passengers is small, it is not possible for them to significantly share the burden for providing transport to low rated bulk traffic and second class (ordinary) passengers.

It was against this background that the RTEC recommended:

i) "The freight structure can be so framed that no price needs to be below the cost of service, and any price can upto the value of service. By charging commodities which can bear only a low incidence of tariff charge at lower rates - as long as they meet the costs of transporting them - and by charging other commodities which can bear a high incidence at higher rates, the total traffic carried can be maximised and so also the total revenue."<sup>10</sup>

ii) "The tariff levels should be adjusted from time to time in such a manner that railway tariffs keep pace with changes in the prices of major inputs in the production of railway services."<sup>11</sup>

#### Cost Methodology

The Railway Freight Structure Enquiry Committee - 1955-57 commented on the inadequacy of the cost studies on Indian Railways. On the importance of traffic costing, they maintained that "it will be of value, even on the basis of certain assumptions, to make a rough attempt at the cost of service. Even if such cost of service cannot be ascertained objectively for individual commodities, comparative cost may be ascertained and they are of value to railways in determining by and large the relative distribution of cost over different kinds of traffic and their relationship to the rates charged."<sup>12</sup>



In Railway Reforms Committee's Report (Sarin Committee appointed in 1983 - henceforth referred to as RRC) (Vol. XXII), costing methodology is discussed briefly. According to the Committee:

i) For the purpose of ascertaining transport cost for various facets of traffic operations, the Zonal Railway is considered as an operating unit. The zonal expenses are first segregated gaugewise and then trafficwise by the costing organisation. The expenses which can be identified as pertaining to a particular gauge or particular stream of traffic are first allocated accordingly. The remaining expenses are bifurcated between the two services on the basis of certain ratios developed with the help of statistical analysis, surveys, experience and knowledge of engineers and field staff.

ii) Once the annual working expenses are segregated gaugewise and servicewise, the costing organisation undertakes computation of various unit cost for goods services and passenger services gaugewise. The cost statements prepared by zonal railways are sent to the Railway Board, where data is compiled and unit cost for Railway as a whole is worked out by Board for broadgauge and metergauge separately.

The RRC has pointed out some of the following shortcomings in the computation of cost of services.

i) It is observed that variations in the unit costs from one zone to another are substantial. Within the zone also it differs from division to division and from year to year. It is pointed out (Vol.XXII, page 7) that the unit costs of zonal railways, differ significantly. As zonal railways furnish aggregative cost for each facet of traffic and no break up of unit cost is given there are no indications regarding the activities which account for the bulk of variations. In this situation meaningful investigation cannot be undertaken.

ii) The annual appropriation to the Depreciation Reserve Fund from railway revenue is distributed zonal railwaywise, further divisionwise and then gaugewise in proportion to capital at charge. The gaugewise and servicewise distribution of appropriation to DRF under each subhead is then done according to instructions from Railway Board. If appropriation to DRF is low, the unit cost worked out gets vitiated. This unit cost does not give a realistic picture. This happened in earlier years.

iii) There is a time lag in calculation of unit cost and its application in pricing. Therefore some escalation factor should be applied to arrive at unit cost for future years.

The RRC has also suggested redefinition of parameters applied for apportioning the common cost between goods and coaching traffic. It has also pointed out that

as the proportion of common cost is as high as 75 per cent, distribution of it is to be done on scientific principles supported by detailed and specific studies. Any arbitrariness or adhocism in the matter will lead to generating unrealistic and inaccurate cost data.

#### Cost Price Relationship of Some Bulk Commodities

The cost methodology adopted on the Indian Railways reveals that unit cost of individual commodities or different classes of passengers is computed not on economic costing principles (as it is extremely difficult to find out the cost of haulage of a particular commodity or passenger) but on the principle of fully distributed cost. It was virtually for the first time that the RTEC (1980) attempted to relate the freight structure to the cost data. It attempted to estimate long run economic cost of railway transportation in 1976-77, the bench mark year chosen by the committee for proposed tariffs. (Between 1950-51 to 1978-79, the Indian Railways achieved the best performance in 1976-77 and 1977-78. However 1976-77 was the latest year for which unit cost data could be made available to RTEC).<sup>14</sup>

In order to estimate long run marginal cost of Indian Railways, data regarding accounting unit cost compiled by Railway Board has been used by RTEC. These data are not published as such by Indian Railways because it is meant

for departmental use only. It was fortunate that the Committee discussed the costing methodology and unit cost data for 1976-77, of the Indian Railways and used it for analysing relative tariffs.

The Committee reviewed the management of railway finances and suggested that there are certain important elements where the actual cost incurred or provisions made are inadequate as compared to what was really required. RTEC estimated that Rs. 321 crores were to be added to the total accounting cost of Indian Railways in 1976-77 in order to reflect the true cost of rail transportation in that year. Its break-up was given as under.

Rs. 62 crores towards operating cost\*

Rs. 102 crores as increased depreciation fund\*\*

Rs. 157 crores towards interest cost and appropriate return on the basis of historical value of the Railways' capital stock

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\* Break-up of Rs.62 crores was as under.

i) Extra provision for pension fund	- Rs. 13.84 crores
ii) Extra provision for maintenance and repairs	- Rs. 10.00 crores
iii) Retrospective effect of wage award	- Rs. 38.00 crores

\*\* RTEC pointed out that the annual provision made for depreciation was meagre and it was necessary to ensure that appropriate funds are made available for carrying out replacements in a satisfactory manner so as to maintain value of railway assets and their efficient operation.

(RTEC calculated the real annual capital cost in the following manner:

- i) Depreciation - 4.7 per cent of the book value of total railway investment
- ii) Interest - 10 per cent return on the book value of the loan capital (capital at charge)

Though the total accounting cost for 1976-77 was calculated they have emphasised the need for adjustment of the tariff level from time to time in such a manner that Railway tariffs keep pace with changes in the prices of major inputs in the production of railway services. The tariff escalation formula suggested by the Committee is as follows:

$$\text{Total escalation (per cent)} = 0.80 \left[ (0.55 \times s) + (0.9 \times c) + (0.9 \times d) + (0.4 \times e) + (0.23 \times os) \right]$$

Where

- s = per cent increase in staff cost
- c = per cent increase in coal price
- d = per cent increase in diesel price
- e = per cent increase in electricity charges
- os = per cent escalation in the prices of stores and other materials

The escalation can be worked out by considering actual cost difference or index numbers or charges paid

by railways for various inputs. Since depreciation and divided contribution are not included only 80 per cent of the total expenditure is provided for in the above formula. They have also suggested re-examination of the formula or to evolve a new formula after some time, if necessary.

It is observed that the Indian Railways carry 11 principal commodities. They constituted 85 per cent of total freight tonnage and 79 per cent of total NTKM in 1976-77 while in 1986-87, their share increased to 93 per cent of total originating tonnage and 90 per cent of total NTKM. Therefore, it would be useful to confine ourselves to an examination of the tariff structure of these commodities.

As already discussed, the present system of charging freight rates is based on the principles - cost of service and value of service. The cost principle fixes the lower limit below which the service would prove to be too costly to the transporter and value of service fixes the upper limit above which the service would prove too costly to the rail user. In order to facilitate easy calculations, class 100 rate is evolved and all commodities having different classification are linked with percentage system to the base class 100 rate. The classification is based on various factors for example,

- 1) Value of goods i.e. higher the value of good, higher is the class.

ii) The volume and bulk of the article in relation to its weight. Light and bulky commodities are placed in higher class where as heavy and dense <sup>goods</sup> are charged at lower scale.

iii) Goods which are liable for damage are placed in higher class.

iv) Articles which require careful packing or closed wagons are placed in higher class.

v) Smalls are charged at higher rate whereas concessions are given for wagon loads and train loads.

vi) The commodities for which wagons are to be hauled empty in one direction, <sup>a</sup> are put in higher class e.g. petrol etc.

vii) If the traffic is regular, it is placed in lower class.

viii) Commodities carried at railway risk are placed in higher class.

As on 15.4.1985 in all there are 30 classes, ranging from class 80 to class 300. This number was 32 ranging from class 65 to class 300, when the new freight structure resulting from the recommendations of the RTEC came into force from 1.4.1983. A lower class rate is charged for wagon load/train load due to some economies of operation and handling the wagons. Benefit of lower wagon load or train load is given only when a consigner

is prepared to pay a certain minimum weight even though the actual weight of his consignment is less than <sup>the</sup> prescribed minimum. The minimum weight condition for applying wagon load for all the bulk commodities is the carrying capacity of the wagon. Since "most of the traffic on railways is in wagon loads and about 2 per cent traffic is in smalls",<sup>15</sup> further discussion relating to tariff would be mainly centred on cost price relationship for wagon load classification/traffic.

For most of the bulk commodities, classification as on 15.4.1985 was as under (Table 3.7).

The discussion of railway costing methodology in the main report of RTEC<sup>17</sup> indicates that the relative cost of bulk commodities are mainly determined by the average pay load and empty haulage of wagons involved. As the minimum weight condition for charging wagon load rate or train load rate is uniform for all the bulky commodities (except mineral oil products) the average pay load is assumed to be the same for all of them. As far as empty haulage of wagon or train is concerned, mineral oils are hauled in a tank wagons for which empty return ratio is 100 per cent,<sup>18</sup> hence their transportation involves higher cost. Other bulk commodities are carried in general service wagons, their empty haulage is therefore not likely to have significant commoditywise variation (empty return ratio for general service wagon is 25 per cent).<sup>19</sup>



Table 3.7 : Minimum Weight Conditions for Bulky Commodities for Wagon Load and Train Load and their Average Lead

Commodity	Wagon load scale	Train load scale	Minimum weight (BG)* (tonnes)	Average lead (kms)
Coal	120	115	1400	615
Foodgrains	85	80	1400	1232
Iron & Steel A	240	220	1400	1147
" " B	230	210	1400	1147
" " C	220	200	1400	1147
Cement	130	125	1400	679
Crude oil	260	240	1100	597
Kerosene	200	190	1100	597
Petrol	300	280	1100	597
Chemical manures	125	115	1400	1020
Lime stone	120	115	1400	326

\* Minimum weight on BG line is considered as over 85 per cent of freight traffic is carried on BG System. 16

Source : R. N. Saxena, Rail Transport Pricing in India, pp. 470-472.

The tentative hypothesis which can be drawn from the above analysis is that the relative transportation cost of all the bulk commodities except mineral oils is <sup>very</sup> nearly the same. This hypothesis is also supported by the 1976-77 accounting data for cement, fertilisers, food-grains, coal, iron & steel, etc. The broad gauge cost per tonne for 800 kms\* of these commodities are:

Foodgrain	Rs. 53.54	Coal	Rs. 52.97
Iron ore	Rs. 52.30	Ferti- lisers	Rs. 52.04
Cement	Rs. 51.81		

Their relative deviation is 1.10 per cent.<sup>20</sup>

Since the relative transportation cost of most of the bulk commodities (except mineral oils, the higher cost of haulage is justified due to higher empty movement) is nearly the same, they should be charged on a uniform basis. But this is not so. For example, though the carrying cost of foodgrains is higher than that of cement and fertilisers, it is always placed at lower class (class 85 in 1985). It has often been observed that foodgrains were carried by the railways at rates which resulted in losses. Further, earnings from coal is a major source of freight revenue. In 1950-51, coal contributed 27.6 per cent to total tonnage fetching 12.5 per cent of total earnings. In 1986-87, coal tonnage originating was 39

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\* Average lead of traffic was 677 km.<sup>21</sup>

per cent of the total tonnage and brought in 33.6 per cent of freight revenue.. Prior to 1974, coal and coke were outside the framework of the general freight structure. After that it has been classified at a very low level, despite the higher cost of haulage per tonne i.e. class 120 as compared to iron ore (class 220), cement (class 130), or chemical manures (class 125). Even in the case of mineral oils, a higher charge for petrol (class 300 for wagon load) may be justified as compared to diesel (class 260 for wagon load) as it is more risky to carry highly inflammable product. But a lower charge for kerosene (class 200 for wagon load) as compared to diesel cannot be economically reasoned.

It is often argued that if transport rates of basic raw materials such as coal, iron ore etc. are raised to realistic levels it would result in a higher cost economy. Besides, dependent industries will tend to be located near the resource regions, which would then become over-industrialised thereby creating socio-economic problems. Further, the discriminatory rate structure may be justified from the point of view of achieving balanced regional growth or subsidising articles of mass consumption like foodgrains, kerosene, etc. But this has an adverse effect on the financial viability of the railways. Thus, in an attempt to serve the community while conforming to

national economic and social policy objectives, the railways have necessarily to restrict themselves in matters of pricing of services on a commercial basis, thereby creating losses which can be considered as 'social burdens'.

References to Chapter III

- 1 Government of India, Report of Rail Tariff Enquiry Committee (RTEC) (1977), Vol.I, p. 18.
- 2 Ibid., p. 27.
- 3 Ibid., p. 28.
- 4 R. N. Saxena, Rail Transport Pricing in India, p. 41.
- 5 Government of India, Railway Year Book 1986-87, p.67.
- 6 Ibid., p. 103.
- 7 Report of Railway Reforms Committee, Vol.XXII, p.53.
- 8 Government of India, Railway Freight Structure Enquiry Committee (1955-57).
- 9 Government of India, Report of RTEC 1977, Vol.I,p.63.
- 10 Ibid., p. 62.
- 11 Ibid., p. 87
- 12 Government of India, Report of R.F.S.E.C.
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- 14 Government of India, Report of RTEC, Vol.I, p. 45.
- 15 Government of India, Report of NTPC, p. 148.
- 16 Ibid., p. 139.
- 17 Government of India, Report of RTEC 1977, Vol.I, Chap. V.
- 18 Ibid., p. 47.
- 19 Ibid., p. 47.
- 20 Ibid., Vol. II, pp. 58, 69, 75, 86, 99 and Kulbir Singh. Towards a Rational Freight Structure, Economic & Political Weekly, dated 19.2.1983.
- 21 Government of India, Railway Ministry, Annual Report, 1976-77.

## CHAPTER IV

### COSTING AND PRICING OF PASSENGER TRAFFIC

The Indian Railways run passenger services on all the three gauges, i.e. BG/MG/NG and the traffic has two main components, i.e. suburban and non-suburban. Non-suburban traffic consists of 5 different types of passenger services viz. First Class Air Conditioned, First Class including Second Class Air Conditioned sleeper, Air Conditioned Chair Car, Second Class Mail/Express and Second Class Ordinary. Passenger services range from Rajdhani super fast express to ordinary passenger trains which stop at almost every station. There is a sizeable component of non-suburban traffic (9.7 per cent) moving on monthly season tickets.<sup>1</sup>

Suburban traffic at present includes only traffic moving on EMU (Electric Multiple Unit) services in Bombay, Calcutta, Madras and Delhi and provides first class and second class services. A very large portion of suburban traffic (71.5 per cent) moves on monthly season tickets.

The growth of passenger traffic originating on the system can be gauged from Table 4.1.

Table 4.1 : Growth of Passenger Traffic from 1950-51 to 1985-86

Year	Sub-urban all class	Non-suburban traffic				Total non-suburban	Grand total
		Upper class	Second class				
			Mail/Exp.	Ordinary	Total		
1950-51	412	25	52	795	847	872	1284
1960-61	680	15	96	803	899	914	1594
1970-71	1219	16	155	1041	1196	1212	2431
1980-81	2000	11	260	1342	1602	1613	3613
1985-86	1884	12	314	1223	1537	1549	3433

Source : Ministry of Railways Year Book 1986-87.

The growth in passenger kilometres during the same period is shown in Table 4.2. Further the composition of passenger traffic is given in Table 4.3 and average distance travelled by a passenger (average lead) are shown in Table 4.4.

Table 4.2 : Growth of Passenger Kilometres During 1950-51 to 1985-86

Year	Suburban (all classes)	Non-suburban			Total non- suburban	Grand total	
		Upper class	Second class				
			Mail/ Exp.	Ordinary			Total
1950-51	6551	3790	12537	43639	56176	59986	66517
1960-61	11770	3454	22251	40190	62441	65895	77665
1970-71	22984	4394	37856	52886	90742	95136	118120
1980-81	41086	5160	86712	75620	162332	167472	208558
1985-86	45438	6945	109277	78954	188231	195176	240614

8

Source : Ministry of Railways Year Book 1986-87.



Table 4.3 : Composition of Passenger Traffic

Category	1950-51		1976-77		1985-86	
	Pass-enger ori-gina-ting	Pass-enger kms	Pass-enger ori-gina-ting	Pass-enger kms	Pass-enger ori-gina-ting	Pass-enger kms
<u>Non-suburban</u>						
a) All classes (Millions)	847	59986	1498	126754	1612	167472
b) IInd class (Millions)	795	56176	1491	123126	1602	162332
c) Share of IInd class(%)	93.86	93.65	99.5	97.1	99.4	96.9
<u>Suburban</u>						
a) All classes (Millions)	412	6551	1802	37082	2000	41086
b) IInd class (Millions)	NA	NA	1728	35515	1901	38792
c) Share of IInd class(%)	NA	NA	95.9	95.8	95.1	94.1

Source : Ministry of Railways Year Book 1986-87 and Annual Report 1976-77.

Table 4.4 : Average Distance Travelled by a Passenger (Average Lead)

Year	Suburban (All classes)	Non-suburban				(Kilometres)	
		Upper class	Second class			Total non- sub- urban	Grand total
			Mail/Exp.	Ordinary	Total		
			-----				
1950-51	15.9	151.6	241.1	54.9	66.3	68.8	51.8
1960-61	17.3	203.3	232.4	50.0	69.5	72.1	48.7
1970-71	18.9	274.6	244.2	50.8	75.9	78.5	48.6
1980-81	20.5	484.0	333.3	56.4	101.3	103.9	57.7
1985-86	24.1	585.3	347.8	64.6	122.4	126.0	70.1

Source : Ministry of Railways Year Book 1985-86.

Figures in the above tables bring out certain distinct trends.

1) There has been an impressive increase in the volume of passenger traffic in recent past both in terms of passenger originating and passenger kilometres. Passenger originating have risen by 178.8 per cent since 1950-51 and passenger kilometres by 285.6 per cent as the average lead of traffic increased by 38.2 per cent.

2) The suburban traffic increased significantly over the years between 1950-51 and 1985-86 by 357.3 per cent and 563.1 per cent in terms of passenger originating and passenger kilometres respectively. Suburban as well as long distance Mail/Express traffic has shown a much faster rate of increase than the overall average.<sup>2</sup>

3) There has been a progressive increase in the average distance travelled by a suburban passenger from 15.9 in 1950-51 to 24.1 in 1985-86 and by a non-suburban passenger from 68.8 kilometres in 1950-51 to 126.0 in 1985-86. Besides, suburban as well as long distance Mail/Express traffic have shown a much faster rate of increase than the overall average.

Passenger earnings constitute about 27 per cent of the gross traffic receipts. Both non-suburban and suburban passenger services are being subsidised. Losses on MG are proportionately higher than on BG. Concession on

monthly season ticket is very high. Total subsidy on passenger services during 1984-85 was estimated at Rs. 800 crores.<sup>3</sup>

Short History of Passenger Fares before Independence

Prior to 1939, on the various railways the rate structure and class structure was varied. Generally there were 7 classes of passengers viz. Air Conditioned, First, Second, Inter (Mail) Inter (Ordinary), Third (Mail), Third (Ordinary). Upto 1939 there was no uniformity in the matter of fares and each railway had its own bases for fixing the fares. The average earning per passenger mile for all over the Indian Railways was 1.63 paise in the year 1938-39.<sup>4</sup>

Before the emergence of the Indian Railways, there were ad hoc increases in fares from time to time considering the budget requirements of the government. In 1948 for the first time fares for Mail/Express trains were standardised for all classes. The basis of charge and the subsequent charges till 1951 are given in Table 4.5.

In 1951, the classes were newly designated and upto 1970 fares were continuously revised, with some adjustments from the budgetary point of view. In between 1970 and 1974, some ad hoc changes were made in passenger rates. These were as follows:

Table 4.5 : Basis of Charges for Mail/Express Trains from 1.4.1948 to 1.4.1951

Class	Pies per mile per passenger from			
	1.4.1948	1.1.1949	1.12.1949	1.4.1951
Air conditioned	36	36	30	30
First	30	24	24	27
Second	16	-	14	16
Inter (mail)	9	9	9	10½
Inter (ordinary)	7½	7½	7½	9
Third (mail)	5	5	5	6
Third (ordinary)	4	4	4	5

Source : Report of RTEC, Vol. I, p. 100.

- 1) The increases in upper classes fares were more than increases in Third Class fares.
- 2) Most of the time, Third Class was exempted from the increase in fares.
- 3) The former Second Class was abolished from

1.4.1974 and former Third Class was designated as Second Class.

4) Concessional fare table for Third Class Ordinary passengers upto 50 miles which was introduced in 1955 was converted in 80 kilometres in metric units and reduced to 50 kilometres in 1962, was continued upto 31.3.1979.

5) Concessional fare table for Third Class Mail/Express passengers upto 50 kilometres which was introduced in July 1962 was abolished from 1.4.1974.

6) From 1974 to 1983, Indian Railways tried to get additional revenue by charging more per passenger or per ticket imposing passenger tax, fixing the minimum fare limit, charging the distance blocks, surcharge for A.C. Chair Car and sleeper etc.

An analysis of the changes in passenger fares prior to 1.4.1983 brings out the following features.

1) Passenger fare structure was not scientific as it was not based on cost studies.

2) Initially, the basis of the fare was a flat charge per mile irrespective of the distance travelled. But in 1955, telescopic principle was introduced. The rationale behind this was to give relief to passengers travelling over long distances, as the cost of haulage reduces with increase in distance. This principle has now become an integral part of the fare system.

3) The speed of transit, comfort etc. are factors governing the levy of passenger fares or surcharge.

4) A disturbing feature was that the increase in fares has not kept pace with the rise in costs. The average revenue earned per kilometre has increased at much slower rate than the prices, generally with the result that real cost of travel has been decreasing year by year in sharp contrast to the increase in other ingredients of cost of living. While the cost of living index with 1960-61 as base year went upto 324 in 1978-79, the index of earning per kilometre increased only upto 236 for second class Mail/Express and 187 for Second Class Ordinary.<sup>5</sup>

The RTEC which went into the question of tariff structure in relation to costs and other considerations pointed out that:

1) The then existing structure had grown haphazardly as it was a result of ad hoc changes made from time to time leaving many anomalies in the system.

2) The increase in fares (particularly for Second Class) was artificially held down (especially in 1970s) against the trend in cost as a measure of deliberate policy to keep down the cost of living of the vulnerable sections of the society.<sup>6</sup>

In order to prove the argument, the committee has

given statistics regarding increase in fares and standard of living as well as wholesale prices.<sup>7</sup> According to the committee "During the period 1950-51 to 1978-79, the average earning of the railway per passenger kilometre increased by 203 per cent while general index of wholesale prices for all commodities registered an increase of 291 per cent and the cost of living index number (working class) increased by 298 per cent during this period."<sup>8</sup>

On studying the gap between the railways operating cost and the then existing fares, the committee emphasised the need for raising Rs. 250 crores of additional revenue to meet all the necessary costs including dividend on capital. It implied that the railways were to increase their passenger revenue by 40 per cent, the burden of which would vary according to circumstances of the various streams of passenger traffic.

The basic scale suggested by the committee and accepted by the government was fixed at class 100, the fare for lowest class i.e. Second class (ordinary) and all other fares are expressed as a percentage of this class.

It is important to note here that the basis for lowest class (Second ordinary), upto 150 kilometres has been calculated in comparison with bus fares. It was presumed that the passenger trains (Second class ordinary)



Table 4.6 : Basic Class 100 Scale with Effect from  
1.4.1983

Distance in (kms)	(per km) scale suggested by committee for class 100	(per km) scale adopted by government for class 100
0	25 paise (fixed charge)	50 paise (fixed charge)
1 to 150	5 paise	5.7 paise
151 to 400	4 paise	5 paise
401 to 750	3.25 paise	4 paise
751 to 1200	2.75 paise	3.5 paise
Over 1201	2.50 paise	3 paise

Source: R.N.Saxena, Rail Transport Pricing in India, p.197.

Table 4.7 : Distance Blocks Adopted

Distance	Block
1 to 50 kms	1 km
51 to 300 kms	5 kms
301 to 1000 kms	10 kms
1001 to 2500 kms	25 kms
Over 2501 kms	50 kms

Source: R.N.Saxena, Rail Transport Pricing in India, p.197.

Table 4.8 : Indices for Various Classes in Relation to Class 100 Base Scale

Class	Indices
Second (ordinary)	100
Second Mail/Express	140
A.C.C.C.	300
First class	550
A.C.	1100

travel for short distance (average journey cover 52 kilometres in 1978-79)<sup>9</sup> and road transport is a convenient alternative mode for such passengers. As the State Road Transport Corporations generally charged 5 paise per kilometre<sup>10</sup> in 1978-79, the basic rate for this distance proposed by the committee was 5 paise per kilometre which was enhanced to 6 paise per kilometre by government since 1.4.1983.

The Rajdhani fares which were ad hoc in nature till 1983 were brought within the purview of the nationalised passenger fare structure. The fares have been fixed 20 per cent more than the fares of A.C. First class and A.C. Chair car.

The above fare structure continues to be in force with some modifications and changes therein.

Suburban and Non-suburban Season  
Ticket Fares

It is generally admitted that the railways are more suited for long distance rather than short distance transport. But in major urban areas where mass movement of people takes place over short distances, the railways are considered to be more efficient. The growth of some of these areas as centres of industries, trade, education and administration has resulted in considerable increase in commute traffic to and from these urban centres to suburbs. There has been increasing demand on this system to provide transport services at convenient timings. The suburban traffic increased significantly over the years and in 1987-88, the same was 423.3 per cent more as compared to 1950-51 in terms of passengers originating and 690.1 per cent increase in terms of passenger kilometres.<sup>11</sup>

Suburban passenger traffic is divided into card ticket holders, i.e. those who purchase tickets at every time they travel, monthly season ticket (MST) holders and quarterly season ticket (QST) holders. For suburban season tickets, the distance limit is fixed according to the length of the suburban section of that particular metropolitan city but non-suburban passengers can travel upto a distance of 150 kilometres on season tickets. It is estimated that about 73 per cent of suburban passengers commute on concessional season tickets.<sup>12</sup>

Though issue of concessional season tickets results in revenue loss, it enables the railways to have a guaranteed traffic flow besides reducing wastage by way of delays in issue of tickets, etc.

Brief History of Suburban and Non-suburban Season Ticket Fares

Prior to 1948, the season ticket fare varied not only between the three cities of Bombay, Calcutta and Madras but also within the cities of Bombay and Calcutta, each railway having its own fare. Even after standardisation of the single journey fares on 1.1.1948, the differences in them continued. In 1949 and 1950, the number of classes were fixed according to the need of local conditions. Similarly the system of tapering was introduced in fixing the revised fares.

In 1950-51, the single journey fares covered by MST for Third class varied from 11 to 27 (minimum 11 and maximum 27 varying according to distance), while in 1974, MST for Second class (former Third class) covered only 6 (minimum) and 13 (maximum) single journey fares. It is obvious that though there was gradual increase in fares, the concessions for season ticket holders increased, the result was that there was increasing loss of revenue.

The practice of issuing season tickets on various railways for non-suburban areas upto 100 kilometres was followed before independence. With effect from 1.1.1948, the basis of season ticket fares for all classes over the non-suburban sections were fixed as equivalent to 24 single journey Mail fares. In 1950 and 1955, when passenger fares were revised, no change in the MST fare was made. Therefore the number of equivalent single journeys got reduced below stipulated number of 24 in the subsequent years.

After 1960, though there were revisions of non-suburban fares, the MST fares for short distances were unaffected. The result was that MST fares covered less and less single journey fares. For example, in 15.9.1984, the second class MST fare covered only 9 to 13 single journey fares whereas the first class MST covered merely 3 to 5.

As a result of low season tickets both for suburban and non-suburban railways, there has been a phenomenal increase in number of passengers travelling on season tickets, while the number of ordinary single journey passengers had gone down comparatively, as shown in Table 4.9.

In 1975-76, about 53 per cent of the total Second class (Ordinary) passengers travelled on season tickets in suburban and non-suburban areas but earnings therefrom

Table 4.9 : Percentage of Passengers Travelling with Season Tickets and with Single Journey Tickets

Year	Suburban		Non-suburban	
	Single journey ticket	Season ticket	Single journey ticket	Season ticket
1972-73	30	70	83	17
1973-74	29	71	82	18
1974-75	27	73	79	21
1975-76	27	73	72	28

Source : Saxena, Rail Transport Pricing in India, p. 223.

came to less than 11 per cent of the total earnings from Second class (Ordinary) passengers, causing a loss of Rs. 21.35 crores on suburban areas.<sup>13</sup>

A new MST fare structure was introduced from 1.4.1979 in partial acceptance of the RTEC recommendations in their interim report with following changes.

- 1) Distance limit was extended to 150 kilometres.
- 2) The distinction between suburban and non-suburban tickets was abolished and both fares were fixed at same level.

3) Quarterly season tickets were continued to be charged 2 1/2 times of MST.

4) First class MST was fixed 4 times of Second class MST.

Keeping in view the recommendations of RTEC (final report), the MST fares were revised with effect from 1.4.1983 which were continued with some minor changes upto 1985-86.

In 1985-86, the season tickets were equivalent to a maximum of 25 single journey fares at a distance of 15 kilometres and minimum of 9 single journey fares at a distance of 150 kilometres. Thus the quantum of concession enjoyed by season ticket holders as compared to card ticket holders is substantial.

#### Costing of Passenger Services

As in the case of freight services, the costing of passenger traffic is also taken up by the traffic costing cell. The methodology which is essentially the same as for freight is briefly described in the following paragraph.

Given that the annual working expenses between goods traffic and coaching traffic are segregated, the share of expenses on coaching services excluding EMU and rail car services are apportioned between the terminal and running costs. The terminal costs are further apportioned

among ticket-booking, ticket checking, reservation, enquiry, parcels, luggage, postal and catering services. The running costs are distributed among the passenger services, parcels, luggage, postal and catering services. In the next stage, these expenses are apportioned between Mail/Express trains and Ordinary passenger trains. The expenses are then distributed amongst various classes of travel.<sup>14</sup> Here again the principle of fully distributed cost is applied to arrive at costs per passenger unit in each zone which is averaged for entire Indian Railways.

#### Pricing of Passenger Services

The fare structure enforced prior to 31.3.1983, had evolved over the past 132 years and had undergone a number of changes. As the passenger fare structure before 1983 adhered to ad hoc changes from time to time, there was apparently no scientific basis for it. For the first time, the RTEC (1980) studied the entire gamut of passenger fares in a detailed way and suggested revised fares both for suburban and non-suburban passenger traffic.

Before 1977, it is observed that the railways have been very cautious in regard to increase in passenger fares and have resorted to such increases only when they were unavoidable.



The RTEC conducted passenger profile surveys in order to get a clear idea of socio-economic profile of the different categories of passengers, their travel habits etc. The committee, while recommending the new fare structure held the view that since transport pricing should be cost based, ideally passenger services should not only meet their full cost including dividend (interest) on capital but also earn something more as a contribution to the revenues required for the development of the railways. Therefore, passenger tariffs should aim at making passenger services self-supporting besides making <sup>them</sup> more rational.<sup>15</sup>

The committee was aware that if prices are so designed as to cover the cost of their service, the increase in ordinary fares would be much more than on other classes so as to cause substantial hardships. In fact, the Second class ordinary passengers are relatively poorer than the Second class Mail/Express passengers. Similarly, an ordinary train provides a much less efficient service. Besides if fare is based on its fully distributed cost it would be lower for Mail/Express trains even though the users of them are much better off. Instead of such a policy, committee held the objective that passenger business as a whole should be self-supporting. Accordingly, the level of fares for different sectors/classes should be fixed in as a equitable manner as possible, taking into account all relevant considerations including cost, standard of comfort

and the ability of passengers travelling in a particular class to bear the fares. The cross subsidisation between different sectors/classes that is implicit in this scheme of things is unavoidable.<sup>16</sup>

The RTEC has also given special attention to the EMU traffic travelling on season tickets which is ever increasing. In 1978-79, over half the journeys on Indian Railways were performed on season tickets. This consisted of 1562 millions in the suburban services and 384 millions in non-suburban services in the rest of the country.<sup>17</sup>

The revenue per kilometre received from Second class suburban and non-suburban passenger was only 24 per cent and 18 per cent respectively when compared to the fare paid by single journey ticket holding passenger. As season tickets were priced at low levels, they caused losses to the railways.

With the help of cost data prepared by Directorate of Costing and RITES (Rail India Technical & Economic Services), the Committee estimated the magnitude of losses. To fill this gap between cost and price of season tickets, the Committee suggested three phases of increase in fares so that by the end of eighties the MST fare will be equivalent to 25 single journey fares for all distances. But in the first phase i.e. on 1.4.1983, revised fares involved heavy increase and therefore it was impossible to implement second stage till 1985-86. So the

season ticket holders continued to enjoy a concession ranging from 50 per cent to 80 per cent at different legs when compared to single journey fares.

Some Considerations Regarding  
Cost-Price Relationship

Second class passengers travelling by slow passenger trains are charged ordinary fares while those by fast and long distance trains are charged express fares, which are 40 per cent more than ordinary fares. But the operational cost of fast trains is less either due to higher speeds or fewer halts. As a result, there is economising on staff as also on rolling stock requirements. For example, on the Pune-Bombay rail route, express trains cover the distance in 4 hours by normally stopping at 6 stations. For the same distance, a passenger train takes 6 hours and about 20 stops. The fares for Mail/Express and passenger trains are Rs. 28/- and Rs. 16/- respectively. The passenger train requires locomotives, coaches, engines' crew and guards for a longer time (nearly 50 per cent more) than the express train. Besides, the energy consumption of the slow train is also greater. On the contrary, extra expenditure incurred in providing amenities to the express passengers, for example, reservation windows, ticket checkers, better coaches will be offset by the operation economies of higher average speed. It is,

therefore, obvious that though the slow passenger trains incur more expenditure, their passengers are charged less and the principle of cost based fares is not followed.

Another example in regard to comparison of railway and bus fares can be cited. Take the case of Pune-Bombay travel, almost for the same distance, the fare for passenger train is Rs. 16/- against ordinary bus fare Rs.20/-. In fact, ordinarily, the resource cost of rail passenger is consistently higher than those of highway transport for a length of journey upto 500 kilometres.<sup>18</sup>

Fortunately, we have cost data for the year 1981-82 for non-suburban passenger services from Railway Reforms Committee Report. It shows that unit cost per passenger kilometre varies widely among zonal railways. Table 4.10 shows unit cost per passenger kilometre (All India average) vis-a-vis revenue per passenger kilometre for the year 1981-82.

It is observed that First class Mail/Express passengers and Second class ordinary train passengers were carried below the cost of providing services in 1981-82 thereby causing losses on non-suburban sections.

In 1985-86, season tickets were equivalent to a maximum of 25 single journey fares at a distance of 15 kilometres and minimum of 9 single journey fares for a distance of 150 kilometres. The extent of concession seems excessive when we consider the case of a commuter

Table 4.10 : Unit Cost and Unit Revenue Per Passenger  
Kilometre

Class of travel	All India average	
	Unit cost	Unit revenue
<u>Mail/Express</u>		
1) ACC	33.6	39.4
2) First	22.6	19.3
3) ACCC	7.0	10.7
4) Second	4.1	5.42
<u>Ordinary</u>		
Second	5.1	3.48

Source : 1) Unit cost from RRC Report, Vol. XXII, p. 11.

2) Unit revenue from Ministry of Railways  
Annual Report 1981-82, p.S-20.

who performs a total of 50 single journeys a month. The concession works out to about 50 per cent at 15 kilometres and maximum of 82 per cent at 150 kilometres. On the Japanese Railways 40 per cent concession is given for all distances.<sup>19</sup> The British and Swedish Railways cover single journey fares ranging between 11 to 32 and 12 to 31 respectively for a distance of 150 kilometres and 130 kilometres respectively.<sup>20</sup> Obviously the high quantum

of concession on season tickets disturb the cost price relationship causing heavy losses to Indian Railways.

From the above analysis it may be concluded that in fixing passenger fares, the cost of service principle does not seem relevant. The passenger fare structure involves cross subsidisation which operates in two ways. Firstly, passengers travelling on season tickets and Second class (ordinary) do not pay full cost of their travel and part of the cost has to be subsidised by travelling in other classes. Second and more important is that as the cost of operation cannot be met by internal subsidisation, the loss incurred by Indian Railways on passenger traffic as a whole is subsidised by revenue earned by goods traffic.

References to Chapter IV

- 1 Ministry of Railways Corporate Plan 1985-2000, pp. 3-1.
- 2 Ministry of Railways, Year Book 1986-87, p. 50.
- 3 Ministry of Railways Corporate Plan 1985-2000, p. 3-VIII.
- 4 B. N. Saxena, Rail Transport Pricing in India, p.176.
- 5 Ministry of Railways, RTEC Main Report, Vol. 1, p.103.
- 6 Ibid., p. 162.
- 7 Ibid., p. 109.
- 8 Ibid., p. 20.
- 9 Ibid., p. 161.
- 10 Ibid., p. 164.
- 11 Ministry of Railways, Year Book 1987-88, p. 55.
- 12 Government of India, National Transport Policy Report, 1980, p. 145.
- 13 RTEC, p. 110.
- 14 Railway Reforms Committee Report 1982, Vol. XXII, p. 6.
- 15 RTEC, p. 162.
- 16 Ibid., p. 162.
- 17 Ibid., p. 175.
- 18 NTPC, p. 37.
- 19 RTEC, p. 73.
- 20 Ibid., p. 177.

## CHAPTER V

### SUMMARY AND CONCLUDING REMARKS

#### Summary

From the preceding chapters, it is obvious that pricing of services on a system like the railways is highly complicated as it is influenced by several theoretical and practical considerations. Theoretically speaking, the most equitable charges seem to be those proportional to costs incurred by the railways in performing a given service. But given the essential non-homogeneous nature of the products and also the dominance of common/joint cost elements, it is impossible to ascertain exactly the cost of any railway service. Though the value of service and cost of service principles are expected to provide guiding limits within which tariffs could be fixed, in practice, the basis is quite arbitrary.

In fact, the costing cell of the railways does not compute cost of railway operations on the basis of economic costing principle but works out unit cost of individual commodities and classes of passengers in accordance with the accounting concept of fully distributed cost. Given this basis, it was observed in



the case of many bulk items that though their cost of haulage is very nearly the same, the tariff structure is not cost-oriented, but depends on the classification of these commodities which is based on other considerations. Moreover, the present system of identifying rate classes as a percentage of the basic class 100 does seem unrealistic as the basic class is allotted not on any common ground of transportation or operational characteristics of the units of transportation but on the ground that it is nearest to the class that covers most of the originating traffic. Further, it also leads us to believe that changes in classification are merely to satisfy the budgetary needs and are not related to the increase in cost of operation as was the case in the reclassification of classes 65, 70, 75 into class 80 and levy of supplementary charge of 10 per cent beyond distance of 500 kilometres in 1985-86.

In the case of passenger traffic also, the fares are not cost-based. The average fare realised per kilometre from second class ordinary passenger is less as compared to that from second class Mail/Express, though the operational cost of the former is comparatively high. Consequently, the losses on passenger train are higher than that of profits by Mail/Express trains.

Monthly season tickets (MST) have remained considerably under priced, with second class MST fares covering only 9 to 25 second class ordinary full fares. Considering the number of working days, the concession goes to the maximum extent of 82 per cent at 150 kilometres which is quite high when compared to the Japanese, British and Swedish Railways.

#### Concluding Remarks

It is widely recognised that railway tariffs have been persistently kept low. The Corporate Plan (1985-2000) for the Indian Railways admits that this has resulted 'in a severe resource shortage for financing an accelerated programme of replacement of over-aged assets and simultaneously building up transport capacity to meet the needs of increasing traffic.' (p.21.1). The plan, while emphasising the necessity to follow a pragmatic pricing policy which includes a policy of rating based on cost of service, also contradicts this idea in pointing out the need to ensure that contribution to total revenue is related to what the service can bear. At present, the cost of service computations are based on the analysis of fully distributed cost. While such a procedure can give us an idea of the cost actually incurred in a period of time, it provides very little knowledge as to the necessary and unnecessary, the

justified or unjustified costs on the system. Therefore, attempts should be made to fix tariffs of individual streams of traffic on the basis of long run marginal cost which also takes into account replacement costs. If it is found necessary to subsidise particular streams of traffic, it should be undertaken through explicit subsidies from the central exchequer. Thus, other rail users would not be burdened by the effects of cross subsidisation and at the same time, the pricing structure would remain undistorted.

At present, bulk commodities account for nearly 94 per cent of the originating tonnage in freight traffic. And many of them have a low classification in regard to tariffs. Consequently, an insignificant portion of the total traffic (high valued items) has necessarily to subsidise bulk commodity flows. Under such circumstances, if the incidence on these items goes on increasing it is likely that even this component would be diverted to the highways as has been happening in the past and the railways would be involved only with movement of bulk traffic. In such a situation, it would be difficult to meet the cost of running the system based as it is on low classification of bulk items. The solution to this problem is to link the base class 100 with operational characteristics associated with movement of different commodities. Further, in order to cope with rising

costs, the basic class should be reviewed and revised periodically. If this is done, the rationale behind 'telescopic principle' to achieve a regular and progressive increase through a percentage system of rates from lowest to the highest class will be retained. As suggested by the RTEC, the base class for passenger and freight traffic i.e. class 100 should be revised on the basis of a suitable formula from time to time taking into account the rising prices of inputs. Consequently the structural adjustments in relative tariffs can be imputed to yield the desired revenue to meet the cost. The formula for escalation should itself be revised when the composition of expenditure would have undergone a major change. Moreover, it may be also useful to evolve a formula which would indicate the relationship if any, between working expenses and transport output.

It has often been suggested that the railways should concentrate on long distance traffic leaving the short-distance component to road transport. Accordingly, such a suitability appears to have been kept in view while deciding tapering in tariffs. While this can normally be expected to consolidate the road transport sector's hold on short distance traffic, this does not occur in a number of regions due to the sheer neglect of the road transport sector. In this context, active

coordination between the railways and the state governments would be necessary in order to identify and provide the necessary roads and road transport services.

Another need of the hour is to improve operational efficiency on the system. 'Wagon turn around time', which is an indicator of efficiency, is rather high and has declined only over the past few years. Attempts should be made to minimise incidence of idle hours of wagons by bringing down the loading, unloading, marshalling and repairing times. Equally important is the usage of empty wagons by proper scheduling of goods trains and coordination of movement at stations and transshipment points. This would enhance the financial viability of the system.

The role of the railways in the overall transport system is expected to be significant in the years to come, though their share in passenger and freight traffic has been declining. Traffic densities have increased manifold and many of the major routes are saturated. There are frequent shortages of rail services. To meet the emerging needs, rehabilitation of the system by way of renewal of tracks, modernisation of signalling facilities, introduction of modern wagons etc. needs to undertake in a massive way. Given the perpetual shortage of funds as is evidenced from the

inadequate allocation for investment purposes, the railways have been attempting to tap unorthodox sources of fund by offering bonds to the general public. However, it is understood that these funds have not been fully utilised. In such a situation, the burden of interest payment can prove to be heavy and act as a drag on railway finances.

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